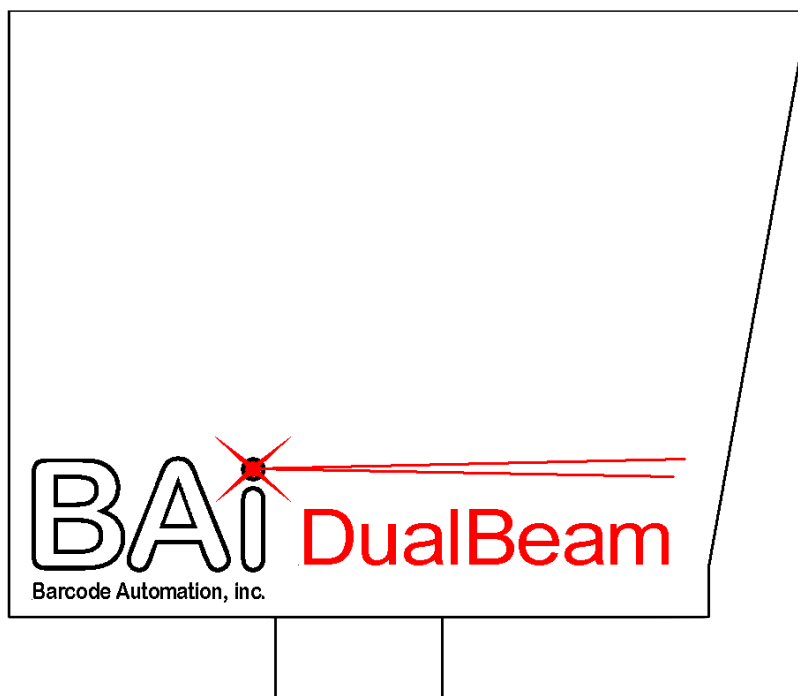


INSTALLATION AND MAINTENANCE MANUAL FOR BA-440 DUALBEAM BARCODE READER



revised 3/29/2012



Doing It Better - Because We Care.

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FOREWORD

The purpose of this manual is to provide information on how to install, configure, operate, and maintain the Barcode Automation BA-440 DualBeam Barcode Reading and Access Control System. 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.

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March 2012

INTRODUCTION

This section contains information for 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. Figure 1 on page 6 shows 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

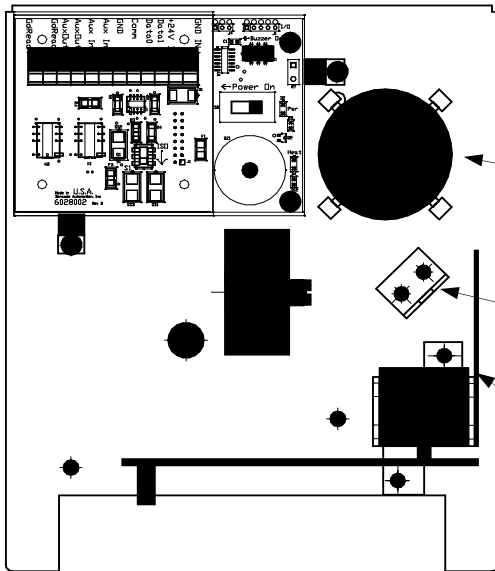
Never stare directly into laser beam. The laser diode is interlocked with the motor that turns the polygon mirror so that if the motor slows or stops for any reason the laser will be automatically turned off.

ELECTRICAL SAFETY

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

REQUIRED MAINTENANCE

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 include:



