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HARDWARE INSTALLATION GUIDELINES
Chapter 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

All B.A.S.I.S. hardware products can use an AC power source (except for the BAS-1300).

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>
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<tr>
<td>DC Coupled</td>
<td>Differential DC coupled</td>
<td>Single-ended DC coupled</td>
<td>Differential AC coupled</td>
<td>Single-ended current</td>
</tr>
<tr>
<td>DC Isolation:</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>
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</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 UL NEC Type 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>
<th>Nominal Capacitance pF/meter</th>
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</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>42</td>
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<tr>
<td>88102 NEC CMP CSA</td>
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<td>24.0 ohms/M 78.7 ohms/km</td>
<td>15.5 ohms/M 50.9 ohms/km</td>
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<th>Cond.</th>
<th>Description</th>
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<th>South West number</th>
<th>WCW part number</th>
<th>WP number</th>
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<tr>
<td>RS-485, 2-wire</td>
<td>Non-plenum</td>
<td>24</td>
<td>1P</td>
<td>overall shield</td>
<td>9841</td>
<td>170050</td>
<td>42007</td>
<td>n/a</td>
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<tr>
<td>RS-485, 2-wire</td>
<td>Plenum</td>
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<td>1P</td>
<td>overall shield</td>
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<td>110050</td>
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<td>170105</td>
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<td>Reader drops</td>
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<td>6</td>
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<td>110070P</td>
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<tr>
<td>12 VDC power</td>
<td>Non-plenum</td>
<td>22/24</td>
<td>6</td>
<td>overall shield</td>
<td>5504FE, 9536</td>
<td>161240</td>
<td>C0743</td>
<td>3270</td>
</tr>
<tr>
<td></td>
<td>Plenum</td>
<td>22/24</td>
<td>6</td>
<td>overall shield</td>
<td>6504FE</td>
<td>110253P</td>
<td>444351-04</td>
<td>253270B</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>2</td>
<td>overall shield</td>
<td>5300FE, 8760</td>
<td>163004</td>
<td>414109</td>
<td>293</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plenum</td>
<td>18</td>
<td>2</td>
<td>overall shield</td>
<td>6300FE, 88760</td>
<td>112000P</td>
<td>442320</td>
<td>25293B</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 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 be then grounded as a noise shield.
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 down stream 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><strong>ACCESS HARDWARE</strong></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-1100</td>
<td>12 VAC, 350 mA RMS or 12 VDC, 350 mA</td>
</tr>
<tr>
<td>BAS-1200</td>
<td>12 VAC, 600 mA RMS or 12 VDC, 500 mA</td>
</tr>
<tr>
<td>BAS-1300</td>
<td>12 VDC, 125 mA</td>
</tr>
<tr>
<td>BAS-1320</td>
<td>12 VAC, 600 mA RMS or 12 VDC, 450 mA</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>BAS-2020W</td>
<td>12VDC (10.2 to 13.8VDC), 80 mA</td>
</tr>
<tr>
<td>BAS-4000</td>
<td>12 VAC, 200 mA RMS or 12 VDC, 150 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>
</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**
- **3/4" and 1" Knock Outs**
- **0.375" Clearance Hole**
- **0.1875" Slots nominal**

**Dimensions:**
- **0.8125"**
- **5.1875"**
- **4.8125"**
- **0.125"**

**Insert standoffs here**

**Do not dispose**

**[QTY 2]**
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
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

- **ISC**
  - **T+ T- SG**
  - **= On Board Termination**

- **Earth Ground**, one point only per ISC

- **Shield**
  - PVC Cover Wire
  - PVC Cover Wire for Drain Wire

- **T+ T- SG**
  - **Dual Reader Interface**

- **T+ T- SG**
  - **Biometric Reader Gateway**
  - **T+ T- SG**

- **T+ T- SG**
  - **Dual Reader Interface**

- Downstream ports 2 & 3 typical

- **T+ T- SG**
  - **Biometric Reader**

- **T+ T- SG**
  - **Biometric Reader**

- **T+ T- SG**
  - **Biometric Reader**

- **Enclosure Ground**
  - **Enclosure Ground**
  - **Enclosure Ground**
RS-485 Multi-drop Wiring and EOL Termination: ISC and BAS-500B

- **T+ T- SG**: Interface connections.
- **T+ T- SG**: RS-485 in and out or less than 10 foot drop.
- **T = On Board Termination**: Indicates RS-485 in and out.
- **Earth Ground, one point only per ISC**: Grounding point.
- **PVC Cover Wire**: Protective covering for wires.
- **Shield**: Electrical shielding.
- **Downstream ports 2 & 3 typical**: Typical downstream connections.
- **Enclosure Ground**: Grounding of enclosures.

Diagram illustrates the hardware installation guidelines with the highlighted areas denoting specific connections and terminations.
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.

\[\text{Weather Shield} \text{ – part #BAS-WS10}\]

\[\text{EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOTHED, RADIUS 0.015 TYP.}\]

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

### 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 is 3.072 recommended</td>
</tr>
<tr>
<td>Input Control Module (BAS-1100)</td>
<td>Yes</td>
<td>Firmware version is 1.04 or higher</td>
</tr>
<tr>
<td>Output Control Module (BAS-1200)</td>
<td>Yes</td>
<td>Firmware version is 1.04 or higher</td>
</tr>
<tr>
<td>Single Reader Interface Module</td>
<td>No</td>
<td>Firmware download is not possible. In order to update the firmware, a chip replacement is required.</td>
</tr>
<tr>
<td>(BAS-1300)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Reader Interface Module</td>
<td>Yes</td>
<td>Firmware version is 1.08 or higher, and the board is rev. B</td>
</tr>
<tr>
<td>(BAS-1320)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command Keypad (BAS-CK)</td>
<td>Yes</td>
<td>Firmware version 1.4x</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 1.02</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”, or whatever), 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.
## 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 exceeded 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\accessct.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. |
### System Problem: | Possible Causes:
--- | ---
Entry denied on valid badges | 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.

#### Reader Interface Modules, Readers

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keypad is not responding, or “invalid badge” appears with each numeric entry</td>
<td>“Keypad type” in reader software configuration is incorrect. Refer to reader documentation for output format.</td>
</tr>
<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](image)

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.

**BAS-500 Board**

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

---

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 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>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>
<th>Nominal Capacitance pF/meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9841</td>
<td>NEC CM CSA</td>
<td>1</td>
<td>24.0 ohms/M</td>
<td>3.35 ohms/M</td>
<td></td>
<td>120</td>
<td>12.8</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>78.7 ohms/km</td>
<td>11.0 ohms/K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9842</td>
<td>NEC CM CSA</td>
<td>2</td>
<td>24.0 ohms/M</td>
<td>2.2 ohms/M</td>
<td></td>
<td>120</td>
<td>12.8</td>
<td>42</td>
</tr>
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<td></td>
<td></td>
<td></td>
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<th>Nominal Capacitance (pF/feet)</th>
<th>Nominal Capacitance (pF/meter)</th>
</tr>
</thead>
<tbody>
<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>42</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 – 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>
<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>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: 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 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>TR2+, TR2-</td>
<td>TR3+, TR3-</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.

### 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: 2: 3: 4:</td>
</tr>
<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>
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</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps (default)</td>
<td>ON ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off ON</td>
</tr>
<tr>
<td>9600 bps</td>
<td>ON off</td>
</tr>
<tr>
<td>(not used)</td>
<td>off 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.

![LEDs A, B, C](image)

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 (Panasonic part # BR2325) 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
  - Port 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°C to +70°C (32°F 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

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 the Intelligent System Controller communications overview showing access control system, downstream communications, 32 downstream devices total, RS-485 multi-drop 2 or 4 wire, single reader interface module, dual reader interface module, input/output control module(s), and downstream communications with four 2-wire ports, two 4-wire ports, and combination 2 and 4 wire ports.]
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 or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

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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**

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**RS-485 Line Termination**

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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>pF/feet</td>
</tr>
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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>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>88102</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>
</tr>
<tr>
<td>88102</td>
<td>NEC CMP CSA</td>
<td>2</td>
<td>78.7 ohms/ km</td>
<td>50.9 ohms/km</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, CONFIGURED AS RS-232

PORT 1, CONFIGURED AS RS-485

Terminates 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.

<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>not used</td>
<td>not used</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.

<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</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>TR2+, TR2-</td>
<td>TR3+, TR3-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Port 4: 2-wire   | TR4+, TR4- | GRD |
| Port 5: 2-wire   | TR5+, TR5- | GRD |

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)

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>

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></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>
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 7: ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>6: off 7: ON</td>
</tr>
<tr>
<td>9600 bps</td>
<td>6: ON 7: off</td>
</tr>
<tr>
<td>(not used)</td>
<td>6: off 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

Single Reader Interface Module
Dual Reader Interface Module
Input/Output Control Module(s)

EOL Termination Required

RS-485 Multi-drop
2 or 4 wire

Total

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

32 Downstream Devices Total

Single Reader Interface Module
Dual Reader Interface Module
Input/Output Control Module(s)

EOL Termination Required

RS-485 Multi-drop
2 or 4 wire
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 (Panasonic part #BR2325) 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

Note: These specifications are subject to change without notice.
BAS-2000
INTELLIGENT
SYSTEM
CONTROLLER
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.
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.

