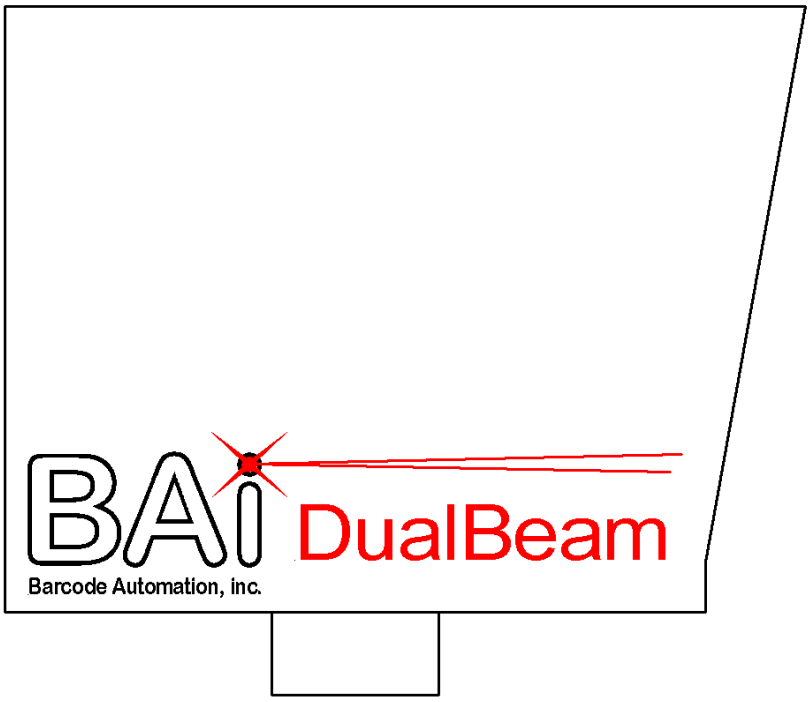
# INSTALLATION AND MAINTENANCE MANUAL FOR BA-440 DUALBEAM BARCODE READER Rev B

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## FOREWORD

The purpose of this manual is to provide information on how to install, configure, operate, and service the Barcode Automation BA-440 DualBeam Barcode Reading and Access Control System, Revision B. Barcode Automation Inc. has made every effort to insure that the information in this manual is both accurate and adequate. It is recommended, in the interest of safety and efficiency, that each section be read carefully before installing or servicing this system.

## INTRODUCTION

This section contains information on the proper installation, operation and maintenance of the Barcode Automation BA-440 DualBeam Barcode Reader. Each item in this section should be read completely before proceeding to other sections of this manual. If there are any questions contact Barcode Automation, inc at 1-800-528-9167 for assistance.

## FCC CLASS A STATEMENT

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this manual, may cause interference to radio communications. A class A computing device, as defined in Part 15, Subpart J of the Federal Communications Commission rules is designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residence is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures necessary to correct the interference.

## CDRH COMPLIANCE STATEMENT

This laser barcode reading system complies with Standard 21CFR, Subchapter J, for Class II laser products as set forth by the Center for Devices and Radiological Health. Any alteration or adjustment for Class II laser products is not authorized, and will void certification of the system as a Class II laser product. Illustrations on page 5 show the type and location of warning labels affixed to the reader in compliance of the CDRH standard.

## SAFETY PRECAUTIONS

This barcode reader incorporates features that provide for maximum safety. However, it must be recognized that any equipment employing electrical voltage and emitting direct or scattered radiation may cause serious damage and/or personal injury if improperly handled. The following are recommended safeguards that should be observed at all times.

## WARNING

Use of controls, adjustments or performance of procedures other than those specified herein may result in exposure to hazardous radiation or electrical voltages.

## OPTICAL SAFETY

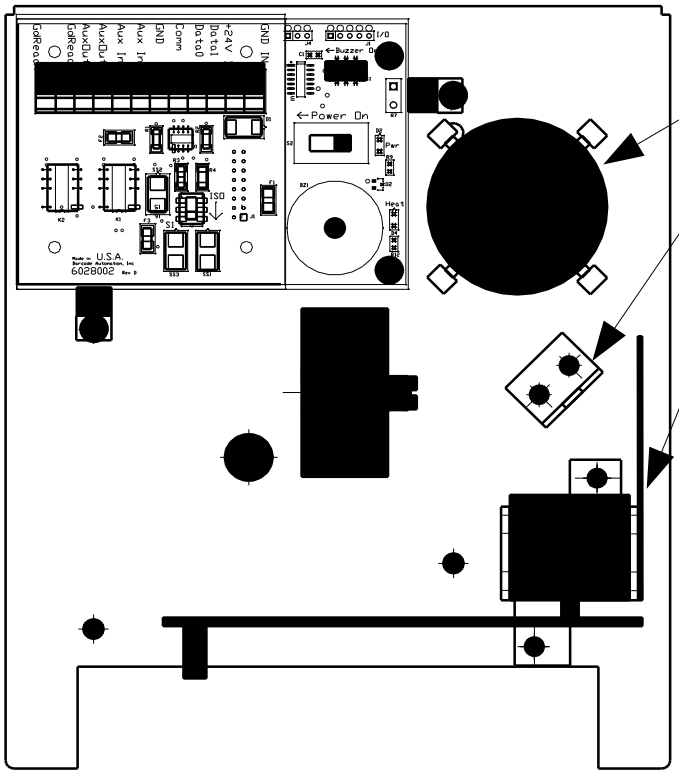
Never stare directly into laser beam. The laser is interlocked with the motor that turns the polygon mirror, so that if the motor slows or stops the laser will be automatically turned off.

## ELECTRICAL SAFETY

Disconnect the main power line before working on any electrical equipment.  Always use insulated tools.

## REQUIRED SERVICE

The outside surface of the BA-440 window should be cleaned as needed with a non-abrasive glass cleaner. Optical components inside the reader should be inspected and cleaned at 6 month intervals. These optical components include:

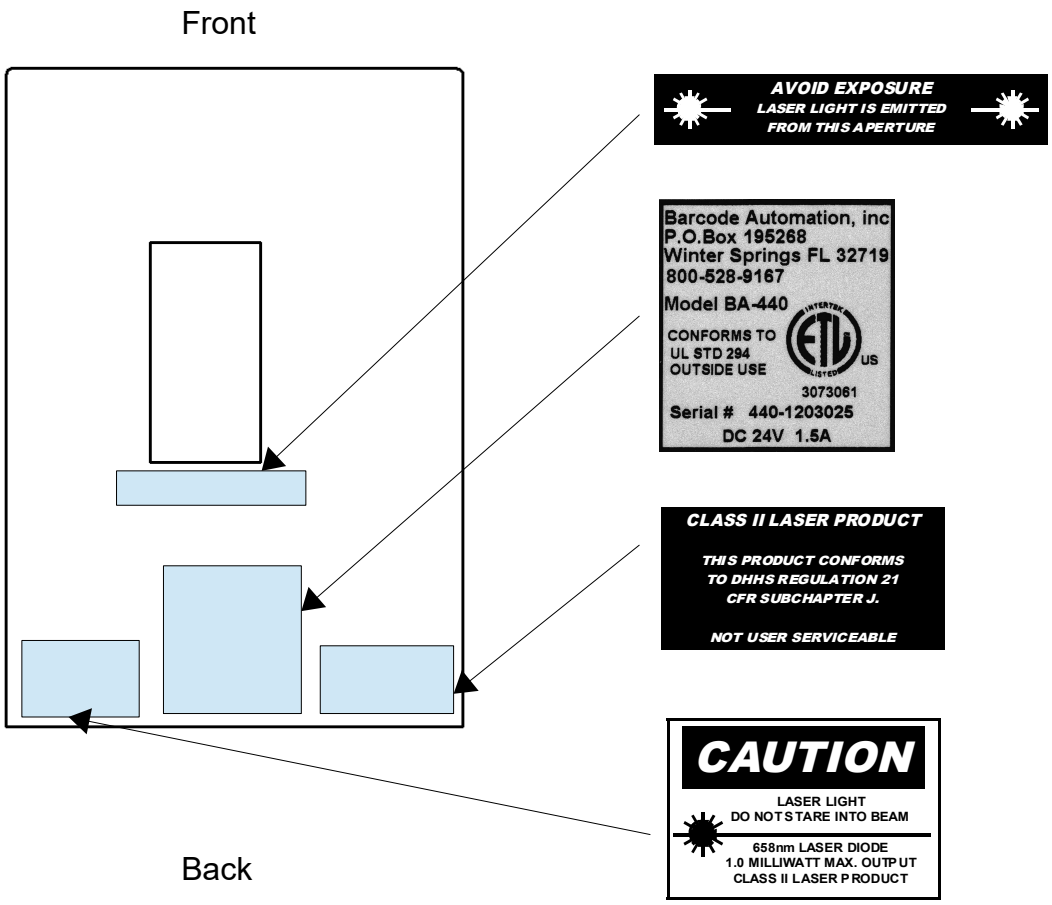



The internal optics should be cleaned with 100% denatured alcohol and soft material such as Kleenex® or cotton balls. **DO NOT USE LENS CLEANING MATERIAL or OPTICAL WIPES,** they will scratch the metal of the mirror wheel and degrade reader performance. Routine cleaning is best accomplished by following these steps:

1. Remove 6 flanged nuts from bottom of reader.
2. Lift hood/cover straight up off of the reader.
3. Clean the inside/outside of the window glass on the reader hood/cover.
4. Clean all 8 mirror sides on the silver wheel (polygon).
5. Clean the small mirror directly below the silver wheel (polygon).
6. Clean the lens in the receiver block located below the small mirror.
7. Replace Desi-Paks if necessary.
8. Replace the reader hood cover over the unit.
9. Reinstall and hand tighten the 6 flanged nuts on the bottom of reader.

Do not adjust or remove any hardware not specified in these directions. Any changes to the optical alignment may result in poor reader performance. If you have questions contact BAi at 800-528-9167.

# WARNING LABEL PLACEMENT FOR BA-440



# Table of Contents

## GENERAL SPECIFICATIONS

Light Source: Visible Laser Diode
Output Wavelength (nominal): 658 nM
CDRH Safety Class II
Output Power: less than 1mW/$cm^2$

Read Zone:
Operating Distance: 24 to 72 in (61 to 182 cm) measured from window

Decals:
Various Color Decals can be used; Configurable to read decals from other equipment manufacturers such as Accu-Sort, Amtel, ISI, & LazerData

Communication (RS232):
Data Rate: 2400, 4800, 9600, 19200, 38400 Baud
Parameters: 8N1

Communication (Wiegand): 26bit format
Timing of Wiegand pulses is adjustable

Indicator:
Audible indicator for Good Read (beep)
Length of audible beep adjustable or can be disabled

Power Input:
Voltage input: 24 Vdc @ 1.5A max
Power: 36 Watts max

Environmental:
Operating Temperatures: -22 to 130° F (-30 to 55° C)
Relative Humidity: 10% to 100% (non-condensing)

Relay Contacts:
Do Not Exceed 30 Vdc @ 2A

Mechanical Specifications: Reader housing rated NEMA 4 when sealed according to BAi guidelines

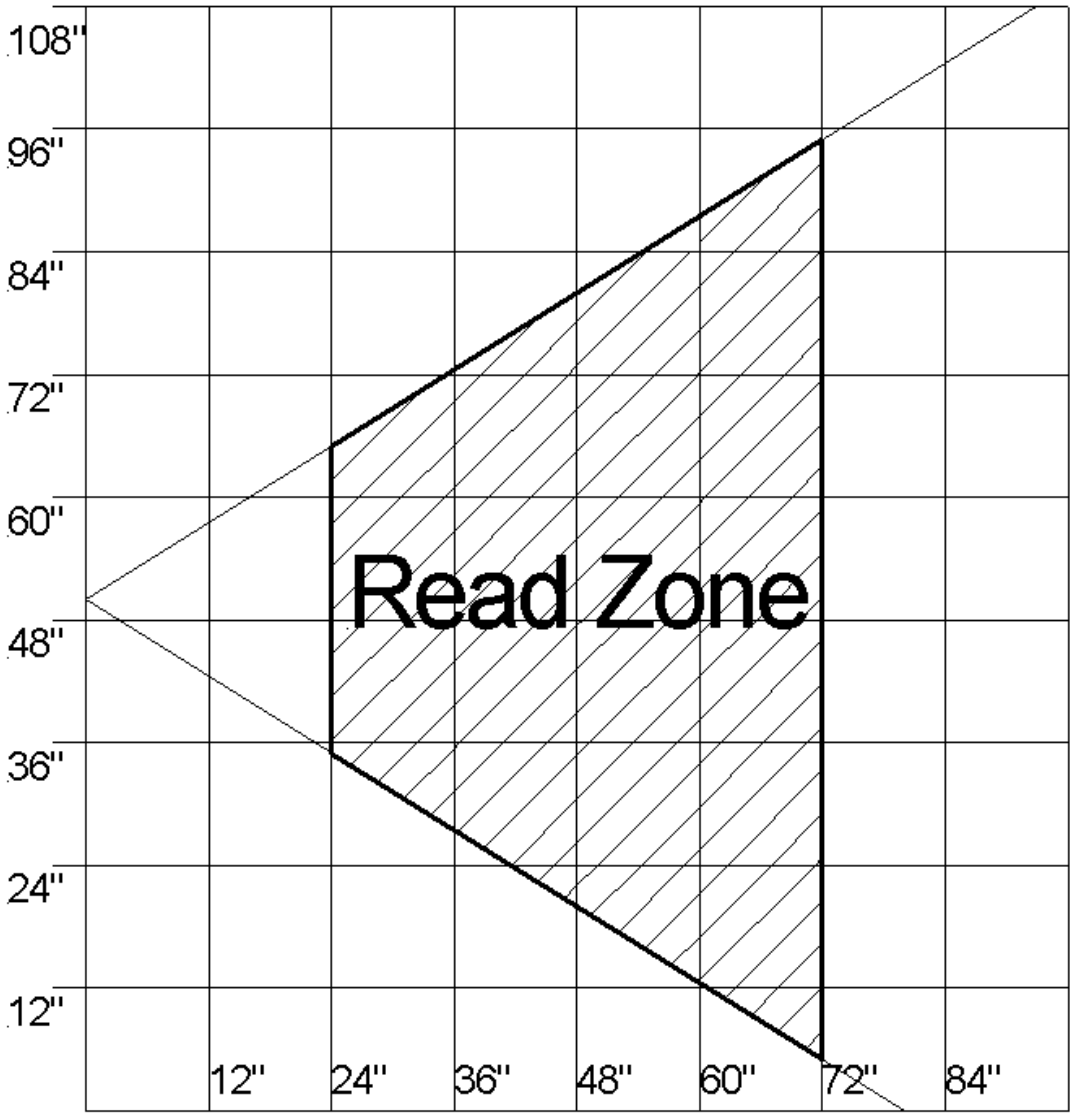
## GENERAL SPECIFICATIONS

### Optical

Reading area begins 24” from enclosure and extends out to 72”
The laser lines are vertical with a fan shaped read area.

Read area chart is measured in inches above pavement.

This assumes that the center of the BA-440 DualBeam window is 50” above the pavement.



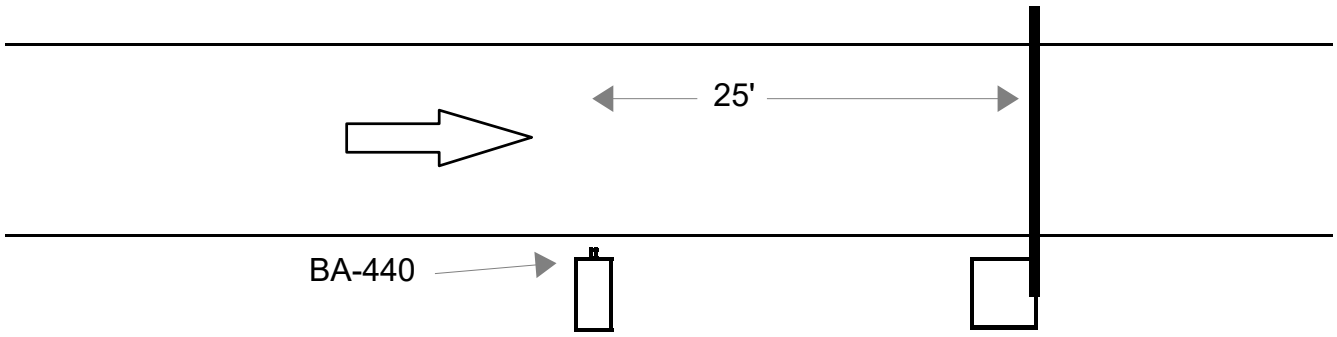

Reading distance in inches from the body of the BA-440 DualBeam.