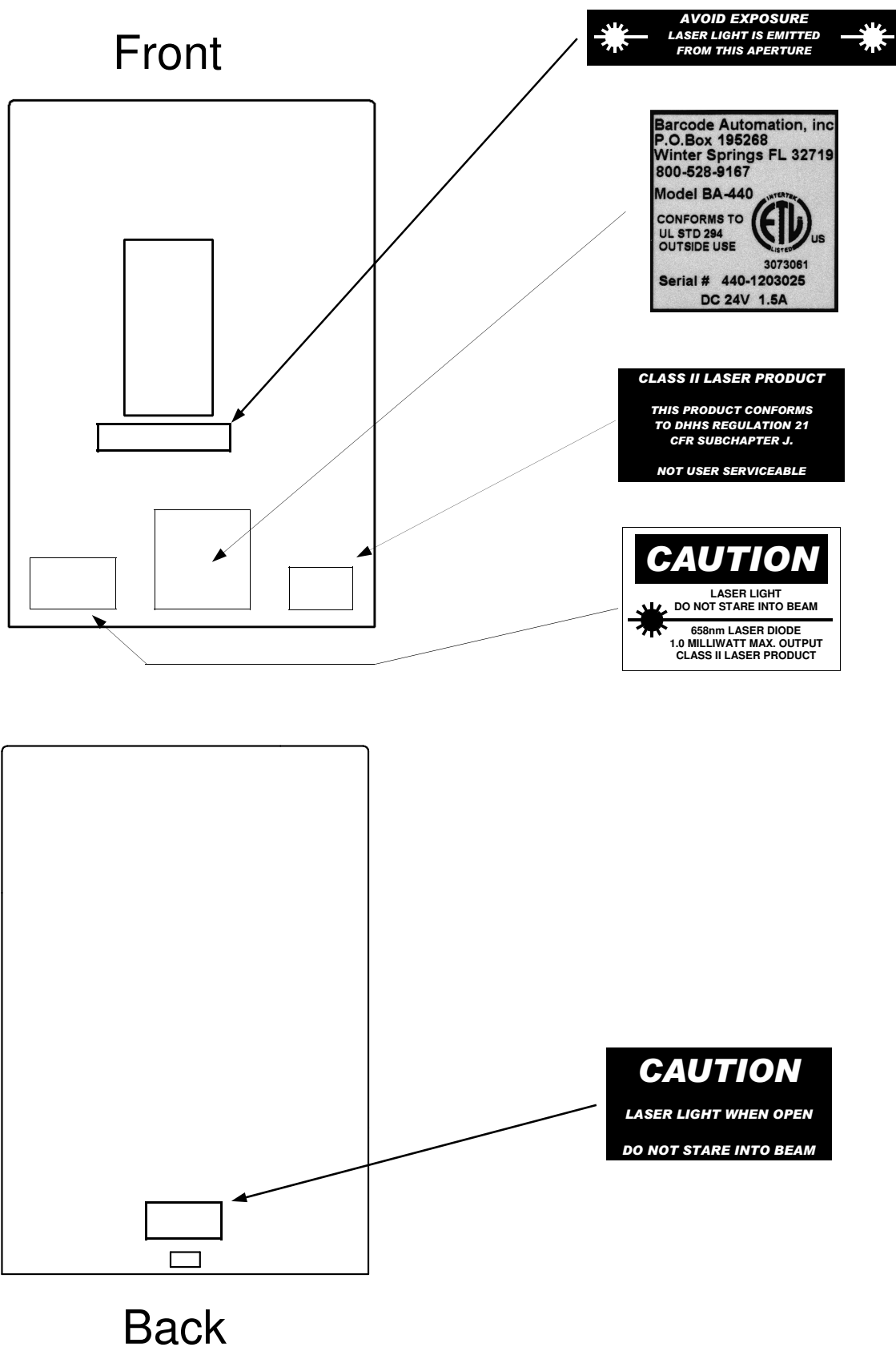
- Window glass both inside and outside
- 8 sided gold mirror wheel (Polygon)
- Small mirror below gold wheel (Polygon)
- “Fisheye” lens in the silver block below the small mirror

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.** These will scratch the metal of the gold wheel and degrade reader performance. 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 inside/outside the window glass on the reader hood/cover.
4. Clean all 8 mirror sides on the gold wheel (polygon).
5. Clean the small mirror directly below the gold 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 tighten the 6 flanged nuts on the bottom of reader.

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

Warning Label Placement for BA-440



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General Specifications

Light Source: Visible Laser Diode
Output Wavelength (nominal): 658 nM
CDRH Safety Class II
Output Power: less than 1mW/cm²

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 Accu-Sort, Amtel, ISI, & LazerData

Communication (RS232):