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 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</th>
<th>UL NEC Type/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</th>
</tr>
</thead>
<tbody>
<tr>
<td>9841</td>
<td>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 42</td>
</tr>
<tr>
<td>9842</td>
<td>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 42</td>
</tr>
<tr>
<td>88102</td>
<td>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 42</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 PORTS (1 & 6) CONFIGURED AS RS-485
**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>Jumper</th>
<th>Setting</th>
<th>Jumper</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>J5</td>
<td>ON 485 pins 1 &amp; 2</td>
<td>J5</td>
<td>ON 485 pins 1 &amp; 2</td>
</tr>
<tr>
<td>J9, J11</td>
<td>Termination ON</td>
<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.
Downstream Device Communication Wiring (Ports 2-5)

**2-WIRE**

<table>
<thead>
<tr>
<th>Port 2</th>
<th>Port 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR2+</td>
<td>TR2+</td>
</tr>
<tr>
<td>TR2-</td>
<td>TR2-</td>
</tr>
<tr>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>TR3+</td>
<td>TR3+</td>
</tr>
<tr>
<td>TR3-</td>
<td>TR3-</td>
</tr>
<tr>
<td>GND</td>
<td>GND</td>
</tr>
</tbody>
</table>

**4-WIRE**

Port 2/3:

<table>
<thead>
<tr>
<th>Transmit</th>
<th>Receive</th>
<th>GRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR2+</td>
<td>TR3+</td>
<td></td>
</tr>
<tr>
<td>TR2-</td>
<td>TR3-</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

Port 4/5:

<table>
<thead>
<tr>
<th>Transmit</th>
<th>Receive</th>
<th>GRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR4+</td>
<td>TR5+</td>
<td></td>
</tr>
<tr>
<td>TR4-</td>
<td>TR5-</td>
<td></td>
</tr>
</tbody>
</table>

RS-485 Communication Wiring

- RS-485 CABLE, 100 Ohm IMPEDANCE
- BELDEN 9842 OR EQUIVALENT
- TO PREVIOUS UNIT OR TERMINATOR
- TO NEXT UNIT OR TERMINATOR
- KEEP DOWN LEAD SHORT (10 FEET MAX)

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:
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></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></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 (Panasonic part # BR2325) 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.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:</td>
<td>7:</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>

In order to communicate with an ISC at 115,200 bps, an extra wire is required in the RS-232 cable. The CTS wire should be connected to the 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.
Note: DIP switches 6 and 7 control the communication baud rate for port 1 only. Port 6 is fixed at 38400 bps.

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.

- **J5**
  - Control for Port 1, RS-232/Lantronix MSS-LITE or RS-485
  - Control for Port 1, 2-wire or 4-wire

- **J13, J15, J16, J19**
  - Control for Port 6, RS-232 or RS-485

- **J18, J20**
  - OFF: Port 6 RS-485 EOL termination is not on
  - ON: Port 6 RS-485 EOL termination is on

- **J14**
  - Control for Port 6, RS-232 or RS-485

- **J17**
  - Control for Port 6, 2-wire or 4-wire

- **J4, J6, J7, J10**
  - Control for Port 1, RS-232/Lantronix MSS-LITE or RS-485

- **J9, J11**
  - OFF: Port 1 RS-485 EOL termination is not on
  - ON: Port 1 RS-485 EOL termination is on

- **J21, J22, J23, J24**
  - for Ports 2, 3, 4, 5 respectively
  - OFF: RS-485 EOL termination is not on
  - ON: RS-485 EOL termination is on

- **J18, J20**
  - OFF: Port 6 RS-485 EOL termination is not on
  - ON: Port 6 RS-485 EOL termination is on

- **J26**
  - OFF: Port 1 is Lantronix CoBox-Micro
  - ON: Port 1 is RS-232/RS-485/Lantronix MSS-LITE

* Jumper J26 and mounting pin block J27 are available on boards with serial numbers of 1600 or greater.
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.

<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

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

Dual Reader Interface Module

Input/Output Control Module(s)

EOL Termination Required

32 Downstream Devices Total

Intelligent System Controller

EOL Termination Required

Single Reader Interface Module

Dual Reader Interface Module

Input/Output Control Module(s)

EOL Termination Required

RS-485 Multi-drop 2 or 4 wire

Downstream Communications
- Four 2-wire ports
- Two 4-wire ports
- Combination 2 and 4 wire ports
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 (Panasonic part #BR2325) 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.
20 Specifications

**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, type BR2325, BR2330, 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

---

**Note:** These specifications are subject to change without notice.
SETTING UP ISC COMMUNICATIONS
21 ISC Communications

The following information can be used to configure communication for the BAS-500, 1000, or 2000 unless otherwise stated.

21.1 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).

A BAS-2000 primary path 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.

21.1.1 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.

EZWebCon configuration wizard

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

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

(A NULL MODEM CABLE IS REQUIRED)

**Step 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).

**Note:** 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.

- 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.

**Step 2: Establishing Network Communications**

1. Determine the IP Address for the device.
2. At the prompt, type:
   ```
   set privileged and press <Enter>.
   ```
3. Type in the password:
   ```
   system and press <Enter>.
   ```
4. At the command prompt, type:
   ```
   change ipaddress <your IP address> and press <Enter>.
   ```
5. At the prompt, type:
   ```
   logout and press <Enter>.
   ```
6. Exit from Terminal and cycle power to the device.
Step 3: Configuring the ETHLAN

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

1. 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. 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. Type `change speed [baud rate]`. For example, if the ISC is set to 38400, the command would be `change speed 38400`.
9. Type `change flow control ctsrts` and press <Enter>.
10. Type `change dedicated tcp port=3001` and press <Enter>.
11. (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.
   a. The commands are:
      - `change subnet mask [your subnet mask]`
12. Type in the following to disable BOOT and RARP, depressing the <Enter> key after each line.
   LOCAL>>CHANGE BOOTP DISABLE
   LOCAL>>CHANGE RARP DISABLE

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

14. Disconnect from the device and exit.

15. 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.

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

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

21.3 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:
   \[\text{arp} -s <IP Address> <Ethernet/Hardware Address>\]
   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 21.2, Step 2: Establishing Network Communications. It is critical to perform line item 4 (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.

21.3.1 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](image-url)

**Standoffs for ETHLAN LITE to ISC**

- **INSERT STANDOFFS HERE**
- **DO NOT DISPOSE [Qty 3]**
21.4 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.

21.4.1 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 (this stands for RS-232 communication)
- **c.** Flow Control = 02 (this stands for CTS/RTS)
- **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.

MAC address 00204883503E
Software version V6.1.0.2 [060404] M100

Press Enter for Setup Mode

*** basic parameters
Hardware: Ethernet TPI
IP addr 10.112.6.28, no gateway set

*** Security
SNMP is enabled
SNMP Community Name: public
Telnet Setup is enabled
TFTP Download is enabled
Port 7777 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 Q3001
Connect Mode: CO
Send '+++' in Modem Mode enabled
Auto increment source port disabled
Remote IP Addr: --- none ---, Port 00000
Disconn 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
Disconn 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

Verify that all settings are configured properly and exit the Telnet session.
21.4.2 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.

21.4.3 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.

21.4.4 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.

## 21.4.5 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.

## 21.5 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>Prefix Length</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>
</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 (this sets the device to RS-232C 8N1)</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>

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 (this sets the device to RS-232C 8N1)</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></td>
</tr>
<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>
</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

not used

Intelligent System Controller
21.6  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.

21.6.1  DSTni-Xpress DR RS-232 Configuration for the ISC

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

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.

### Server configuration

Channel 1 configuration

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</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>Remote IP Addr</td>
<td>--- none ---</td>
</tr>
<tr>
<td>Port No</td>
<td>3001</td>
</tr>
<tr>
<td>Connect Mode</td>
<td>C0</td>
</tr>
<tr>
<td>Disconn Mode</td>
<td>00</td>
</tr>
<tr>
<td>Flush Mode</td>
<td>00</td>
</tr>
<tr>
<td>TCP Keepalive</td>
<td>45s</td>
</tr>
<tr>
<td>ARP cache timeout</td>
<td>600s</td>
</tr>
<tr>
<td>Save and exit</td>
<td>Your choice? 0</td>
</tr>
<tr>
<td>IP Address</td>
<td>(206) . (152) . (245) . (159)</td>
</tr>
<tr>
<td>Set Gateway IP Address</td>
<td>Y</td>
</tr>
<tr>
<td>Gateway IP addr</td>
<td>(206) . (152) . (245) . (254)</td>
</tr>
<tr>
<td>Netmask</td>
<td>Number of Bits for Host Part = default</td>
</tr>
<tr>
<td>Change telnet config password</td>
<td>N</td>
</tr>
</tbody>
</table>

### Channel 1 configuration

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</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>(3001)</td>
</tr>
<tr>
<td>Connect Mode</td>
<td>(C0)</td>
</tr>
<tr>
<td>Remote IP Addr</td>
<td>(000) . (000) . (000) . (000)</td>
</tr>
<tr>
<td>Remote Port</td>
<td>(0)</td>
</tr>
<tr>
<td>Disconn Mode</td>
<td>(00)</td>
</tr>
<tr>
<td>Flush Mode</td>
<td>(00)</td>
</tr>
<tr>
<td>Disconn 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>

### 21.7 Lantronix SecureBox SDS1100

Connect the SDS1100 with an ISC. As of September 2005, the firmware version is 5.6, with an AES library version 1.8.2.1.
## Setting Up ISC Communications

**SDS110 to ISC, 2-wire RS-485**

### Ports 1 & 6 Wiring Configuration

<table>
<thead>
<tr>
<th></th>
<th>25-Pin Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISC</td>
<td>Pin 14 and 21</td>
</tr>
<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.)