## BASIC INSTALLATION AND SETUP STEPS

- Determine where the Reader will be installed
- Run wiring to the mounting point for power & communications
- Pour concrete pad for post mount
- Secure mounting post and BA-440 DualBeam to the pad
- Connect power & communications to the reader
- Place decals on vehicles (the same side the reader will be on)
- Turn Power Switch On
- You're up & running

If the BA-440 DualBeam was not set up for your specific installation at the Factory you may have to configure the Reader after it is mounted in place. To do this refer to the Operation and Configuration Manual for details.

**Determine where the BA-440 DualBeam will be installed:**




Overhead view of Installation

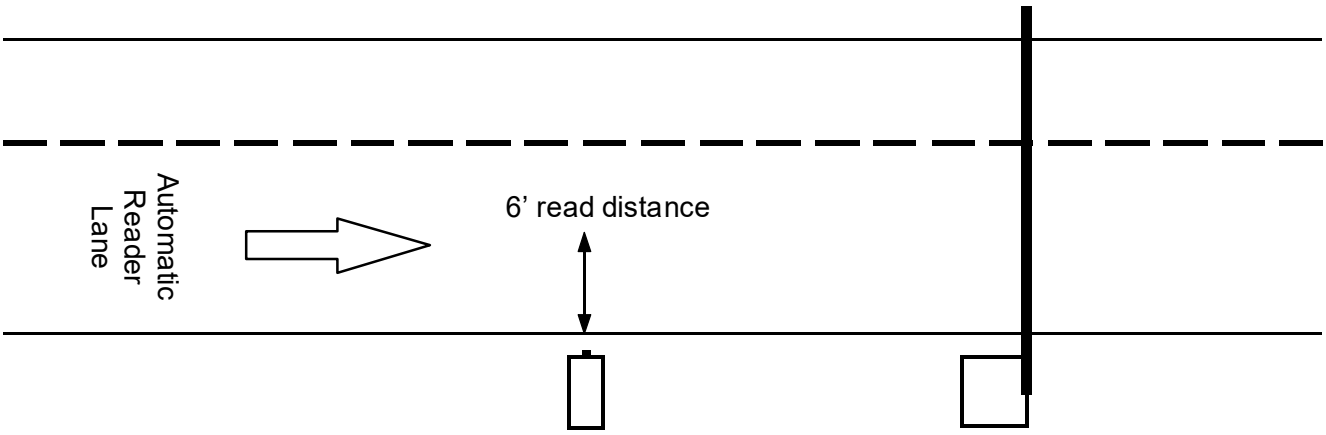
As shown in this figure, the reader should be located 25 feet before the gate. This allows about one car length (plus a small gap) for vehicles to pass the reader. It does not matter which side of the road it is mounted on, as long as the vehicle decals are on the same side. **Always locate the reader and decals on the same side of the car.**

The height of the reader above the pavement is very important. The general rule of thumb is for the bottom of the reader to be 44” above the pavement where the vehicle tires ride. BAi offers a standard mounting post that is 38” high, it is intended to be used on a 6” curb or concrete mounting pad for a total height of 44”.

## BASIC INSTALLATION AND SETUP STEPS

The reader should be mounted close to the edge of the road or drive without being in danger of collision with a vehicle. It has a 6 foot reading distance which will extend out across the road or drive, but traffic should not pass by closer than 2 feet from the reader. Installing protective bollards or barriers around the BA-440 DualBeam is recommended.

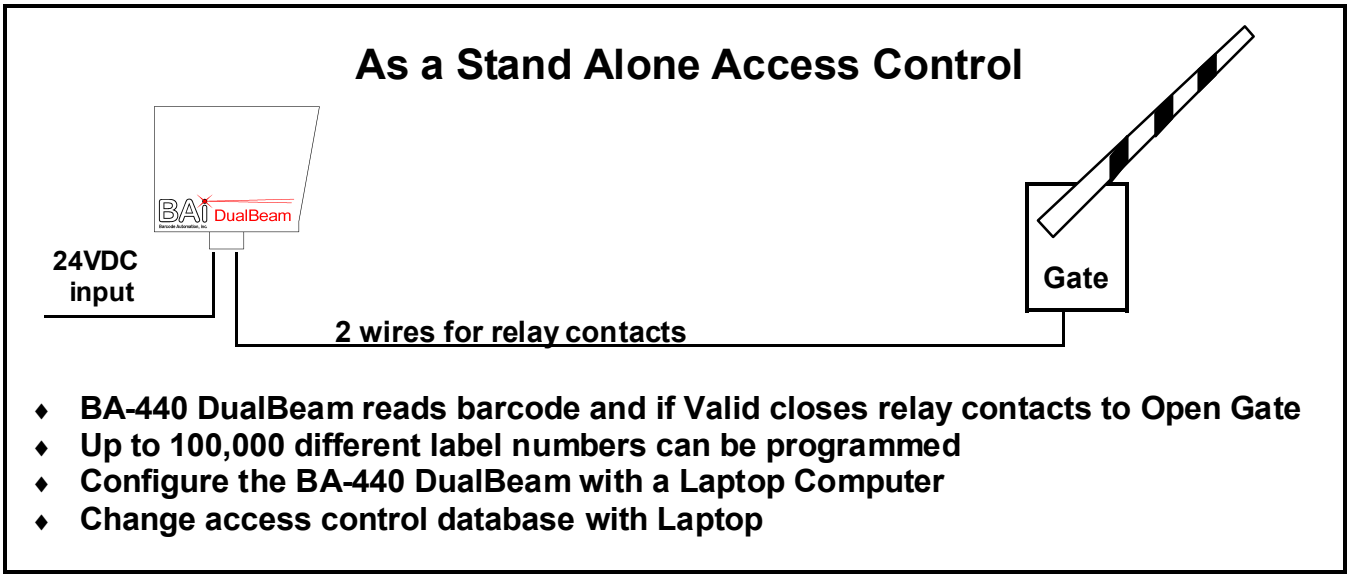
In some locations the vehicle drive is very wide, as shown in the illustration below. In these cases, we recommend painting lane lines or stripes to indicate where the vehicle must pass by in order to be read by the BA-440 DualBeam.



## BASIC INSTALLATION AND SETUP STEPS

### What Wiring do I need?

There are three basic ways to use the BA-440 DualBeam Reader, which cover most applications.




In this situation, the BA-440 DualBeam reader acts as the Access Control and controls the vehicle gate directly. Barcode decal numbers are programmed into the reader from a laptop computer and configured to grant or deny access based on the individual number.

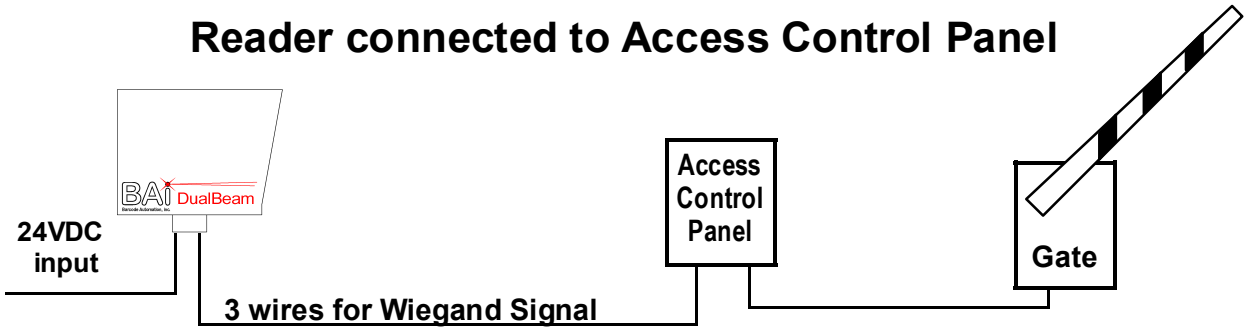
When vehicles pass by the BA-440 DualBeam reads the barcode and checks to see if that number has access. If access is granted the Gd Read relay contact closes to open the gate. If access is denied the gate does not open and the Aux Out relay contact will close. The Aux Out relay can be connected to an indicator or alarm to show the vehicle driver that access is denied.