Data Rate: 2400, 4800, 9600, 19200, 38400 Baud

Parameters: 8N1, 7E1

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: NEMA 4

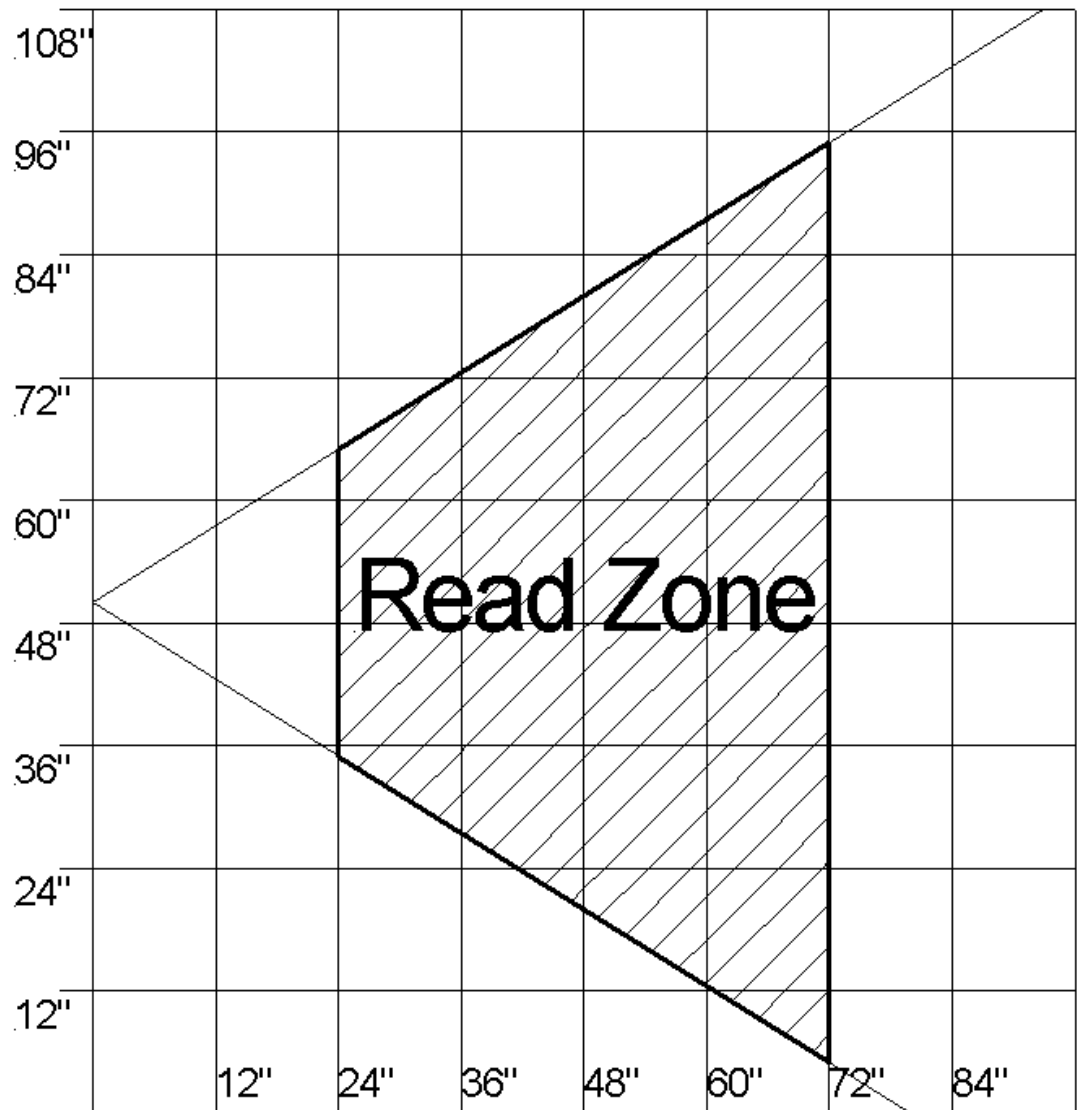
General Specifications

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.