---

### Intelligent System Controller

![Intelligent System Controller Diagram](image-url)
**SDS110 to ISC, 4-wire RS-485**

### Ports 1 & 6 Wiring Configuration

<table>
<thead>
<tr>
<th>Component</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISC</td>
<td>25-Pin Connector</td>
</tr>
<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)
21.7.1 Configuration of the SDS1100

From the command prompt, type the following to enter the configuration menu:

```
TELNET <IP Address> 9999
```

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

---

**SDS1100 settings**

---

**Lantronix Secure Device Server**
MAC address 00:20:40:80:74:77
Software version 05.6 <040402> SDS:1100
AES library version 1.8.2.1

Press Enter to go into Setup Mode

---

**Basic parameters**

- **Hardware**: Ethernet TPI
- **IP addr**: 192.168.34.42, **gateway**: 192.168.034.254, **netmask**: 255.255.255.000

---

**Security**

- **SNMP is**: disabled
- **Telnet Setup is**: enabled
- **TFTP Download is**: disabled
- **Port 777F0h is**: disabled
- **Web Server is**: disabled
- **ECHO is**: disabled
- **Encryption is**: enabled
- **Enhanced Password is**: disabled

---

**Server configuration**

```
IP Address : (192) . (168) . (194) . (042)
Set Gateway IP Address <N> N
Gateway IP addr (192) . (168) . (034) . (254)
Netmask: Number of Bits for Host Port 0=default 9
Change telnet config password <N> N
```

```
Baudrate <9600> ?
I/F Mode <4C> ?
Flow <00> ?
Port No <3001> ?
ConnectMode <00> ?
Remote IP Address : <000> . <000> . <000> . <000>
Remote Port <0> ?
DisConnMode <00> ?
FlushMode <00> ?
DisConnTime <00:00> ?:
SendChar 1 <00> ?
SendChar 2 <00> ?
```
Channel 1 configuration

For the security configuration, type N for no when asked to enable encryption. Due to software limitations, the AES encryption must be disabled.

### 21.7.2 Supported Controller Types

The following controller types support communication over an encrypted connection via the SDS1100.

#### Configuration Information

<table>
<thead>
<tr>
<th>Controller Type</th>
<th>Baud Rate</th>
<th>I/F Mode</th>
<th>Flow Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Fire) ESPA</td>
<td>4800</td>
<td>F8</td>
<td>00</td>
</tr>
<tr>
<td>(Fire) Notifier AM2020</td>
<td>2400</td>
<td>78</td>
<td>00</td>
</tr>
<tr>
<td>(Fire) Notifier NFS-640</td>
<td>2400, 9600</td>
<td>78</td>
<td>00</td>
</tr>
<tr>
<td>(Fire) Pyrotronics</td>
<td>1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200</td>
<td>78</td>
<td>00</td>
</tr>
<tr>
<td>(Personal safety) Visonic SpiderAlert</td>
<td>9600</td>
<td>78</td>
<td>00</td>
</tr>
<tr>
<td>(Receiver) Bosch 6500</td>
<td>1200, 2400, 4800, 9600, 19200, 38400</td>
<td>4C</td>
<td>02</td>
</tr>
<tr>
<td>(Receiver) Bosch SIA</td>
<td>1200, 2400, 4800, 9600, 19200, 38400</td>
<td>4C</td>
<td>00</td>
</tr>
<tr>
<td>(Intrusion) Bosch D7412G / D9412G</td>
<td>9600</td>
<td>4C</td>
<td>00</td>
</tr>
<tr>
<td>(Intrusion) Bosch DS7400Xi / DS7400XIV4</td>
<td>2400, 9600</td>
<td>5C</td>
<td>02</td>
</tr>
</tbody>
</table>
## Configuration Information

<table>
<thead>
<tr>
<th>Controller Type</th>
<th>Baud Rate</th>
<th>I/F Mode</th>
<th>Flow Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intrusion) Galaxy 8, 18, 60, 128, 500, 504 and 512</td>
<td>1200, 2400, 4800, 9600, 19200, <strong>38400</strong></td>
<td>4C</td>
<td>00</td>
</tr>
<tr>
<td>Note:</td>
<td>Note: This will not be supported if the Galaxy panel is configured to use the separate standalone Galaxy Ethernet module.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Point of sale) TVC-2100 series</td>
<td><strong>9600</strong></td>
<td>4C</td>
<td>02</td>
</tr>
<tr>
<td>(Access control) Apollo</td>
<td>1200, 2400, 4800, <strong>9600</strong></td>
<td>4C</td>
<td>00</td>
</tr>
</tbody>
</table>

### 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>
21.8     Lantronix UDS-10

Step 1: Establish a serial connection with ETHLAN

With the power OFF on the UDS-10, establish a serial communication from the UDS-10 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 in on the UDS-10. 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-10.
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 UDS-10 manual when you come to the part about 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-10.
6. You can close your current HyperTerminal session.

Step 3: Configure the UDS-10 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 (this stands for RS-232 communication)
   c. Flow Control = 02 (this stands for CTS/RTS)
   d. Port Number = 3001
   e. Connection Mode = C0
   f. Remote IP Address = (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-10 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.

---

21.8.1 Wiring Configuration for Custom DB25 Serial Cable

The cable for the UDS-10 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-10 custom cable must have a male connector because the fixed serial port on the device has a female adapter.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD</td>
<td>Pin 2</td>
</tr>
<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 UDS-10 installation manual for more information on the custom cable and pin out information.
21.8.2 Connecting the UDS-10 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></th>
<th>25-pin connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISC</td>
<td></td>
</tr>
<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 an UDS -10 to an ISC 4-Wire (232)

ISC:
Communications Interface Type = RS-232
RS-232 Type = 4-Wire RS-232
(Refer to ISC documentation for more information)
Setting Up ISC Communications

**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.

```
Baudrate <38400> ?
L/F Mode <4C> ?
Flow <02> ?
Port No <03001> ?
ConnectMode <00> ?
Remote IP Address : <000> . <000> . <000> . <000>
Remote Port <00000> ?
DisConnMode <00> ?
FlushMode <00> ?
DisConnTime <00:00> ?:
SendChar 1 <00> ?
SendChar 2 <00> ?
```

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

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

<table>
<thead>
<tr>
<th>ISC</th>
<th>25-pin connector</th>
</tr>
</thead>
<tbody>
<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 an UDS -10 to an 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.

```plaintext
Bandrate 38400?  
LP Mode 4P?  
Flow 02?  
Port No 03001?  
ConnectMode C0?  
Remote IP Address 0000.0000.0000.0000?  
Remote Port 000000?  
DisConnMode 00?  
FlushMode 00?  
DisConnTime 00:00 ?  
SendChar 1 00?  
SendChar 2 00?  
```
21.9  BAS-IC108A/IC109A RS-232 to RS-485 Converter (4-wire)

**Black Box Settings:**

**Jumpers:**
- W5 - should be on B-C to set RTS/CTS/CD
- W8 - 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)
21.10 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)
21.11 BAS-IC108A RS-232 to RS-485 Converter (2-Wire RS-485) to S711D FiberOption Converter to an ISC

21.11.1 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.)
21.12 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

Modem Configuration: 8 Data, 1 Stop, No Parity

Intelligent System Controller

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

US Robotics Sportster 56Kbps Modem
25 Pin Male Connector

Intelligent System Controller

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

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

Modem-controller cable, part #HOC-56KEXT

Black Box Part # BC00301 (DB9F/DB25M)
25 Pin Male Connector
2 3 4 5 6 7 8 20

Black Box Part # BC00401 (DB25M/DB25F)
25 Pin Female Connector
2 3 4 5 6 7 8 20

Host PC with Access Control Driver
9 or 25 Pin Connector Communication Ports

Hardware Installation Guide
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.

### DIP SWITCH SETTINGS

<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>

21.12.1  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 diagram]