Wiring Needed:
2 conductor 18 AWG from reader to gate operator
2 conductor 18 AWG copper for 24VDC power connection to BA-440

Optional:
Shielded 3 conductor 18 AWG for connecting RS232 serial port of reader to computer. Distance should not exceed 100 feet.

## BASIC INSTALLATION AND SETUP STEPS

### What Wiring do I need?




- **BA-440 DualBeam reads barcode decal and sends number to Access Panel**
- **Panel determines if the decal number is Valid and controls gate**
- **Change access control database through the Access Control Panel**
- **Compatible with any Access Control Panel using 26 bit Wiegand Interface**

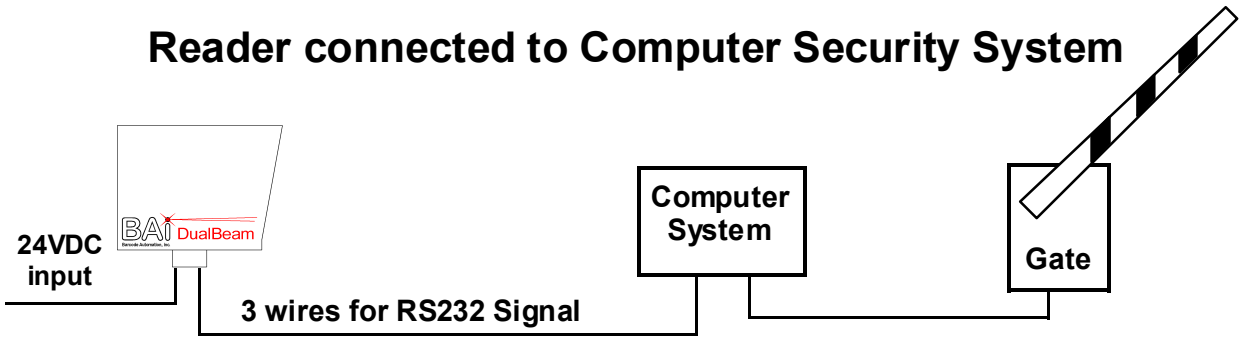
In this situation the BA-440 DualBeam is connected to an external Access Control panel by Wiegand communication. The reader's task is to read decals as vehicles pass, then transmit the information to the Access Control Panel. All decision-making takes place in the Access Control panel.

The barcode ID numbers are programmed into the Access Control panel and set up to have access granted or denied. When the vehicle pulls up to the BA-440 DualBeam, it reads the decal and transmits the number to the Access Control panel, which checks the database for valid numbers. If access is granted, the panel opens the gate.

Wiring Needed:
Shielded 3 conductor 18 AWG from reader to access control panel for Wiegand communication
2 conductor 18 AWG copper for 24VDC power connection to the BA-440

## BASIC INSTALLATION AND SETUP STEPS

### What Wiring do I need?




- **BA-440 DualBeam reads barcode decal and sends data to Computer System**
- **Computer System determines if the number is Valid**
- **Configure BA-440 DualBeam through the Computer System or Laptop**
- **Change access control database through the Computer System**
- **Compatible with any Computer System with RS232 or Wiegand Interface**

In this application the BA-440 DualBeam is connected to a Computer Security System through an RS232 serial port. Barcode decal ID numbers are programmed into the Computer Security system. When a vehicle passes the BA-440 DualBeam reader, it reads the decal and transmits the number to the Computer Security system. All decision-making takes place in the Computer Security system. If the decal is valid, the Computer Security system opens the gate.

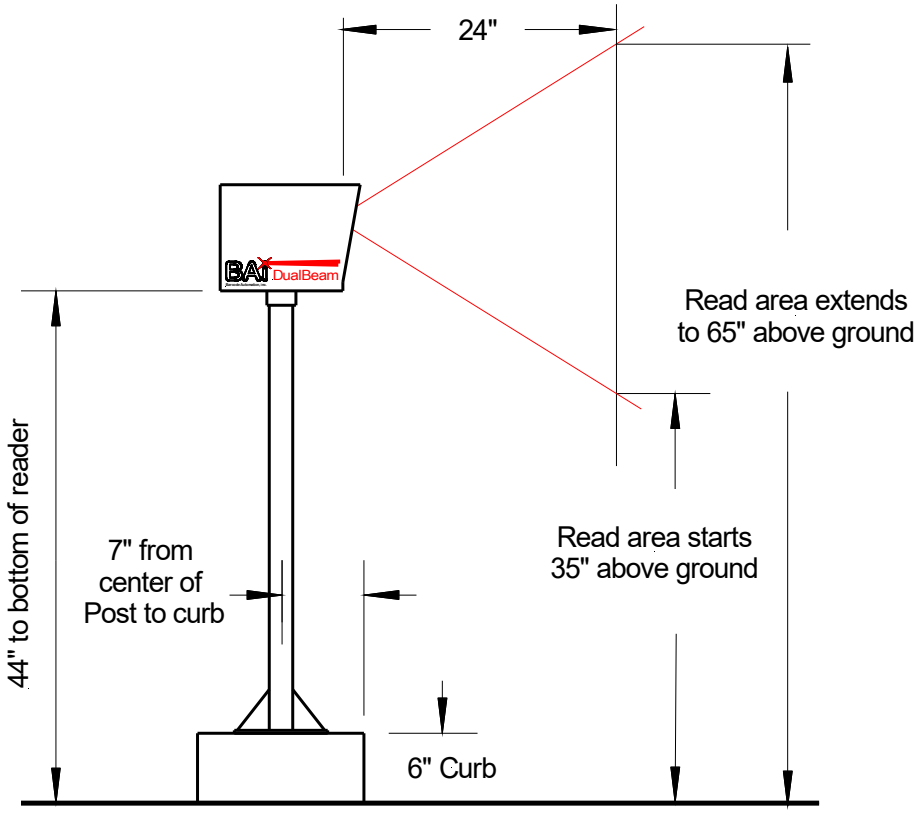
**Power Input**
24VDC - Two wires (Ground and +24VDC) Recommend 18 AWG copper wire. Refer to local building codes for special requirements.

**Communications**
For RS232 interface - Three wires (Transmit, Receive, Ground)
Minimum 3 conductor shielded cable 18 AWG

For Wiegand interface - Three wires (Wiegand 0, Wiegand 1, Ground) Minimum 3 conductor shielded cable 18 AWG

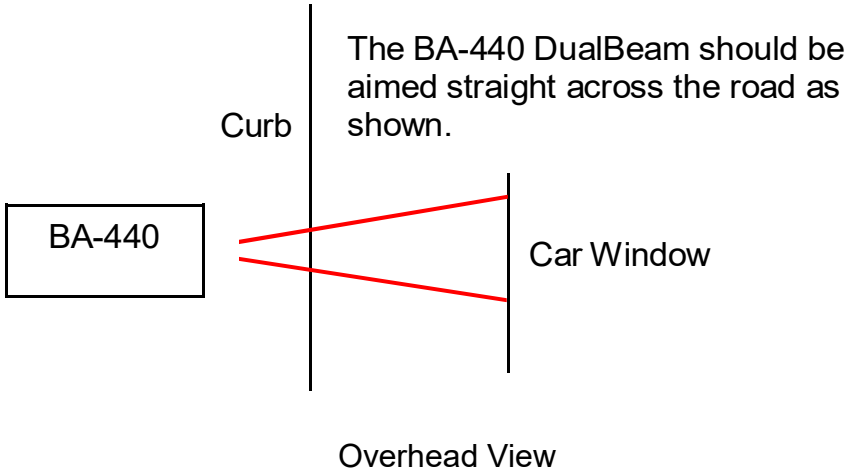
**For I/O**
GdRead relay - Two wires 18 AWG
AuxOut relay - Two wires 18 AWG
AuxIn - Two wires 18 AWG