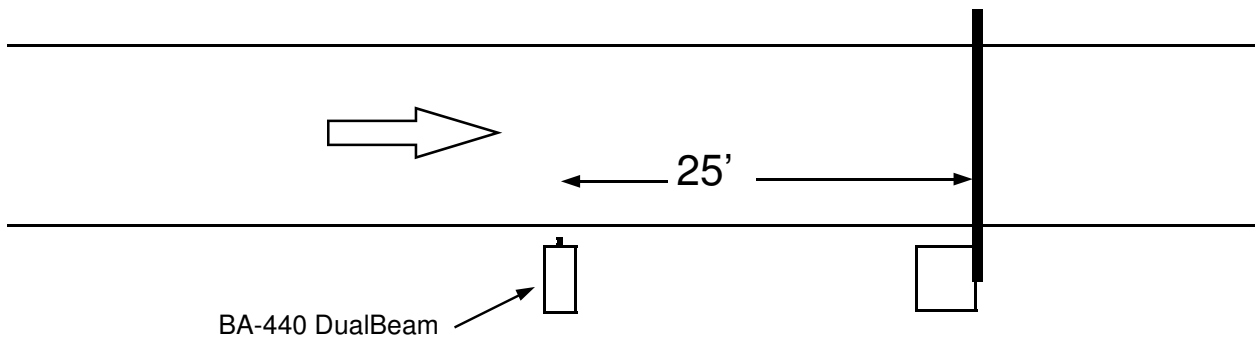
Reading distance in inches from the body of the BA-440 DualBeam.

Basic Installation and Setup steps

1. Determine where the Reader will be installed
2. Run wiring to the mounting point for power & communications
3. Pour concrete pad for post mount
4. Secure mounting post and BA-440 DualBeam to the pad
5. Connect power & communications to the reader
6. Place decals on vehicles (**the same side the reader will be on**)
7. Turn Power Switch On
8. 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:



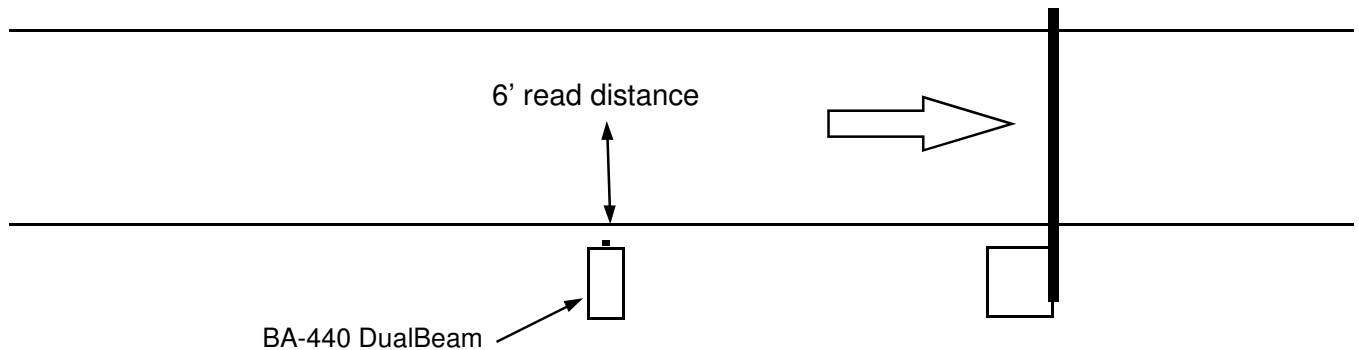
Overhead view of Installation

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.

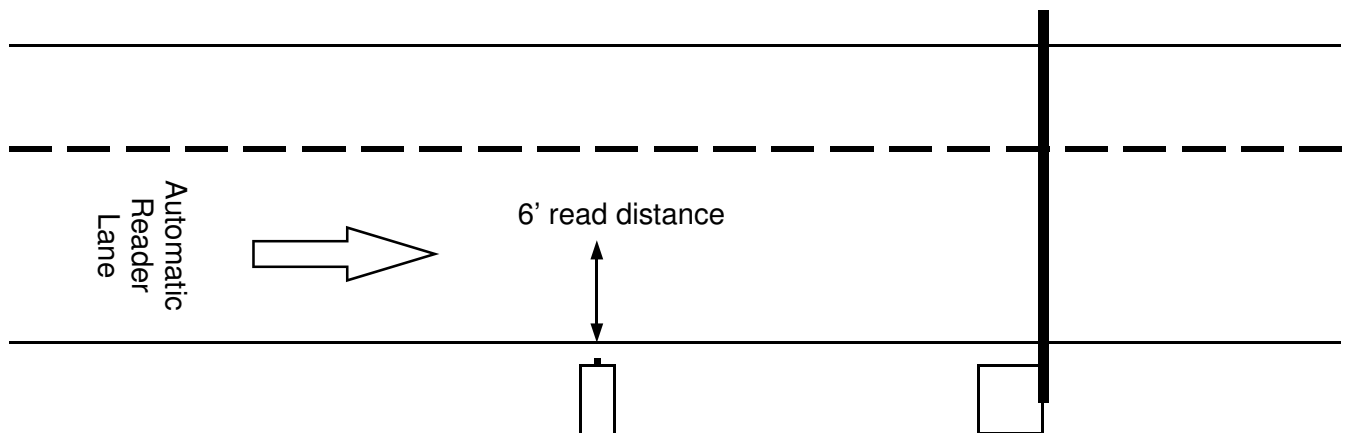
Determine where the BA-440 DualBeam will be installed:

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".