**DIP switch settings**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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+PQC=3<Enter>
   ATY0X4T&A3&B1&H1&R2&W0<Enter>
   ```

3. Exit the terminal program.

### 21.13 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.
RJ-11 Connector
Used to connect the modem to a normal dial circuit or a dedicated 2-wire leased circuit

Power Connector
Provides DC voltages to the modem (rack mount versions)
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.

### 21.14 Configuring Two BAS-838A RS-232 to RS-485 Converters

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

#### 21.14.1 Black Box Settings for 2-wire RS-485 Configuration

**Jumper**

- **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

21.14.2 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).
Setting Up ISC Communications

2-wire RS-485

Black Box LD485A

Black Box LD485A

ISC panels can be multidropped on the RS-485 line using this configuration. Follow typical EOL termination.

9 or 25 Pin Connector

Workstation (PC)

5 or 25 Pin Connector

Male

Female

Intelligent System Controller

Black Box LD485A

Black Box LD485A

25-Pin Serial Connector
21.14.3 Black Box Settings for 4-wire RS-485

Jumper

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

21.14.4 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).
21.15 Fiber Options

21.15.1 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.

21.15.2 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.
21.16 **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 four selectable output ports (RS-232, RS-422, or RS-485). It is certified for a maximum of 16 ISCs on each RocketPort hub.
21.16.1 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.

21.16.2 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>na</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>
DIP Switch Settings

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>BAS-500</th>
<th>BAS-1000</th>
<th>BAS-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>off</td>
<td>ON</td>
<td>off</td>
</tr>
<tr>
<td>2</td>
<td>ON</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>3</td>
<td>off</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>4</td>
<td>off</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>5</td>
<td>off</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>6</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>off</td>
<td>off</td>
<td>off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud</td>
<td>38400</td>
<td>38400</td>
<td>38400</td>
</tr>
</tbody>
</table>

21.16.3 RocketPort Driver

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

21.16.4 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 MAXC 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>485</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
22 Overview

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.

22.1 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
- 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
22.2 The Input Control Module

The 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.

22.2.1 Status LEDs

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.
23 Installation

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

23.1 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.

23.1.1 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.

23.1.2 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>
<tr>
<td>Fault – Foreign Voltage</td>
<td>50 – 750</td>
<td>50 – 750</td>
</tr>
<tr>
<td></td>
<td>1250 – 1500</td>
<td>1250 – 1500</td>
</tr>
<tr>
<td></td>
<td>2500 – 15K</td>
<td>2500 – 15K</td>
</tr>
</tbody>
</table>

Software Configurable Alarm Input Wiring (Inputs 1-16)

**23.1.3 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 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.
23.1.4 Power

The power source should be located as close to the Input Control Module as possible.

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

---

Note: Be sure to observe polarity.

---

23.1.5 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.

23.2 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.
24  Configuration

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

24.1  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>

24.1.1  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>
### 24.1.2 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></td>
<td>6:</td>
</tr>
<tr>
<td>38400 bps</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.

## 24.2 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 an on-board terminator. The installer should determine which device is at the end of the communication line.
25 Specifications

**The BAS-1100 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% RHNC
- **Approvals:**
  - UL 294 & UL 1076 Listed
  - CE Marked
  - RoHS Compliant
BAS-1200 OUTPUT CONTROL MODULE
26  Overview

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.

26.1  Interfaces

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

![Intelligent System Controller Communications Overview](image)
26.2 The Output Control Module

The Output Control Module 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.
26.2.1 Status LEDs

The OCM has a total of 20 LEDs.

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).
27 Installation

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

27.1 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.

27.1.1 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)](image)

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

27.1.2 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 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.
Upstream Controller Communication Wiring: 2-wire (Port 1)

RS-485 2-WIRE COMMUNICATIONS

27.1.3 Power

For its power input, the 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.

27.1.4 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)**

**27.2 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

Intelligent System Controller

Access Control System

Output Control Module

Input Control Module

Single Reader Interface

Single Reader Interface Module

Maximum: 4000 feet, 5 conductors

Up to 128 Outputs - eight Output Control Modules

Up to 128 Inputs - eight Input Control Modules

Elevator Control Room

Elevator Reader (inside cab)
28 Configuration

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

28.1 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>

28.1.1 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>
### 28.1.2 Communication Baud Rate

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

<table>
<thead>
<tr>
<th>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 off 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>

#### BAUD RATE: DIP SWITCH

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

28.2 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 on-board terminators. The installer should determine which devices are at the end of the communication line.
29 Specifications

** The Output Control Module 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 Marked
  - RoHS Compliant
BAS-1300 SINGLE READER INTERFACE MODULE
30 Overview

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.

30.1 Interfaces

The Single Reader Interface Module interfaces upstream with the Intelligent System Controller, and downstream with a card reader.

30.2 The Single Reader Interface Module Board

The 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.

### 30.2.1 Status LEDs

The 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
31 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).

31.1 Wiring

31.1.1 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).

### 31.1.2 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 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 (two-wire or four-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.

---

**EOL Termination**

- **Intelligent System Controller**
- **Single Reader Interface Module**
- **Dual Reader Interface Module**
- **Input/Output Control Module(s)**

**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

---

**Note:** If the Single Reader Interface Module is at the end of the RS-485 line, the J4 termination jumper must be set.
31.1.3 Power

The Single Reader Interface Module requires a filtered 12VDC ± 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).

31.1.4 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.
31.1.5  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.

Reader/Single Interface Module Downstream Wiring

![](image)

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.
Overview of Elevator Control

Intelligent System Controller

- Output Control Module
- Input Control Module

Single Reader Interface Module

Elevator Reader (inside cab)

Access Control System

Elevator Control Room

Maximum: 4000 feet
5 conductors

Single Reader Interface
Up to 128 Outputs - eight Output Control Modules
Up to 128 Inputs - eight Input Control Modules

Access Control System
32  

Configuration

The Single Reader Interface Module board contains 9 jumpers that must be configured for your system.

32.1  

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 - 15)</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.
## 32.1.1 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></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>
<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>
32.1.2 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>
<th>6:</th>
<th>7:</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>9600 bps</td>
<td>ON</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>2400 bps</td>
<td>off</td>
<td>off</td>
<td></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.

32.1.3 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.

32.1.4 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
33 Specifications

**The SRI 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 Marked
  - RoHS Compliant
BAS-1320 DUAL READER INTERFACE MODULE
34 BAS-1320 Dual Reader Interface Module

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.

34.1 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

RS-485
Multi-drop
2 or 4 wire

Access Control System

Intelligent System Controller

32 Downstream Devices Total

Input/Output Control Module(s)

Up to 16 Output Control Modules
Up to 16 Alarm Input Control Modules

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)
34.2 The Dual Reader Interface Module

The 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.
34.2.1 Status LEDs

The 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: 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.

There are also six (6) LEDs (K1 through K6) which correspond to the six alarm output relays.
35 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.

35.1 Wiring

35.1.1 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 1 Door Contact</th>
<th>In 1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door 1 REX</td>
<td>In 2</td>
<td>0</td>
</tr>
<tr>
<td>Door 1 Aux 1</td>
<td>In 3</td>
<td>0</td>
</tr>
<tr>
<td>Door 1 Aux 2</td>
<td>In 4</td>
<td>0</td>
</tr>
<tr>
<td>Door 2 Door Contact</td>
<td>In 5</td>
<td>0</td>
</tr>
<tr>
<td>Door 2 REX</td>
<td>In 6</td>
<td>0</td>
</tr>
<tr>
<td>Door 2 Aux 1</td>
<td>In 7</td>
<td>0</td>
</tr>
<tr>
<td>Door 2 Aux 2</td>
<td>In 8</td>
<td>0</td>
</tr>
<tr>
<td>Cabinet Tamper</td>
<td>TMP</td>
<td>0</td>
</tr>
<tr>
<td>Power Failure</td>
<td>GND</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PFL</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>GND</td>
<td>0</td>
</tr>
</tbody>
</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.
35.1.2 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 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.
35.1.3 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).

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.
35.1.4 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

```
+  12 to 24 VDC  VIN
-  GND
```

35.1.5 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 STRIKE

AC STRIKE

CLAMP VOLTAGE > 1.5 X VAC RMS
FOR 24 VAC STRIKE, PANASONIC ERZ-C07DK470 TYPICAL
DRI Alarm Output Contact Wiring

### Relay Outputs

#### DRI Alarm Output Contact Wiring

<table>
<thead>
<tr>
<th>0</th>
<th>RLY 1</th>
<th>Door 1 Strike Relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>RLY 2</th>
<th>Door 1 Aux 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>RLY 3</th>
<th>Door 1 Aux 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>RLY 4</th>
<th>Door 2 Strike Relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>RLY 5</th>
<th>Door 2 Aux 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>RLY 6</th>
<th>Door 2 Aux 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 35.1.6 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.
Typical Reader Wiring

- VO ➔ RED (1)
- LED ➔ BRN (4)
- BZR ➔ ORG (5)
- D1/CLK ➔ WHT (3)
- D0/DAT ➔ GRN (2)
- GND ➔ BLK (6)

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.

### 35.2 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

DRI Alarm Input Contact Wiring

<table>
<thead>
<tr>
<th>Reader Aux 1</th>
<th>In 1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reader Aux 2</td>
<td>In 2</td>
<td>0</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>In 3</td>
<td>0</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>In 4</td>
<td>0</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>In 5</td>
<td>0</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>In 6</td>
<td>0</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>In 7</td>
<td>0</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>In 8</td>
<td>0</td>
</tr>
<tr>
<td>Cabinet Tamper Power Failure</td>
<td>In 9</td>
<td>0</td>
</tr>
<tr>
<td>GND</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>In 10</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

DRI Alarm Output Contact Wiring

| Floor Output 1 | NC | C | RLY 1 |
| Floor Output 2 | NC | C | RLY 2 |
| Floor Output 3 | NC | C | RLY 3 |
| Floor Output 4 | NC | C | RLY 4 |
| Floor Output 5 | NC | C | RLY 5 |
| Floor Output 6 | NC | C | RLY 6 |
```
36 Configuration

The Dual Reader Interface 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>
<tr>
<td>ADDRESS</td>
<td>DIP SWITCH</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td>1: 2: 3: 4: 5:</td>
</tr>
<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 off 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>
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></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>

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.

[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
37 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
38  Overview

The Multiplexer is an interface device that facilitates communication between the Intelligent System Controller and up to four (4) downstream RS-232 devices (i.e. line extenders, converter to fiber, modems, etc.). On a 2-wire multi-drop mode, line turn around tri-state timing is set with hardware timers to accommodate 2400 to 38400 bps asynchronous communication. The multiplexer requires either a 12 VDC or 12 VAC for power. It allows conversion of communication protocol, and provides connection with alternate communication devices to extend effective distance.

38.1  Interfaces

The Multiplexer interfaces upstream with the Intelligent System Controller, and downstream with up to four (4) leased-line modems and/or fiber-optic converters. The Multiplexer can be multi-dropped with other downstream devices on the same line. A maximum of eight (8) multiplexers can be connected to each Intelligent System Controller.
38.2 The Multiplexer Board

The Multiplexer board contains the following components: one (1) power input, one (1) RS-485 interface, four (4) RS-232 interfaces and nine (9) jumpers.

![Multiplexer Board Diagram]
39 Installation

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

39.1 Wiring

1. Wire the upstream host communication.
2. Wire the power input.
3. Wire the downstream device communication.

39.1.1 Upstream Controller Communication

The Multiplexer uses Port 1 to communicate to the Intelligent System Controller (Ports 2, 3, 4, and 5 are for downstream communications).
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 for 4-wire or Belden 9841 for 2-wire, or 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.

Note: If the Multiplexer is configured at the end of the RS-485 line, an RS-485 terminator is required.
39.1.2 Power

The Multiplexer 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 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>AC power sources</td>
<td>AC Line (L), AC Neutral (N), Safety Ground (G)</td>
<td>200 mA RMS</td>
</tr>
<tr>
<td>DC power sources</td>
<td>Isolated, non-switching, linear regulated DC power</td>
<td>150 mA</td>
</tr>
</tbody>
</table>

Notes: If using a 12 VDC power source, be sure to observe polarity.
Up to four (4) Multiplexers can be installed inside a single box, or
One (1) Intelligent System Controller with two (2) Multiplexers can be installed in a single BAS-CTX enclosure.

39.1.3 Downstream Device Communication

The Multiplexer can be configured to communicate downstream with up to four (4) RS-232 modems, line extenders, or fiber-optic converter per multiplexer, using Port 2, Port 3, Port 4, and Port 5.

Ports 2, 3, 4, and 5 are RS-232 interfaces that require the following type of RS-232 cables: 24 AWG (minimum).

The RS-232 communication cables for Ports 2, 3, 4, and 5 should be no longer than 50 feet each.
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 a 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).
40 Configuration

The Multiplexer board contains 9 jumpers that must be configured appropriately for your system.