## TYPICAL INSTALLATION ILLUSTRATION



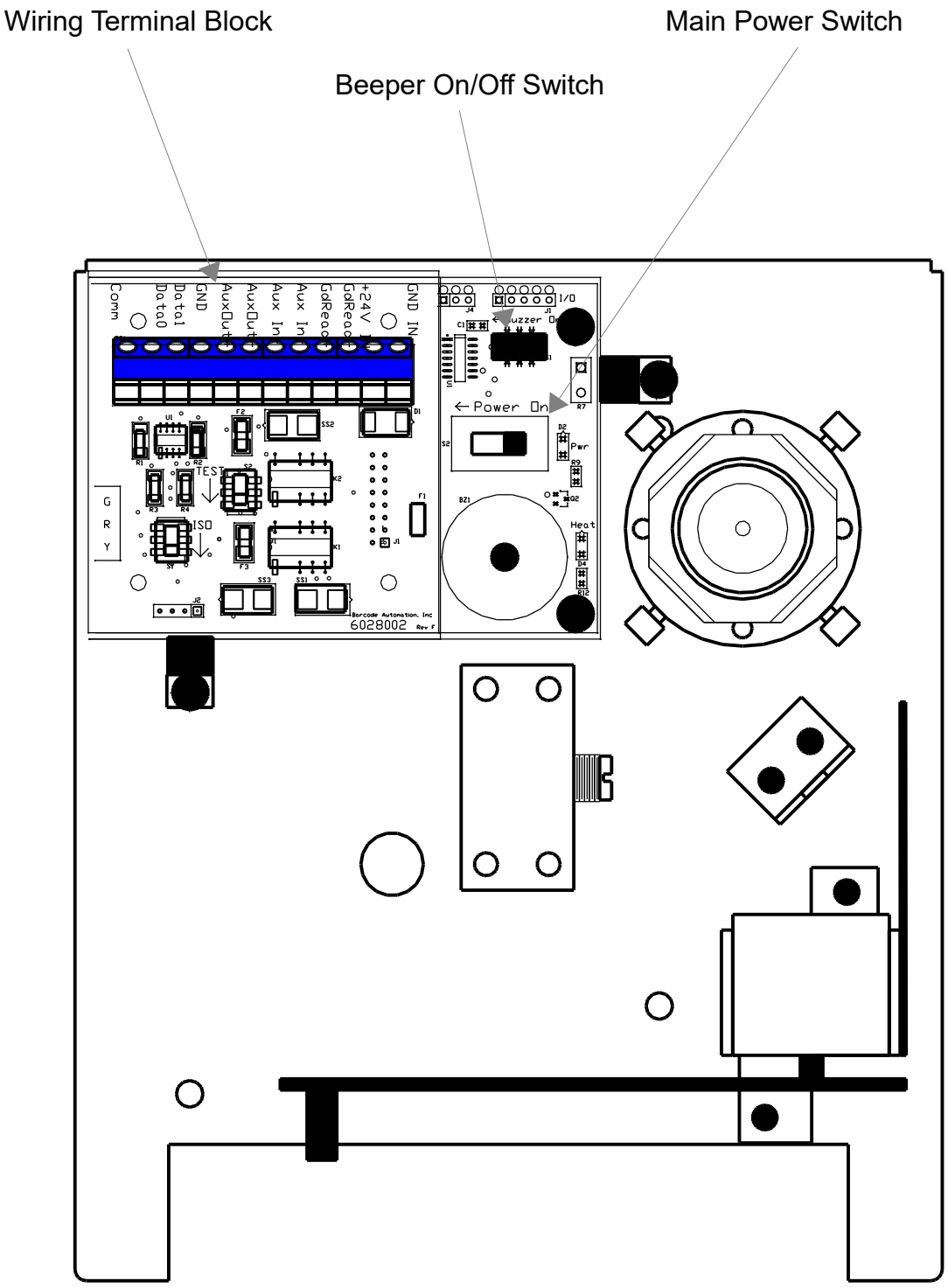

With a 38” mounting post, and a 6” curb, the BA-440 DualBeam (at 24” from the housing) can read barcode decals between 35” and 65” above the pavement .

## MOUNTING ANGLE



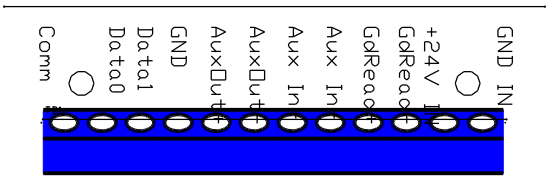

Overhead View

## WIRING CONNECTIONS



## WIRING CONNECTION DEFINITIONS

BA-440 HE Output board




**Input from Power Supply, 24 Vdc @ 1.5A**

GND IN the negative or "-" from the 24 Vdc power supply
+24V IN the positive or "+" from the 24 Vdc power supply

**Ouput Relay for Gate Operator (used in Standalone Operation)**

GdRead- dry contact relay output for gate operator
GdRead+ dry contact relay output for gate operator

**Optional Vehicle Detect input to reader (Not Required)(Loop Detector or Photoeye)**

Aux In- dry contact input to arm reader
Aux In+ dry contact input to arm reader

**Auxiliary Relay Output**

AuxOut- dry contact relay output
AuxOut+ dry contact relay output

**Connection to Reader Ground plane**

GND connection to Reader ground plane

**OptoIsolated Wiegand Communications**

Data1 Wiegand 1 data communication to access system
Data0 Wiegand 0 data communication to access system
Comm signal ground or common to access system
*All three connections are required for reliable communication*

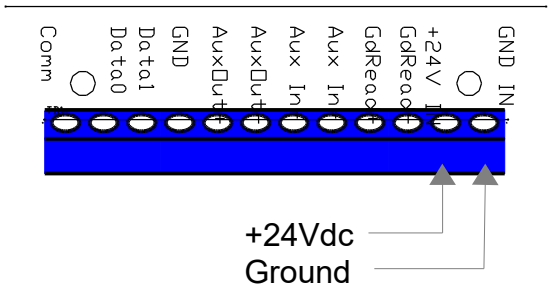
# WIRING CONNECTION DETAILS

## Power Input Terminals

**GND IN**
**+24V IN**

The power input terminals for 24Vdc input are marked for the Ground and +24Vdc leads. Reader is Reverse polarity protected.

**NOTE:** The 24Vdc source must supply 1.5 Amps to the Reader for proper operation. Recommend 18AWG copper cable for runs up to 200’ away from the +24Vdc source.



## WIRING CONNECTION DETAILS

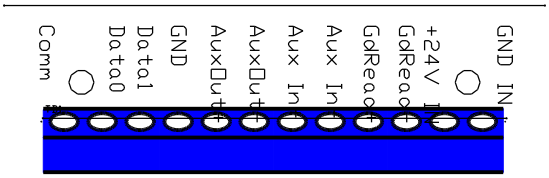
Wiegand Communication Terminals

**Data1**
**Data0**
**Comm**

Wiegand communication from the BA-440 has two different configurations, **Isolated** and **Direct**.

In **Isolated** mode, the reader does not put any voltage on the Wiegand outputs. It relies on voltage from the access control panel or telephone entry system to transmit information. There are several advantages to this, provided the Access panel or telephone entry system supports it.

To use the Isolated connection the access panel or telephone entry system must provide voltage to the Data0 and Data1 connections on the reader. To check compatibility with Isolated communications, connect the access panel as shown on page 19. With the access panel powered on, measure from the **Data0** and **Data1** terminals to **Comm** (NOT GND) with a voltmeter. There will be about +5Vdc at each Wiegand line when using access panels that support the Isolated connection.