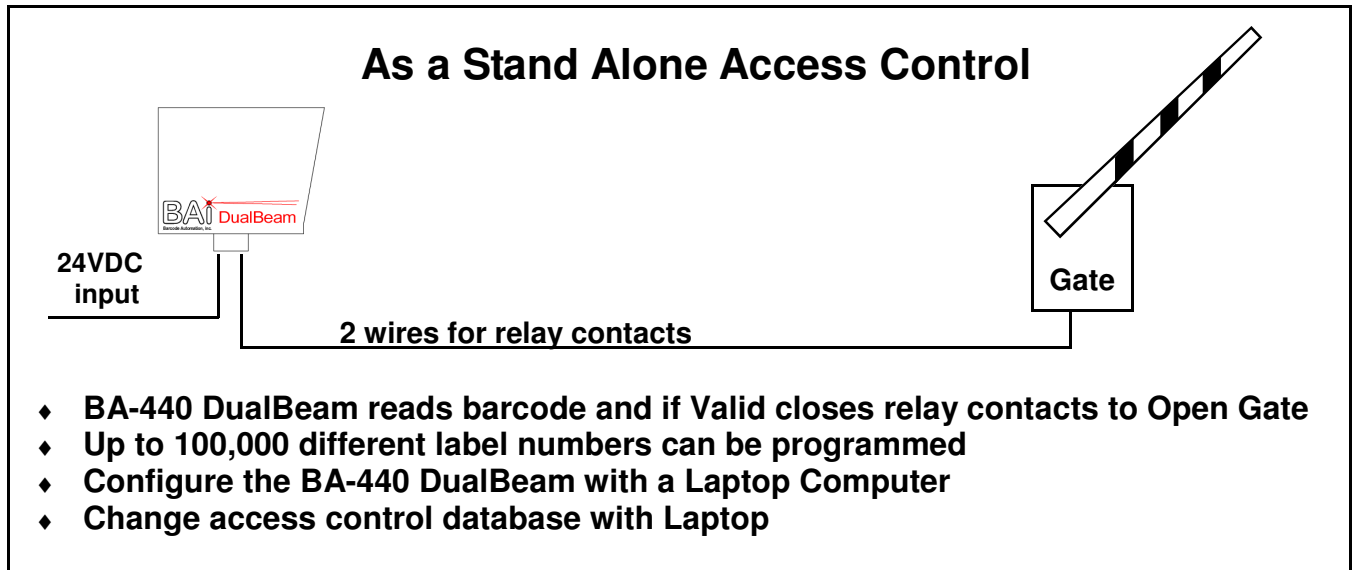
The reader should be mounted close to the edge of the road or drive without being in danger of collision with a vehicle. It has a 6 foot reading distance which will extend out across the road or drive. Traffic should not pass by **closer** than 2 feet from the reader. Protective bollards or barriers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



What Wiring do I need?

For most applications, there are three basic ways to use the BA-440 DualBeam Reader.



In this situation, the BA-440 DualBeam reader acts as the Access Control. Barcode decal numbers are programmed into the reader and set to grant or deny access based on the individual number. The reader can be programmed via a laptop computer. 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 that can be connected to an indicator or alarm to indicate that access is denied.