40.1 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.
41 Specifications

** The Multiplexer is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - AC input: 12 VAC ± 15%. 200 mA RMS
  - DC input: 12 VDC ± 15%. 150 mA
- Communication Ports:
  - Port 1: RS-485 (2-wire or 4-wire), 2400 to 38400 bps async
  - Ports 2-5: RS-232
- 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: 3 x 6 x 1 in. (76 x 152 x 25 mm)
  - Weight: 4 oz. (114 g) nominal

---

Note: These specifications are subject to change without notice.
BAS-8000 STAR
MULTIPLEXER
42 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.

42.1 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.
42.2 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.

### 42.2.1 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>
43 Installation

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

43.1 Wiring

1. Wire the upstream host communication.
2. Wire the downstream device communication.
3. Wire the power input.

43.1.1 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 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.
43.1.2 Downstream Device Communication

The Star Multiplexer topology is capable of eight different downstream directions in RS-485 (2-wire) communications (using Belden 9841 or equivalent) or four different downstream directions with RS-485 (4-wire) communications (using Belden 9842 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.

**Downstream Device Communication Wiring**

![Downstream Device Communication Wiring Diagram]

43.1.3 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.
43.2 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)*
Wiring and Termination (from the ISC to the BAS-8000)

1. Intelligent System Controller
2. Dual Reader Interface Module
3. Input Control Module
4. Star Multiplexer
5. Star Multiplexer

T indicates termination
Note: Examples common across all ports

1000 feet max.
44 Configuration

44.1 Setting DIP Switches

The Star Multiplexers DIP switches are used to control the communication speed setting.

*DIP Switches (shown in default positions: 38400 bps)*

```
1 2 3 4
ON ON OFF OFF 1234
```

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.
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.

- **[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
45 Specifications

** 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

---

**Note:** These specifications are subject to change without notice.
BAS-2005W
MAGNETIC CARD
ACCESS READER
46 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.
47  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.

47.1  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.

47.2  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 be 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.

47.3  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 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.
48 Configuration

48.1 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></td>
</tr>
<tr>
<td>OFF</td>
<td>DATA INTERFACE clock/data (magnetic stripe) output</td>
</tr>
<tr>
<td>ON</td>
<td>data 1/data 0 (Wiegand) output</td>
</tr>
</tbody>
</table>

48.2 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.
48.3 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 by connecting the mounting bracket to earth ground locally (e.g. grounded conduit).

48.4 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.

48.5 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>

48.6 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 based 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.

48.7 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 Model: 2005W</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN: 00100 DATE: 9502</td>
</tr>
<tr>
<td>RATED: 12 Vdc 80mA</td>
</tr>
<tr>
<td>FOR INSTRUCTION, SEE: 10107-0000</td>
</tr>
<tr>
<td>REV: 06/94 MADE IN USA</td>
</tr>
</tbody>
</table>

OUTDOOR USE
ACCESS CONTROL UNIT ACCESSORY

LISTED
6T32 BP6565

PROGRAM ID
SERIAL No.
COPYRIGHT
## 49 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>12 Volt Model: 12 VDC (10.2 to 13.8 VDC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current</td>
<td>80 mA (25 mA typical.)</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>- data 1/0 -</td>
<td>3 mS period</td>
</tr>
<tr>
<td></td>
<td>400 uS setup/hold time typical</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 μS pulse width typical</td>
<td></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 (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></td>
</tr>
<tr>
<td></td>
<td>To order the high-wear read head, add “-OH” to the part number when you place your reader order.</td>
<td></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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100% (-OW option)</td>
</tr>
</tbody>
</table>
49.1 Reader Mounting Dimensions

Optional Wall Plate, WP-10

Fitting Rigid Conduit to Junction Box
WALL OPENING
FOR J-BOX

½" RIGID
CONDUIT

WALL STUD

1-GANG
BOX

2.3 (57)

4.2 (107)
49.2 Reader Weather Shield

Weather Shield – part number BAS-WS10

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
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 module 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.
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 24 AWG 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 be 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.

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Recommended" /></td>
<td><img src="image2.png" alt="Not Recommended" /></td>
</tr>
</tbody>
</table>

51.3 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.

![Diagram of slide engaged and disengaged](image)

**Caution:** DO NOT DISCONNECT KEYPAD WITHOUT DIENGAGING THE CONNECTOR!

### 51.4 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.

![Diagram of weatherproofing](image)

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 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, 2020W, and 2020W-NDK readers.
52 Configuration

52.1 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>26-bit Range</td>
<td>34-bit Range</td>
</tr>
<tr>
<td></td>
<td>Digits</td>
<td>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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Format 6</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>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>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Format 7</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>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>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>FORMAT</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>format 0</td>
<td>ON ON ON ON</td>
</tr>
<tr>
<td>format 1</td>
<td>ON ON off off</td>
</tr>
<tr>
<td>format 2</td>
<td>ON off ON ON</td>
</tr>
<tr>
<td>format 3</td>
<td>ON off off off</td>
</tr>
<tr>
<td>format 4</td>
<td>ON off ON ON</td>
</tr>
<tr>
<td>format 5</td>
<td>ON off ON off</td>
</tr>
<tr>
<td>format 6</td>
<td>ON off off ON</td>
</tr>
<tr>
<td>format 7</td>
<td>ON off off off</td>
</tr>
<tr>
<td>format T (factory reserved)</td>
<td>off off off off</td>
</tr>
</tbody>
</table>

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.

Format T (factory test) magnetic data output: verify track 2 data and send track 2 data without formatting using clock data signaling. Zero trim, reverse read, bad card filter, and tamper monitor option are enabled.
All other combinations are reserved.

ON = switch is set to ON or jumper is uncut.

## 52.3 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>Keypad Data</th>
<th>ASCII</th>
<th>Parity</th>
<th>MSB First</th>
</tr>
</thead>
<tbody>
<tr>
<td>10110000</td>
<td>0</td>
<td>odd</td>
<td>first</td>
</tr>
<tr>
<td>00110010</td>
<td>2</td>
<td>even</td>
<td>last</td>
</tr>
<tr>
<td>00110100</td>
<td>4</td>
<td>even</td>
<td>last</td>
</tr>
<tr>
<td>10110110</td>
<td>6</td>
<td>even</td>
<td>last</td>
</tr>
<tr>
<td>00111000</td>
<td>8</td>
<td>even</td>
<td>last</td>
</tr>
<tr>
<td>00101010</td>
<td>*</td>
<td>even</td>
<td>last</td>
</tr>
<tr>
<td>11010011</td>
<td>SAFE</td>
<td>even</td>
<td>last</td>
</tr>
</tbody>
</table>

### 52.4 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

### 52.4.1 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.
52.5 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).

52.6 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.

52.7 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>
52.8 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.

52.9 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.

<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 80mA</td>
<td>FOR INSTRUCTION, SEE: 10107-0000</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
The reader is for use in low voltage, class 2 circuits only.

<table>
<thead>
<tr>
<th>Power: Voltage</th>
<th>5 Volt Model: 5.8 VDC (4.9 to 6.4 VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 Volt Model: 12 VDC (10.2 to 13.8 VDC)</td>
</tr>
<tr>
<td>Current</td>
<td>80mA (25mA typical.)</td>
</tr>
<tr>
<td>Data output</td>
<td>Data 1/0 pair or clock/data</td>
</tr>
<tr>
<td>Timing - clock/data -</td>
<td>1 mS period</td>
</tr>
<tr>
<td></td>
<td>400 μS 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>
<tr>
<td>LED input</td>
<td>input not driven: LEDs off</td>
</tr>
<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>
<tr>
<td>Buzzer input:</td>
<td>input not driven or &gt; 3.5 Vdc: buzzer off</td>
</tr>
<tr>
<td></td>
<td>input &lt; 0.8 Vdc: buzzer on</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Dimension</td>
</tr>
<tr>
<td></td>
<td>1.95 W x 1.30 H x 5.50 L inches</td>
</tr>
<tr>
<td></td>
<td>(50 W x 33 H x 140 L mm)</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
</tr>
<tr>
<td></td>
<td>10 oz. (284 g) nominal</td>
</tr>
<tr>
<td></td>
<td>Material</td>
</tr>
<tr>
<td></td>
<td>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>
<tr>
<td>Card</td>
<td>75 bpi, ANSI X4.16, Track 2 standard, Speed 3 to 50 ips</td>
</tr>
<tr>
<td>Read Head</td>
<td>500,000 passes typical, standard. Optional high-wear head available.</td>
</tr>
<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>
<tr>
<td>Tamper Switch</td>
<td>(Optional)</td>
</tr>
<tr>
<td></td>
<td>To order the tamper switch, add “-OT” to the part number when you place your reader order.</td>
</tr>
<tr>
<td>Distance</td>
<td>500' (152m) with 18 AWG wires</td>
</tr>
<tr>
<td>Environmental</td>
<td>Temperature:</td>
</tr>
<tr>
<td></td>
<td>Operating: -40° to +75° C (-40° to +167° F)</td>
</tr>
<tr>
<td></td>
<td>Humidity:</td>
</tr>
<tr>
<td></td>
<td>0-95% RHNC, standard</td>
</tr>
<tr>
<td></td>
<td>100% (-OW option)</td>
</tr>
</tbody>
</table>
53.1 Reader Mounting Dimensions

DIMENSIONS: INCH (mm)

- 1.3 (33)
- 2.0 (50)
- 3.3 (84)
- 2.6 (66)
- 1.0 (25)
- 2X 0.18 (4.5) MOUNTING HOLE

DIMENSION: INCH (mm)
Mounting dimensions for the BAS-2020W-

**Optional Wall Plate, WP-10**

2.75 (70)

6.3 (160)

3.3 (84)

2X 0.18 (45)

1.4 (35)

1.2 (31)
Fitting Rigid Conduit to Junction Box

- WALL STUD
- 3/8" RIGID CONDUIT
- 1-GANG BOX
- WALL OPENING FOR J-BOX

Dimensions:
- 2.3 (57)
- 4.2 (107)
53.2 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
54 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 LPMR-1824 and LPMR-1824 MC
- LenelProx LPSR-2400
- 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.