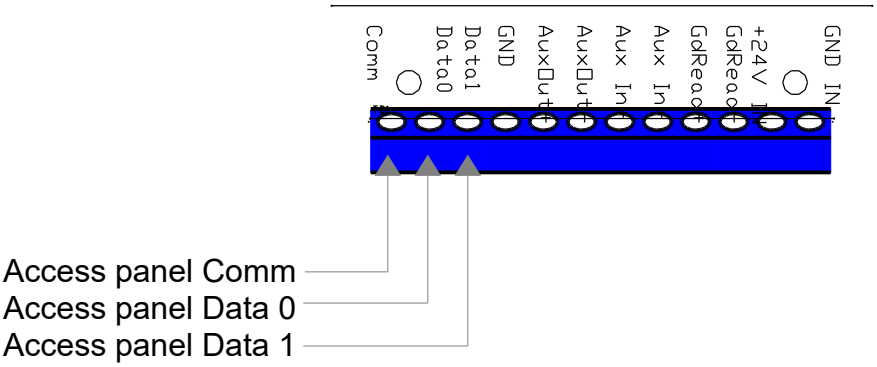

If no voltage is measured from Data0 or Data1 to Comm the Isolated connection will not function. Instead, the BA-440 must be configured for a direct Wiegand connection.

# WIRING CONNECTION DETAILS

## Wiegand Communication Terminals

**Isolated Connection** (Preferred)
The Wiegand output communication terminals are marked as Data1, Data0 and Comm. The normal configuration for Wiegand communication from the BA-440 is **isolated**, where the reader does not supply voltage on the Data0 and Data1 terminals and Comm does not have a direct connection to the reader ground. The Voltage and ground reference is supplied by the access panel or telephone entry system. Use 18Ga shielded copper cable for runs up to 400' and ground the shield at the access system end only.

Once Wiegand communication is connected to the access system, turn the access system on and measure voltage between Comm and Data0, then Common and Data1. There should be approximately 5Vdc present on the Data0 and Data1 terminals. If no voltage is measured from Data0 or Data1 to Ground the Isolated connection will not function. Instead, the BA-440 must be configured for a direct Wiegand connection.



# WIRING CONNECTION DETAILS

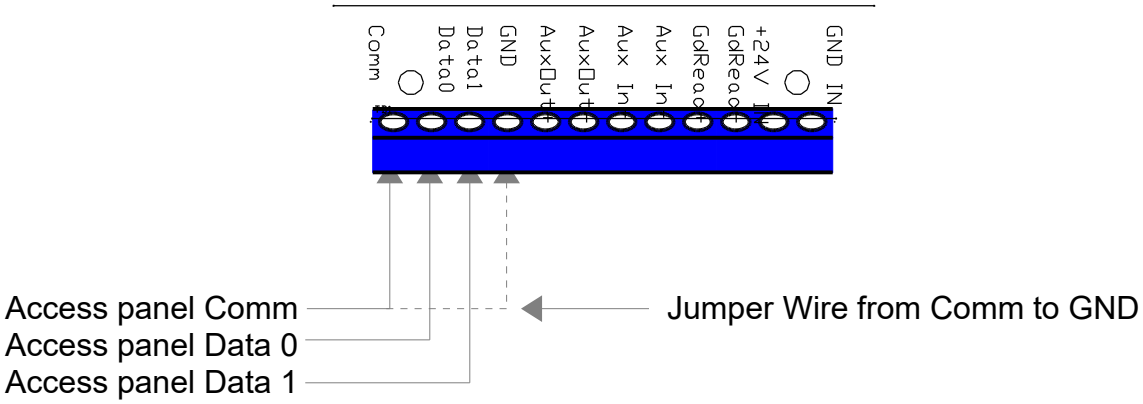
## Wiegand Communication Terminals

**Direct Connection** (if Isolated connection cannot be used)
In some cases the Isolated Wiegand communication cannot be used, generally due to the Access panel or telephone entry not providing voltage on the Data0 and Data1 lines.

To change the Wiegand connection from isolated to direct:

- Move switch S1 to upper position away from the ISO label
- Place small jumper wire between Comm and GND terminals

In **Direct Connection** mode the BA-440 provides 5Vdc voltage pull ups on the Data0 and Data1 lines and connects the Common reference to the reader Ground.



# WIRING CONNECTION DETAILS

## Vehicle Detect Input Terminals

**Aux In-**
**Aux In+**

This is an optional dry contact input (Normally Open) to control when the reader will detect barcode decals. When used, the Aux In connection will allow decal reads only when the connection is Closed.

**DO NOT APPLY VOLTAGE TO THESE TERMINALS. THE TERMINALS SHOULD BE CONNECTED TO SWITCH OR RELAY CONTACTS ONLY.**
Use 18Ga copper cable for runs up to 200'.

Measuring across Aux In+ to Aux In– with a voltmeter should result in a +5Vdc voltage with the connection Open. Closing the connection should result in a measurement of 0 VDC.

## Relay Output Terminals

**AuxOut-**
**AuxOut+**

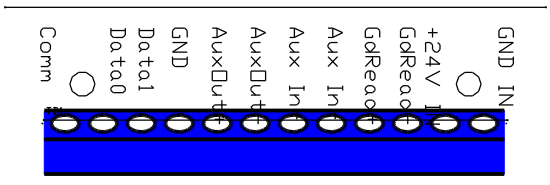
This is a dry contact output whose function changes depending on the reader configuration. See the Configuration manual for details.

**GdRead-**
**GdRead+**

This is a dry contact relay output intended to control a gate operator. See the Configuration manual for details.

## Relay Contact Ratings

Relay contact connection must not exceed 30 Vdc @ 2 A - 60 W



## POWERING UP THE BA-440 DUALBEAM READER

When testing the BA-440 DualBeam, it is useful to have a laptop computer on hand to access the diagnostics built into the unit or alter the configuration if necessary. For more information on how to communicate with the reader refer to the Operation and Configuration Manual.

When the BA-440 DualBeam is powered on:

- A short beep is heard
- The Main Power indicator should light up
- The silver mirror wheel (also known as the polygon) will spin

Within 15 seconds of the Reader powering on:

- The laser should turn on

The BA-440 DualBeam is now ready to read barcode decals

## DIAGNOSTIC LED INDICATORS

Status LED's on the BA-440 are located on the decoder circuit board, which is mounted on the opposite side of the module from the wiring terminals. On the left side of the decoder circuit board, a column of LED indicators provide information on reader operation. From top to bottom they are:

**Gd Read** (Green) – **Good Read** will light for approx 1 second when a decal is read

**Lsr Act** (Yellow) – **Laser Active** indicates when the laser is on

**Rst Act** (Green) – **Reset Active** will light when the unit is being reset

**Data0 Act** (Red) - **Data 0 Active**
**Data1 Act** (Red) - **Data 1 Active**
These LED's indicate when the Wiegand communication lines (Data0 and Data1) are sending data. When the BA-440 DualBeam is not transmitting, these LED's should be off. If one or both of the LED's are on constantly there may be a problem

**Loop In** (Yellow) - **Loop Input** will light when the Aux In– and Aux In+ input detects a dry contact connection

**DigLo** (Yellow) - **Digital Low Channel** will light when data is detected from the receiver board
**DigHi** (Yellow) - **Digital High Channel** will light when data is detected from the receiver board

**Diag** (Green) - **Diagnostic** will light when decoder is in programming or diagnostic mode

**Heat** (Red) – **Heater** will light when heater is turned on

**Sync** (Green) – **Sync** will light when silver wheel is spinning

## HE OUTPUT BOARD

The BA-440 HE Output Board (OB) contains the power surge protection for the reader and a test circuit to verify that 26 bit Wiegand messages are being transmitted. Since the test circuit is battery powered, the OB can be used to test for valid 26 bit Wiegand messages even when it is not installed on the BA-440.

### Using Verifier Function With Output Board Installed on BA-440

With the VOB installed on the BA-440, be sure the wiring connections for power and Wiegand communications are correct. Since the verifier is part of the reader output board, you must be sure that the ISO switch is set correctly. For **Isolated** Wiegand, the ISO switch should be down and there should NOT be a jumper between Comm and GND. For **non-Isolated** Wiegand, the ISO switch should be up and there **must** be a jumper between Comm and GND.

The verifier test circuit indicators are located on the back of the circuit board, aimed to the left where they are visible when standing behind the reader. Since the BA-440 is mounted outdoors with possibly bright sunlight the LED's are located in a shaded area between the Output board and Interface board. On the OB, turn the test switch ON, which is the down position. The Green, Red, and Yellow LED's will blink once **in sequence** to show that the verifier is ready.