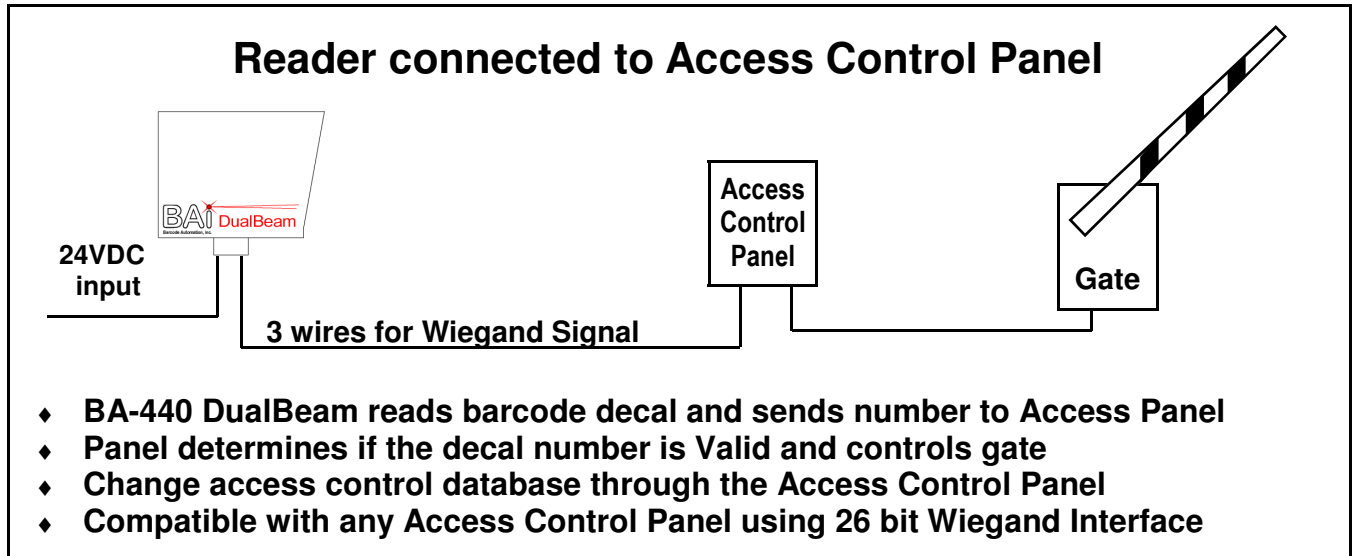
Wiring Needed:

- 2 conductor 18 AWG from reader to gate operator
- 2 conductor 18 AWG copper for 24VDC power connection

Optional:

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

What Wiring do I need?