54.1 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 to 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.

54.2 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.

54.2.1 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.

54.2.2 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.

54.2.3 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.

54.2.4 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.

54.3 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.).

54.3.1 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.

Holes location
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.

---

**Wiring diagram (Wiegand)**

- Reader
- Reader Interface Module
- Cut
- Earth Ground
- Reader Interface Module
- Buzzer
- LED
- Data 1
- Data 0
- Ground
- Power
- Chassis Ground
- Receive (Orange)
- Transmit (Violet)
- Hold (Blue)
- Beep (Yellow)
- LED (Brown)
- Data 1 (White)
- Data 0 (Green)
- Ground (Black)
- 5-12 VDC (Red)
- Shield (Drain)
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.

54.3.2 Specifications

• Indoor/Outdoor UL 294 Listed by AWID (Sentinel-Prox MM-6800)
• CE approved
• ULC approved
• FCC Part 15 certified

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.

54.4 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.).
54.4.1 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.

TYPICAL SOFTWARE SETTINGS
1. Reader Type = WIEGAND/PROX
2. Keypad = NO KEYPAD
3. LED Mode = 1-WIRE LED CONTROL
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**

![Diagram of Dual Reader Interface Module](image)

**TYPICAL SOFTWARE SETTINGS**

1. Reader Type = WIEGAND/PROX
2. Keypad = NO KEYPAD
3. LED Mode = 1-WIRE LED CONTROL

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.

54.4.2  Specifications

- FCC Part 15 certified

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.

54.5  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.

54.5.1  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

- 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.

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.

54.5.2 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.
• **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.

### 54.5.3 Notes

1. A special feature of the LPKP-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 LPKP.
   - To convert from LPKP-6840/BT-LPKP-NDK to LPSP-6820:
     Snap off the LPKP-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 LPKP-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 LPKP-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. LPKP-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).

### 54.5.4 Specifications

• **FCC Part 15 certified**

**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

54.6 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.).

54.6.1 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 Beep 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.

### 54.6.2 Specifications

**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 Beep 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.)

### 54.7 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.

#### 54.7.1 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.
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.

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.

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.

54.7.2 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?

### 54.7.3 Specifications

- Indoor/Outdoor UL 294 Listed by AWID (Sentinel-Prox MR-1824/1824 MC)
- CE approved
- ULC approved
- FCC Part 15 certified

**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.

54.8 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.

54.8.1 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. AWID recommends using #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.

54.8.2 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 controller’s TXD terminal, and the reader’s Transmit line (orange) to the controller’s RXD terminal.

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**Wiring diagram for Wiegand output format**

![Wiring Diagram](image-url)
Wiring diagram for RS-232 output format

Wiring diagram for RS-232 & Wiegand output format

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 interferes 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.

54.8.3 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).

54.8.4 Specifications

Complies with FCC Part 15

Cable to Controller: 9 conductor stranded, 22 AWG, with continuous shield for typical installation

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
55  Lenel Keypads

These keypads are available in two styles: 3 x 4 keypads (part number LNL834S121NN) and 2 x 6 keypads (part number LNL826S121NN).

55.1  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 can not be connected at the same time.

55.1.1 Wiring the BAS-1300

The wiring diagram has the 2 x 6 keypad depicted. A 3 x 4 keypad may also be used.

HID ProxPoint Reader

**Typical Software Settings**

1. Keypad = 8-Bit Output
2. LED Mode = 2-WIRE LED CONTROL
3. Wiegand/Prox data type
55.1.2 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

55.2 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
BAS-500B
BIOMETRIC
READER
INTERFACE
56  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-Flex and V-Station.

56.1  Interfaces

The Biometric Reader Interface Gateway (BRI) interfaces upstream with the Intelligent System Controller, BAS-2000 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)
56.2 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.
57 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.

57.1 Wiring

57.1.1 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.

57.1.2 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 4,000 feet (1219 m), 100 ohms maximum (Belden 9842 4ewire 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.

**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 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 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 42</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 42</td>
</tr>
</tbody>
</table>

**Upstream Host Communication Wiring (Port 1)**

![Upstream Host Communication Wiring (Port 1)](image-url)
Wire Configuration – Switch #5 must be off for all panels in this configuration.

57.1.3 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

AC
GND
AC
GND

12VDC

... OR ...

12VAC

57.1.4 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 4,000 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 4,000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102 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.
58 Configuration

The BRI board contains 8 DIP switches and 11 jumpers that must be configured for your system.

58.1 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>

58.1.1 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: 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>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 off ON</td>
</tr>
</tbody>
</table>
### 58.1.2 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>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>

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<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>
58.1.3  **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.

58.2  **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.
59 Maintenance

59.1 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](image)

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>

59.2 Memory Backup Battery

Use of the memory backup battery (3 V lithium ion battery, Panasonic part #BR2325) does not apply to this hardware.

59.3 Firmware

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading.
60  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
61 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, type BR2325

- **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

---

**Note:** These specifications are subject to change without notice.
62 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.

62.1 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 2000

Note: Different readers are required for enrollment and access control.
63 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)

63.1 Wiring Enrollment Readers

Enrollment readers are directly connected to the PC workstation. The following readers may be used for enrollment.

63.1.1 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.

63.1.2 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.

63.1.3 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.

63.2 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>

63.3 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.
64 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.
64.1 Wiring CombiSmart Readers

CombiSmart Reader Voltage: 12 VDC 0.25A

**Typical Software Settings**

1. Reader Type = Wiegand/PROX
2. Keypad = No Keypad

---

**Diagram**

- Labeled on wire terminal on inside of reader
- Chassis Ground
- Wiegand GND
- Data One
- Data Zero
- 12V +
- 12V -
- Alternate 12 V Power Supply
- 250 mA Current Draw

---

**Single Reader Interface Module**
64.1.1 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. CD set, under the BiocentricSolutions directory.

For configuration, the CombiSmart reader must be hooked up to the workstation via RS-232.
Note: 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.

Note: Other values should NOT be changed.

### 64.1.2 CombiSmart Reader Operation

#### 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></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>

1 This message is displayed for several seconds before the PLEASE REMOVE CARD message appears.
## 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>
</table>
| NO FINGER DETECTED PLACE FINGER ON UNIT | The Combi-device did not detect a finger. This can be caused by:  
• Finger not properly placed  
• Dirty sensor material  
• Fingerprint sensor failure | • Repeat the process with proper finger placement.  
• Clean the sensor.  
• If the error still appears, call the System Administrator. |
| ID NOT VERIFIED               | The Combi-device could not verify the identity of the user. This can be caused by:  
• Finger not properly placed  
• Finger too dry or damp  
• Wrong finger placed on sensor  
• Dirty sensor material  
• Fingerprint sensor failure | • Repeat the process with proper finger placement.  
• If your finger is dry, try applying lotion. If it is damp, dry it and try again.  
• Ensure that the same finger was used as was used for enrollment.  
• Clean the sensor.  
• If the error still appears, contact the System Administrator. |
| DOOR OPEN ALARM              | The door has been left open for longer than the configured time. | Close the door. |

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.
The wall-mounted unit can be used for access verification. A reader interface module is required for connection. Connect the wires of the GuardDog to the reader interface module according to the following table.

<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</td>
<td>An error occurred while the device was being powered up. The device is not operational.</td>
<td>Retry device initialization. If the error still occurs, call for service.</td>
</tr>
<tr>
<td>DEVICE</td>
<td></td>
<td></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>

### 64.2 Wiring GuardDog Readers for Verification

The wall-mounted unit can be used for access verification. A reader interface module is required for connection.

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>
**64.2.1 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>
65 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.

65.1 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.

65.1.1 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.

65.1.2 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.*
Line the cuticle up with the center of the inset.

65.1.3 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.
65.1.4 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.

![Relationship between the threshold parameter setting and the FRR and FAR](image)

You may want to experiment with the various settings to help you determine what the optimal threshold should be for the application.

65.1.5 Specifications

The following specifications are generally for most readers. Please refer to your manufacturer owner’s manual for more detailed information.

Note: These specifications are subject to change without notice.

65.1.6 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

65.1.7 **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**
  - Selectable RS-232, RS-485 half duplex (default).
    - **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
66 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-Flex, V-Smart, and V-Station) are part of Bioscrypt’s Veri-Series line of fingerprint authentication readers.

66.1 V-Flex and V-StationA Readers

The V-Flex is a fingerprint reader. It utilizes an MV1200 sensor. 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.

Pass/Fail Indicator
Yellow – place finger
Off – remove finger
Green – Pass
Red – Fail

Conductive Plastic

Power Indicator

RidgeLock™ to aid in consistent finger placement

Fingerprint Sensor

ABS Plastic Body

Aux. Port
V-Flex readers interface upstream with the Biometric Reader Interface Gateway (BAS-500B). Multiple V-Series devices may be connected in a single network.

Communications overview for the V-Flex readers

The V-StationA has a fingerprint reader as well as a keypad. Like the V-Flex, it also uses controller-based templates. It interfaces upstream with the Biometric Reader Interface Gateway (BAS-500B). This model does not have a smart card reader.
66.2 V-Smart and V-StationG/V-StationH Readers

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 or 1320). 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
### 67 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.

#### 67.1 Reader Power Requirements

The Bioscrypt readers (V-Smart, V-Flex, 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.

#### 67.2 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.
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 352.

### 67.3 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, on the Fingerprint (Bioscrypt) tab.

### 67.3.1 Firmware

If you are running B.A.S.I.S. build 5.10.309, special considerations must be taken for updating the 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.

For B.A.S.I.S. build 5.10.421, the template security level may be set to “Default to Global Security.”

The readers should be running firmware version 7.4 or later. 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 V-Series Firmware**.
3. Then select **Configure> Update Firmware > Update ESI Firmware**.