**Important Note:** To preserve the battery, the verifier will only run for 10 minutes after the switch is turned ON, then it will go into hibernation. If you need to use it longer, turn the TEST switch OFF, wait 5 seconds, then ON again. Be sure to watch for the LED's to blink in sequence to confirm the test circuit is operational.

Once the verifier is ON, watch the LED’s for activity. If you see:

No LED’s blinking - 1. this may mean that there is no Wiegand message being sent. Check the voltage on Data 0 and Data 1 to see if there is 5 VDC present. If no voltage is found or if voltage is less than 3 Vdc, Wiegand cannot be sent.

2. if voltage at Data 0 and Data1 is about 5 Vdc, check to see if Wiegand messages are being sent by observing the Data 0 and Data 1 LED’s on the decoder PCB. If these are not blinking, no messages are being sent.

3. if the Data 0 and Data 1 LED’s on the decoder PCB are blinking but the Verifier LED's do not then there is no Wiegand message to detect. The Wiegand output may be damaged, replace the Output Board and try again.

Green LED blinking - this indicates a 26 bit Wiegand message is detected with valid parity. There is no problem with the Wiegand message.

# HE OUTPUT BOARD

### Using Verifier Function With Output Board Installed on BA-440

Amber LED blinking - this indicates a 26 bit Wiegand message is detected with bad parity. Replace the output Board and test again.

Red LED blinking - 1. this indicates that the Verifier is detecting less than 26 bits or more than 26 bits in a group. Since this is not a valid message the Red LED will blink. Be sure the Wiegand message is 26 bits, not 30 bits or more. Also check voltages on Data 0 and Data 1 - if either one measures 0 or less than 3 Vdc that may be the problem.

2. if red blinks occur when no Wiegand message is sent by the reader there may be electrical interference on the communication line. This interference may be caused by a power line too close to the communications cable or a disconnected shield.

Red & Green blinking - this indicates that both valid messages and electrical interference are detected on the communications line. Some Wiegand messages will fail if the interference occurs when the message is being transmitted.

### Using Verifier Function With Output Board Held in Hand

The HE Output Board (OB) is portable and can be used as a handheld Wiegand test unit. When using the OB as a handheld, be sure the wiring connections for Wiegand communications are correct. Since the verifier is not installed on the BA-440, the ISO switch is disabled, so it doesn't matter what position it is in. All you need to connect is the Data 0, Data 1, and Comm terminals.

You can connect the verifier at any point on the Wiegand communication lines. BAi recommends starting at the reader Wiegand output to verify that it is sending a valid Wiegand message. If the reader shows a valid Wiegand message, move the OB to the Wiegand input of the access panel or telephone entry system and check for a valid Wiegand message. If the OB shows a valid message but the access panel does not, the access panel Wiegand input is likely damaged.

The verifier test circuit indicators are located on the back of the circuit board, aimed to the left. Turn the test switch ON, which is the down position. The Green, Red, and Yellow LED's will blink once **in sequence** to show that the verifier is ready.

**Important Note:** To preserve the battery, the verifier will only run for 10 minutes after the switch is turned ON, then it will go into hibernation. If you need to use it longer, turn the TEST switch OFF, wait 5 seconds, then ON again. Be sure to watch for the LED's to blink in sequence to confirm the test circuit is operational.

## HE OUTPUT BOARD

### Using Verifier Function With Output Board Held in Hand

Once the verifier is ON, watch the LED's for activity. If you see:

No LED's blinking - 1. this may mean that there is no Wiegand message being sent. Check the voltage on Data 0 and Data 1 to see if there is 5 VDC present. If no voltage is found or if voltage is less than 3 Vdc, Wiegand cannot be sent.

2. if voltage at Data 0 and Data1 is about 5 Vdc, check to see if Wiegand messages are being sent by observing the Data 0 and Data 1 LED's on the decoder PCB. If these are not blinking, no messages are being sent.

3. if the Data 0 and Data 1 LED's on the decoder PCB are blinking but the Verifier LED's do not then there is no Wiegand message to detect. The Wiegand output may be damaged, replace the Output Board and try again.

Green LED blinking - indicates a 26 bit Wiegand message is detected with valid parity. There is no problem with the Wiegand message.

Amber LED blinking - indicates a 26 bit Wiegand message is detected with bad parity. This is usually caused by a wiring error where the Data 0 and Data 1 connections are reversed at the OB. Swap the Data 0 and Data 1 connections at the OB and test again.

Red LED blinking - 1. this indicates that the Verifier is detecting less than 26 bits or more than 26 bits in a group. Since this is not a valid message the Red LED will blink. Be sure the Wiegand message is 26 bits, not 30 bits or more. Also check voltages on Data 0 and Data 1 - if either one measures 0 or less than 3 Vdc that may be the problem.

2. if red blinks occur when no Wiegand message is sent by the reader there may be electrical interference on the communication line. This interference may be caused by a power line too close to the communications cable or a disconnected shield.

Red & Green blinking - this indicates that both valid messages and electrical interference are detected on the communications line. Some Wiegand messages will fail if the interference occurs when the message is being transmitted.

## READING A TEST BARCODE

Refer to page 27 for information on how the barcode must be held for the BA-440 to read it. With the decal held in the correct orientation, pass the barcode through the laser lines. The beeper should sound for approximately 1/4 second to show that the barcode was read, and the **Gd Read** LED (green) on the left edge of the decoder circuit board will light for 1 second.

**Important:** The BA-440 DualBeam will not read the **exact same barcode number** until at least 1 second has passed since the last time it was read.

Remember to wait 1 second between reads before trying to scan the same barcode. If you try to read it again sooner, the BA-440 DualBeam will ignore it. This feature prevents multiple messages from being sent for the same barcode decal. If a different barcode number is read, you do not have to wait, the Reader will beep and you will see the green LED indicator light. The only time you will need to wait 1 second between reads is if you have only 1 barcode number to test with.

## FINISHING THE BA-440 DUALBEAM INSTALLATION

After the Reader is mounted and the wiring is connected, the opening in the bottom of the baseplate must be sealed off. Use silicone, RTV, or other sealant to close off the opening in the bottom so it is watertight. The putty supplied with the unit is intended for temporary use only.

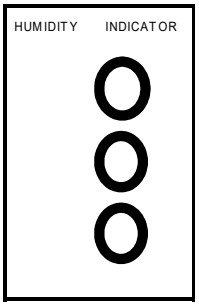
Open the plastic bag and remove the desiccant pouches and humidity card. Place the pouches and humidity indicator card flat on the bottom of the unit just before installing the enclosure Hood. Under normal conditions, the desiccant will absorb moisture from the air in the Reader for approximately 6 months before becoming saturated.

**Important:** Put the desiccant in the reader AFTER the installation is complete and you are ready to close up the enclosure.

Each time you open the Reader for service, immediately check the humidity indicator card. If all of the humidity card circles are pink, remove the old desiccant pouches and humidity card and replace them with fresh ones

.

**BE SURE TO CHECK THE HUMIDITY CARD FIRST WHEN OPENING THE READER.** After the door is opened, the card will react to humidity in the outside air and turn pink to show how humid the outside air is. As long as the card is not all pink when you first open the door there is no need to change the desiccant bag.




If all 3 circles are pink when Reader is first opened the desiccant should be changed.