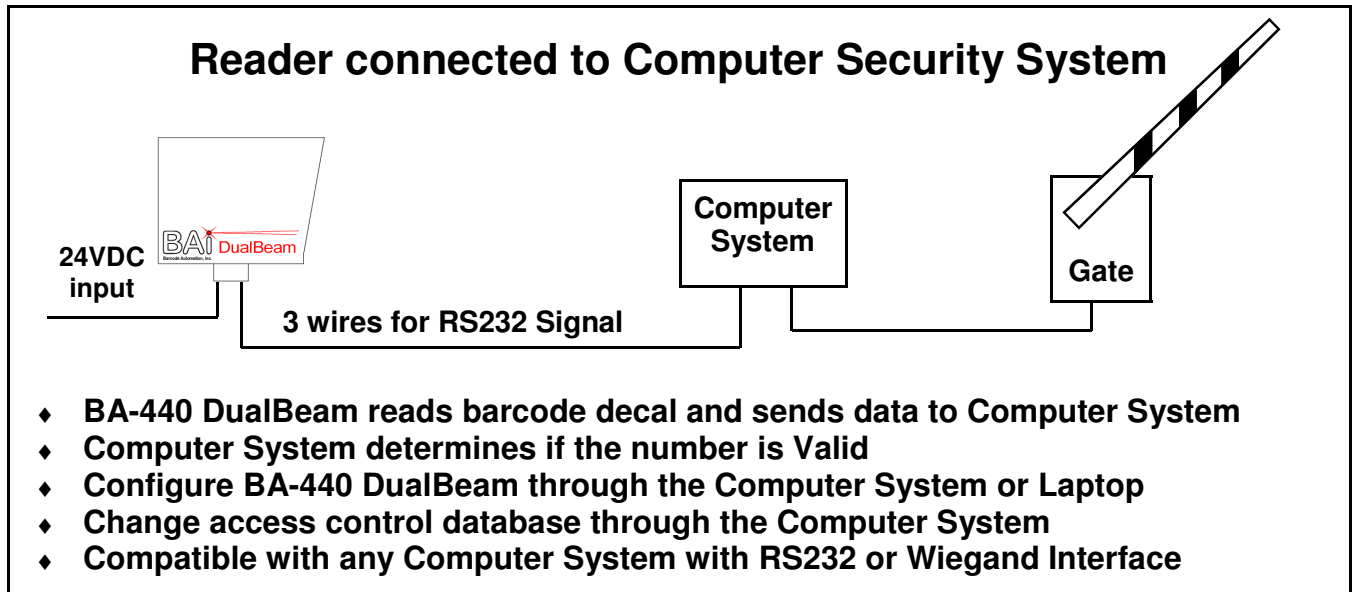


In this situation the BA-440 DualBeam is connected to an external Access Control panel by Wiegand communication. The barcode ID numbers are programmed into the Access Control panel and set up to have access granted or denied. When the vehicle pulls up to the BA-440 DualBeam it reads the decal and transmits 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

What Wiring do I need?



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 pulls up to the BA-440 DualBeam reader, it reads the decal and transmits the number to the Security system. If valid, the 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

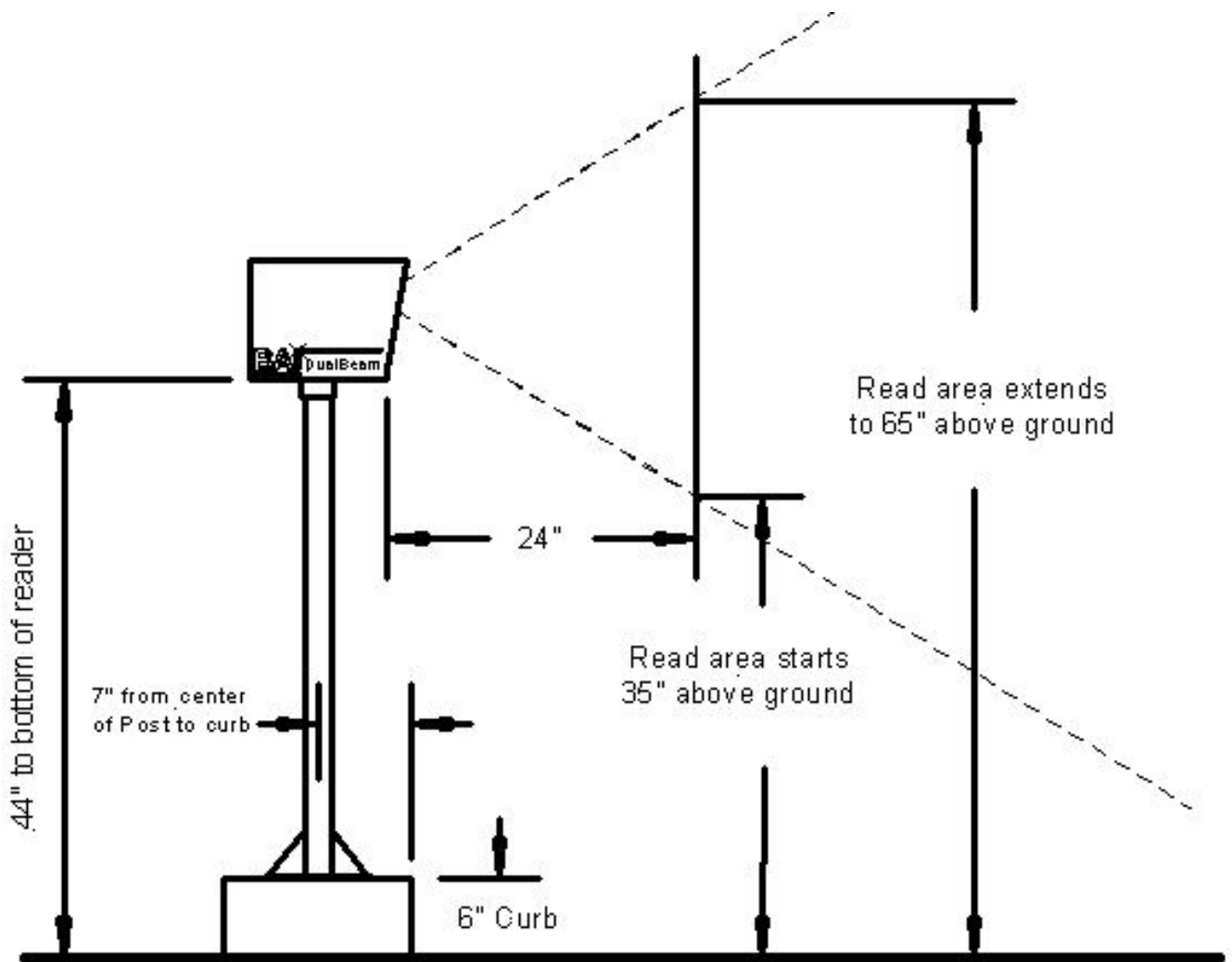
GdRead relay - Two wires 18 AWG

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 .