**Note:** The Biometric Mismatch capability has been enable. This requires VeriAdmin version 5.4 and Veri-Series firmware version 7.4.

### 67.4 V-Flex Verification Readers

Bioscrypt V-Flex and standard V-StationA readers should be connected to the BAS-500B Biometric Reader Interface (RS-485 2-wire multi-drop).
**67.4.1 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.

67.5 V-StationA Verification Readers

Communication between the V-StationA reader and the BAS-500B is done via RS-485 connection.
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.
V-Flex and V-StationA Configuration

In order for the V-Flex and 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.

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. 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.
      - 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. This needs to match the setting of DIP switch 8 on the BRI.
   c. On the Biometrics tab,
      - Change the Global Security Threshold to Very High.
      - Make sure that the Biometric Verification is Enabled, and that Finger Required is selected.
      - Select the number of fingers required and enter the Inter-Finger Timeout in seconds.

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 Biometrics tab,
   - Change the Global Security Threshold to Very High.
   - Make sure that the Biometric Verification is Enabled, and that Finger Required is selected.
   - Select the number of fingers required and enter the Inter-Finger Timeout in seconds.
d. On the Verification Response tab, make sure Verification Polling Mode is Disabled.

e. The default settings may be left on the General Purpose I/O tab (GPO 0=No Action).

67.7 V-Smart Verification Readers

V-Smart readers can be used as access readers, connected to the Reader Interface Module (BAS-1300 or BAS-1320).
Bioscrypt Readers

Wiring the V-Smart reader with the Single Reader Interface Module

Single Reader Interface Module
- Power Ground (11)
- Power In (8-12VDC 400 mA) (13)
- GND
- BZR
- LED
- CLK/D1
- DATA/D0
- VO

TYPICAL SOFTWARE SETTINGS
1. Reader Type = Wiegand/Prox
2. Keypad = No Keypad

Smart Card reader
67.7.1 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.

67.7.2 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

**Use Table for non-wiegand devices**

<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>
67.7.3 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.
2. Click [Security Settings] to configure the smart card security settings.

**Smart Card Security Settings for MIFARE**

- **Smartcard Administrator SiteKey Verification**
  - DISABLED (will only work if no password is used)
  - Enter Once
  - Enter Everytime
  - Timeout 5 Minutes

- **ESI SiteKey Security**
  - Use ESI SiteKey Encryption
  - **Key B Read/Write**

  "A unique one-way HASH function which provides additional security, however, other applications will not be able to use the same Site Key.

- **Smartcard Administrator SiteKey**
  - New PRIMARY:
  - New Secondary:

  - Use software HASH

  - Use software HASH

  - Change SiteKey

  - SAVE Settings

  - Cancel

  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: **C5RH9kVl7yDzSQu**
     - 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.

67.7.4 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.
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. ET650, 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:

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**.

---

<table>
<thead>
<tr>
<th>General</th>
<th>Communication</th>
<th>Wiegand</th>
<th>Biometrics</th>
<th>Verification Response</th>
<th>General Purpose I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Security Threshold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Very High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Very Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biometric Verification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Enabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Template Security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Verification, choose an option for those templates with security threshold set to NONE:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Finger Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Finger NOT Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Finger Verification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fingers Required: 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inter-Finger Timeout: 10 [s]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Password Verification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Enabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duress Finger Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Enabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duress Action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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).
67.8 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.

<table>
<thead>
<tr>
<th>Card Format</th>
<th>Custom Encoding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>64-Bit (V-Smart)</td>
</tr>
<tr>
<td>Type:</td>
<td>Wiegand</td>
</tr>
<tr>
<td>Facility Code:</td>
<td>255</td>
</tr>
<tr>
<td>Code Offset Number:</td>
<td>0</td>
</tr>
<tr>
<td>Total Number of Bits On Card:</td>
<td>64</td>
</tr>
</tbody>
</table>

**Starting Bit** | **Number of Bits**
--- | ---
Facility Code: | 0 | 24
Card Number: | 24 | 32
Issue Code: | 56 | 8

**Number of Even Parity Bits:** 0
**Number of Odd Parity Bits:** 0

After the Wiegand card format is created, define a smart card format to be used during card encoding.

67.9 V-Smart Verification 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).

---

**67.10 V-StationA-G and V-StationA-H Readers**

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 or 1320 is done via Wiegand connection.
67.11 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>Verification Response</th>
<th>General Purpose I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Pre-Defined Format</td>
<td>Pass-Thru Format</td>
<td>Pulse Width</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Pass-Thru Format**
  - Total Bits: 64
  - ID Start Bit: 0
  - Num ID Bits: 0

- **Pulse Width**
  - 40 µsec

- **Pulse Interval**
  - 2000 µsec

- **Wiegand I/O**
  - Enable Input
  - Enable Output: Always Output (regardless of input source)

---

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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**.

<table>
<thead>
<tr>
<th>General</th>
<th>Communication</th>
<th>Wiegand</th>
<th>Biometrics</th>
<th>Verification Response</th>
<th>General Purpose I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Security Threshold</td>
<td>Biometric Verification</td>
<td>Template Security</td>
<td>Multi-Finger Verification</td>
<td>Password Verification</td>
<td>Duress Finger Mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fingers Required:</td>
<td>Fingers Required:</td>
<td>Fingers Required:</td>
</tr>
<tr>
<td>Very High</td>
<td>Enabled</td>
<td>During Verification, choose an option for those templates with security threshold set to NONE:</td>
<td>Inter-Finger Timeout:</td>
<td>Enabled</td>
<td>Enables</td>
</tr>
<tr>
<td>High</td>
<td>Enabled</td>
<td></td>
<td>10 [s]</td>
<td>Enabled</td>
<td>Disabled</td>
</tr>
<tr>
<td>Medium</td>
<td>Enabled</td>
<td></td>
<td></td>
<td>Enabled</td>
<td>Disabled</td>
</tr>
<tr>
<td>Low</td>
<td>Enabled</td>
<td></td>
<td></td>
<td>Enabled</td>
<td>Disabled</td>
</tr>
<tr>
<td>Very Low</td>
<td>Enabled</td>
<td></td>
<td></td>
<td>Enabled</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

**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).
**67.12 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.

---

**67.13 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 the Unit Parameters/Wiegand sub-tab
      - Total Bits: 32
      - ID Start: 0
      - Number ID: 32
   b. In the Unit Parameters/Biometrics sub-tab
      - Password Verification: Enabled
   c. 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.
68 Overview

The BioGuard 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.

68.1 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.
69 Installation

The reader comes with a ferrite. Use the ferrite for electromagnetic protection of the wires. Use the following information to install the reader.

69.1 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 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**

- Yellow LED inside reader active during fingerprint request.
- Firmwire version 1.08 or greater
- For use with VeriAdmin v. 5.3
- Supervision: Not Supervised, Normally Open

**Hardware:**
- 1.6A @ 12VDC
- RS-485
- RS-232
- Tamper Input 1k, 1%
- DC+ to Earth
- DC- to Ground
- BZR, LED, VO
- GND

**Connection Details:**
- TR+, TR- to Biometric Reader Gateway
- TXD (Pin 2) to COM Port Via DB-9
- RXD (Pin 3)
69.2 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:
69.3 BioGuard Reader Configuration

The BioGuard 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 BioGuard 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](image)

<table>
<thead>
<tr>
<th>LED Table settings for Enroll mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED Table</strong></td>
</tr>
<tr>
<td><strong>Use Table for non-wiegand devices</strong></td>
</tr>
<tr>
<td><strong>Accept</strong></td>
</tr>
<tr>
<td><strong>Reset Table</strong></td>
</tr>
<tr>
<td><strong>Cancel</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Settings</th>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Duration</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>VeriSeries Products:</td>
<td>GREEN</td>
<td>RED</td>
<td>BUZZER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting State</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave Card</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place Finger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove Finger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger Not Detected</td>
<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>


### LED Table settings for Verify mode

<table>
<thead>
<tr>
<th>Settings</th>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Duration</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veri Series Products:</td>
<td>GREEN</td>
<td>RED</td>
<td>BUZZER</td>
<td>0</td>
<td>0</td>
</tr>
<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>600</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>600</td>
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</tr>
<tr>
<td>Fail</td>
<td></td>
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<tr>
<td>Error</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### LED Table settings for Idle mode

<table>
<thead>
<tr>
<th>Settings</th>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Duration</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veri Series Products:</td>
<td>GREEN</td>
<td>RED</td>
<td>BUZZER</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Waiting State</td>
<td></td>
<td></td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wave Card</td>
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<td></td>
<td>0</td>
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</tr>
<tr>
<td>Place Finger</td>
<td></td>
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<tr>
<td>Remove Finger</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Finger Not Detected</td>
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<td>Pass</td>
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</table>
### LED Table settings for Make Enroller mode

<table>
<thead>
<tr>
<th>Settings</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></td>
<td></td>
</tr>
<tr>
<td>WAVE CARD</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td>0</td>
<td>1350</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>
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<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>600</td>
<td>0</td>
</tr>
<tr>
<td>FAIL</td>
<td></td>
<td>✔</td>
<td></td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td>ERROR</td>
<td></td>
<td>✔</td>
<td></td>
<td>600</td>
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</table>

### LED Table settings for Make Deleter mode

<table>
<thead>
<tr>
<th>Settings</th>
<th>Line 1</th>
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<th>Line 3</th>
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<th>Interval</th>
</tr>
</thead>
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<td>WAITING STATE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>WAVE CARD</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td>0</td>
<td>1350</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>
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<tr>
<td>PASS</td>
<td>✔</td>
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<td>✔</td>
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</tr>
<tr>
<td>FAIL</td>
<td></td>
<td>✔</td>
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<td></td>
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</tr>
</tbody>
</table>
LED Table settings for Vprox Admin 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></td>
<td>GREEN</td>
<td>RED</td>
<td>BUZZER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting State</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave Card</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place Finger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove Finger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger Not Detected</td>
<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>