## APPLYING DECALS TO VEHICLES – DRIVER SIDE

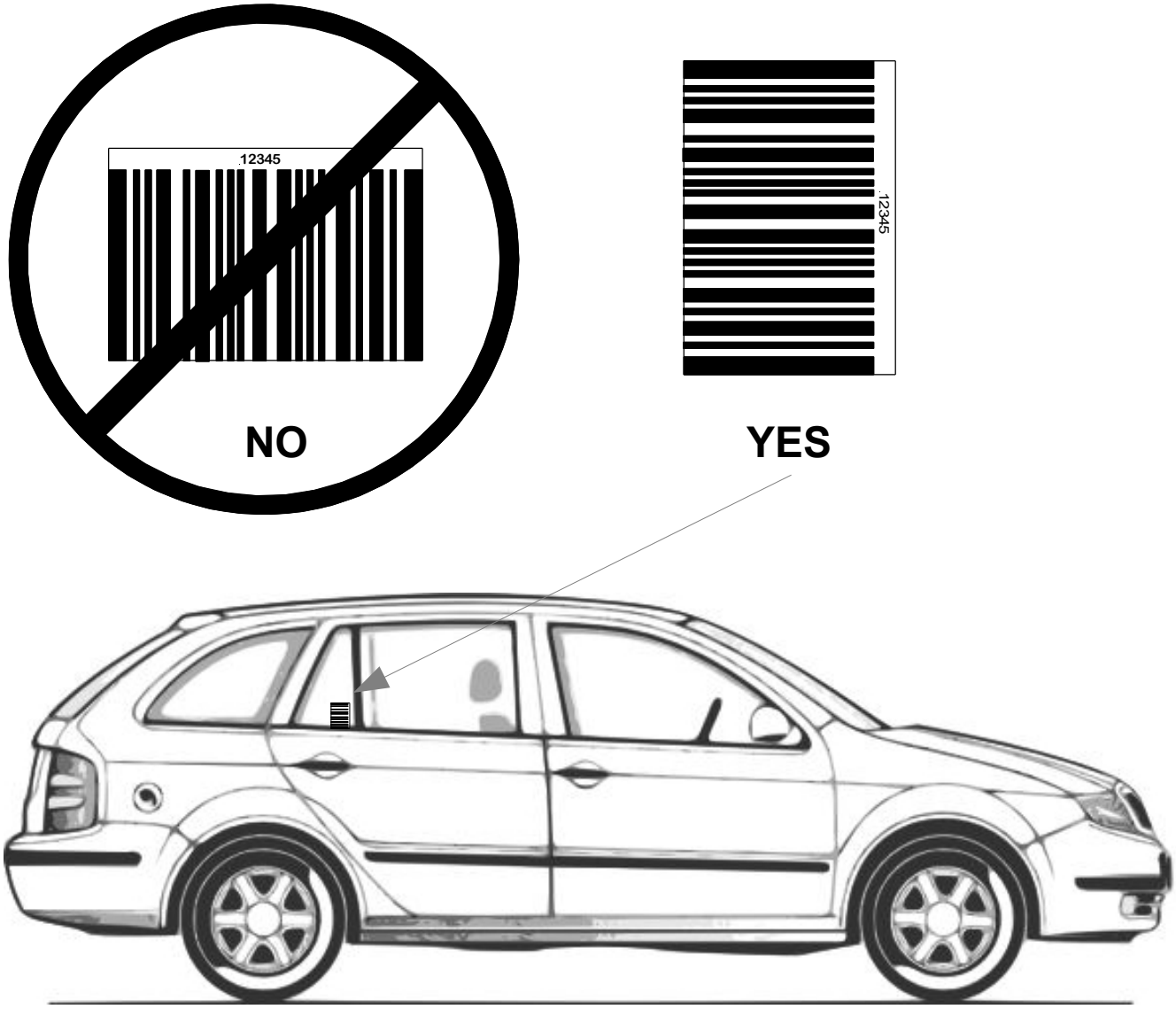
**General Guidelines for applying decals:**

- Place decals on the same side of the vehicle that the reader is on.
- Apply to the outside of the window glass. **Decals will not read reliably through glass.**
- Orient decal with the stripes running horizontal. (as shown).
- The bottom of the decal should be at least 36 inches above the ground.
- The top of the decal should be no more than 65 inches above the ground.
- Place decal in an unobtrusive spot on the rear side window. Windows that do not open are preferred.
- The numbers printed on the decal should be on either the left or right side, never the top or bottom. The decal should be applied vertically, aligned as straight as possible.
- If placed on the vehicle anywhere other than glass, it can be difficult to remove the decal without damaging the surface.

## APPLYING DECALS TO VEHICLES – PASSENGER SIDE

**General Guidelines for applying decals:**

- Place decals on the same side of the vehicle that the reader is on.
- Apply to the outside of the window glass. **Decals will not read reliably through glass.**
- Orient decal with the stripes running horizontal. (as shown).
- The bottom of the decal should be at least 36 inches above the ground.
- The top of the decal should be no more than 65 inches above the ground.
- Place decal in an unobtrusive spot on the rear side window. Windows that do not open are preferred.
- The numbers printed on the decal should be on either the left or right side, never the top or bottom. The decal should be applied vertically, aligned as straight as possible.
- If placed on the vehicle anywhere other than glass, it can be difficult to remove the decal without damaging the surface.



# DECAL APPLICATION PROCEDURE

**Recommended application procedure:**

**Clean the Window.**

1. Clean the window glass using SoftScrub® or other mild abrasive cleaner. **Do not use glass cleaner.** Mild abrasive cleaners will not scratch the window, but are very effective at removing wax or other chemical coatings that will interfere with the decal bonding to the glass. Most glass cleaners now contain silicone or other chemicals that “fill in” pits and scratches in the glass. This also leaves a coating on the glass that prevents the decal from bonding to the window, making it easier to remove intact.
2. Place a small amount of SoftScrub® or other mild abrasive on a green plastic scrubber pad and gently scrub the area where the decal will be applied for 10 – 20 seconds.
3. Rinse and dry the window glass.

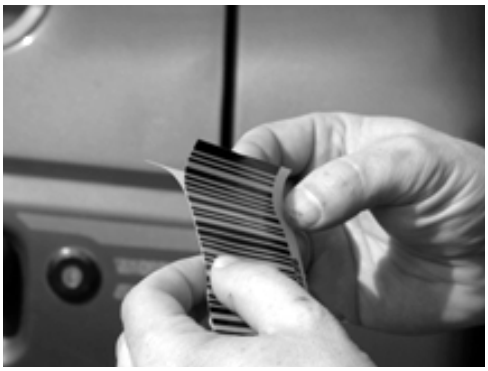
**Apply the decal.**

**Note:** This procedure uses a squeegee from BAi to help apply decals. An object with a thin, straight plastic edge such as a credit card, driver's license or other ID card can be used in place of the squeegee.

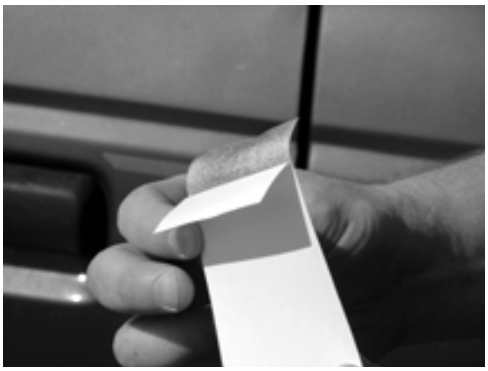
Using these directions will result in a strong bond with the window glass. The decal should not appear “stretched” or have bubbles from trapped air.

**Warning:** The backing paper supports the decal and helps it keep the rectangular shape. The decal material itself is relatively soft and may stretch or sag if the backing is completely peeled off before the decal is applied. For best results, follow these steps:

1. Peel top of decal back about 1”



2. Bend backing paper flat against back of decal



## Applying Decals to Vehicles

### Apply the decal. (continued)

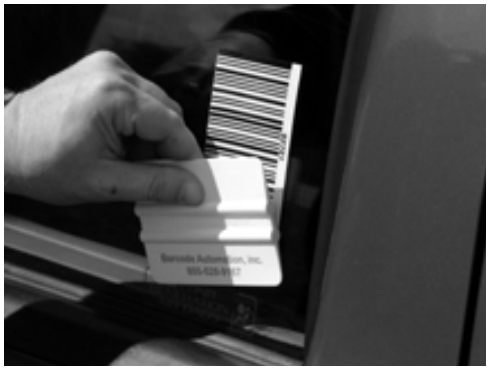
3. Line up decal in desired location on window, then press firmly on top where the backing was peeled back

4. Place squeegee at top of decal. Press firmly against window and run it smoothly down the decal

5. Hold backing with other hand

6. As you move the squeegee down, backing will come loose

7. Decal is now in place



If there are any questions please contact BAi at 800-528-9167.