LED Table settings for Vprox 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></td>
<td>GREEN</td>
<td>RED</td>
<td>BUZZER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting State</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave Card</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1350</td>
</tr>
<tr>
<td>Place Finger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove Finger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger Not Detected</td>
<td></td>
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<td></td>
<td>600</td>
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<tr>
<td>Pass</td>
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<td>600</td>
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<tr>
<td>Fail</td>
<td></td>
<td></td>
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<tr>
<td>Error</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td></td>
</tr>
</tbody>
</table>
### LED Table settings for Vprox Verify mode

<table>
<thead>
<tr>
<th>Settings</th>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Duration</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veri-Series Products:</td>
<td>GREEN</td>
<td>RED</td>
<td>BUZZER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting State</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wave Card</td>
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<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>600</td>
<td>0</td>
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<td>Fail</td>
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<td></td>
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<td>600</td>
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<tr>
<td>Error</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td>0</td>
</tr>
</tbody>
</table>

### LED Table settings for Vprox Delete mode

<table>
<thead>
<tr>
<th>Settings</th>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Duration</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veri-Series Products:</td>
<td>GREEN</td>
<td>RED</td>
<td>BUZZER</td>
<td></td>
<td></td>
</tr>
<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>1350</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>
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</tr>
<tr>
<td>Pass</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td>Fail</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td>0</td>
</tr>
</tbody>
</table>
69.4 BioGuard 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.
70  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%

• FCC and CE Approved

• UL294 pending
WYRELESS
READERS
71 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).

71.1 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.
72 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.

72.1 Wiring

72.1.1 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.

72.1.2 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-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 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>UL NEC Type</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>9841</td>
<td>NEC CM CSA</td>
<td>1</td>
<td>24.0 ohms/M</td>
<td>3.35 ohms/M</td>
<td>11.0 ohms/K</td>
<td>120 12.8 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>78.7 ohms/ km</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9842</td>
<td>NEC CM CSA</td>
<td>2</td>
<td>24.0 ohms/M</td>
<td>2.2 ohms/M</td>
<td>7.2 ohms/K</td>
<td>120 12.8 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>78.7 ohms/ km</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88102</td>
<td>NEC CMP CSA</td>
<td>2</td>
<td>24.0 ohms/M</td>
<td>15.5 ohms/M</td>
<td>50.9 ohms/km</td>
<td>100 12.95 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>78.7 ohms/ km</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Upstream Host Communication Wiring (Port 1)**

```
0  Ø  TXD/TR1+
0  Ø  RXD/TR1-
0  Ø  CTS/R1 +
0  Ø  RTS/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.

### 72.1.3 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.

---

**Power Source Wiring**

![Power Source Wiring Diagram](image)

---

### 72.1.4 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.
73 Configuration

The Wyreless reader gateway board contains 8 DIP switches and 11 jumpers that must be configured for your system.

73.1 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>

73.1.1 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>
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<tr>
<td>7</td>
<td>ON</td>
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</tr>
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<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>
73.1.2 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>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>off off off off 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>

### BAUD RATE | DIP SWITCH
---|---
38400 bps | ON ON
19200 bps | off ON
9600 bps | ON off
2400 bps | off off
### 73.1.3 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>

### 73.2 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

- **[J3, J5, J6, J9]**
  - Control for Port 1, RS-232 or RS-485

- **[J8, J10]**
  - OFF: Port 1 RS-485 EOL termination is not on
  - ON: Port 1 RS-485 EOL termination is on

- **[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

### 73.3 Firmware

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

This section contains information for installing and wiring the PIM-485-16-OTD or the PIM-OTD.

74.1 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.

74.2 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.

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:

---

**74.3 PIM-OTD**

Use the following diagrams to wire the PIM-OTD to single/dual reader interface module.
Wiring the BAS-1300 and PIM-OTD

- Strike
- Ground
- Exit Req
- Door Stat
- Trouble
- Data/D0
- CLK/D1
- Ground

- RS485
- S3
- RESET
- POWER
- 12V

- CR15
- CR10
- CR9
- CR7
- CR6
- SW7
- SW1

- GND
- BZR
- LED
- CLK/D1
- DAT/D0
- +12V

- TR+
- TR-
- GND

- To ISC

- To 12VDC

- Single Reader Interface Module
- NC
- NO
- C

- 1K, 1%

- 12VDC
- Source
Wiring the BAS-1320 and the PIM-OTD
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

### 75.1 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.

### 75.2 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).

### 75.2.1 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.
75.2.2 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.
76 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, type BR2325
- 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

---

**Note:** These specifications are subject to change without notice.
COMMAND KEYPAD
77 Command Keypad Overview

The BAS-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) 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.

77.1 Communication

The command keypad communicates with the controller via a 2-wire RS-485 interface or as a reader device through a dual reader interface module (BAS-1320). There are three possible scenarios:

1. The BAS-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.
2. The BAS-CK can be connected via RS-485 and used as an alternate reader device along with a primary reader (connected to 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.
3. The BAS-CK can be connected as a primary reader device on the dual reader interface module (BAS-1320) along with any type of alternate reader (Wiegand/Magnetic card or Smart Card/Wiegand reader). The BAS-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. The last device on each end of the cable should have the termination installed (set jumper DIP1=ON).
77.1.1 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:

• BAS-CK rev. A uses firmware 1.2x through 1.3x.
• BAS-CK rev. B uses firmware 1.4x or higher.
• BAS-1320 firmware 1.10 or later
• BAS-controller firmware 3.048 or later

77.1.2 Wiring the BAS-CK

The BAS-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>

Wires connected to pins 5-8 are used for units connecting to the BAS-1320 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 dual reader interface module</td>
</tr>
<tr>
<td>6</td>
<td>White</td>
<td>CLK/D1 on the dual reader interface module</td>
</tr>
<tr>
<td>7</td>
<td>Brown</td>
<td>LED on the dual reader interface module</td>
</tr>
<tr>
<td>8</td>
<td>Orange</td>
<td>BZR on the dual reader interface module</td>
</tr>
</tbody>
</table>
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>
<td>13</td>
<td>Orange</td>
<td>READER BUZZER</td>
</tr>
<tr>
<td>14</td>
<td>Black</td>
<td>GROUND</td>
</tr>
</tbody>
</table>

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.

### 77.1.3 DIP Switches

This command keypad has four DIP switches that must be configured.

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>Setting</th>
<th>Used to configure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OFF</td>
<td>RS-485: no termination</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>RS-485: 120 Ohms terminaion</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
<td>Use software configuration settings</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 BAS-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.

### 77.1.4 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.
77.1.5 BAS-CK Configuration

Configuration of the BAS-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.

77.1.6 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)  
AAAAAAABBBB  
(lower line)  
CCCCCCCCSW-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).

77.1.7 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 an BAS-CK to an BAS-1320. Choosing “LCD Command Keypad” tells the system that it is an BAS-CK being connected to the BAS-1320. The reader type in this case is the normal “Dual reader 1...” or “Dual reader 2...” reader type that is normally selected for the BAS-1320, 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 BAS-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 passed through the reader interface module.

**77.1.8 Command Programming**

The command keypad allows PIN entry. If your PIN is shorter then 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).

**77.1.9 Command Keypad Behavior**

The BAS-CK supports two formats for time display: a 12-hour clock or 24-hour clock display. This is automatically chosen based on the 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. The text is displayed permanently until other activity occurs.
- 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. The text is displayed permanently until other activity occurs.
- 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. The text is displayed permanently until other activity occurs.
- 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 later. 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 later. 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 later.
- 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 now 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 BAS-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.

<table>
<thead>
<tr>
<th>If it is armed...</th>
<th>If it is disarmed...</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you would like to disarm the alarm mask group, press [1]. The LCD will then display:</td>
<td>The system will check to see if any points are active.</td>
</tr>
<tr>
<td>*** DISARMED ***</td>
<td>- If no points are active, the LCD will display:</td>
</tr>
<tr>
<td></td>
<td>ALL SECURE</td>
</tr>
<tr>
<td></td>
<td>&lt;2&gt; TO ARM</td>
</tr>
<tr>
<td></td>
<td>- If you would like to arm, press [2]. The LCD will display:</td>
</tr>
<tr>
<td></td>
<td>ARMING, EXIT NOW</td>
</tr>
<tr>
<td></td>
<td>- Otherwise, do not press anything (or if you press key other than [2]), it will remain disarmed.</td>
</tr>
<tr>
<td></td>
<td>• If points are active, the LCD will display:</td>
</tr>
<tr>
<td></td>
<td>nn ZONES FAULTED</td>
</tr>
<tr>
<td></td>
<td>&lt;4&gt; TO VIEW</td>
</tr>
<tr>
<td></td>
<td>(where nn is the number of points active).</td>
</tr>
<tr>
<td></td>
<td>Press [4] (or take no action) and you will be able to view active points. You can let it scroll automatically, or press [4] again to advance to the next name. After it is done, the LCD will display:</td>
</tr>
<tr>
<td></td>
<td>nn ZONES FAULTED</td>
</tr>
<tr>
<td></td>
<td>&lt;3&gt; TO FORCE-ARM</td>
</tr>
<tr>
<td></td>
<td>- Press [3] to force-arm the alarm mask group. The LCD will display:</td>
</tr>
<tr>
<td></td>
<td>ARMING, EXIT NOW</td>
</tr>
<tr>
<td></td>
<td>- Do nothing (or if you press any key other than [3]) to leave it disarmed.</td>
</tr>
</tbody>
</table>
77.2 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

These specifications are subject to change without notice.
CYPRESS TIMER
78 Cypress Timer

The Cypress Timer (LNL-CCK-1201-M) 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.
78.1 System Level Wiring

- Multi-Drop, Central Power
- Multi-Drop, Local Power
- Multi-Drop, Daisy-Chain and Home-Run
78.2 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 --:--.

### 78.3 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.
78.4 Wall Mounting

Mount enclosure to wall with electrical box (single gang).
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