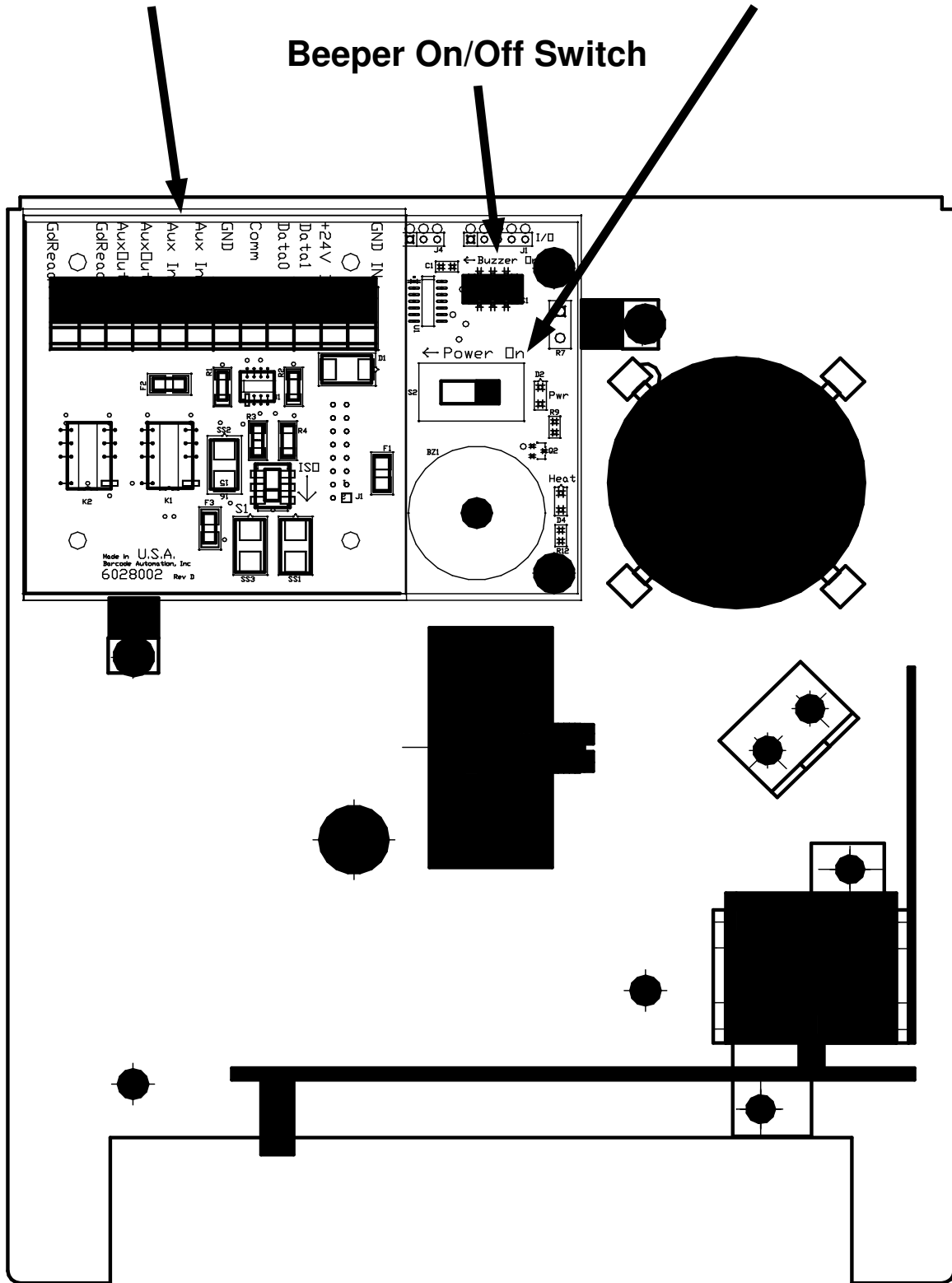


Wiring Connections

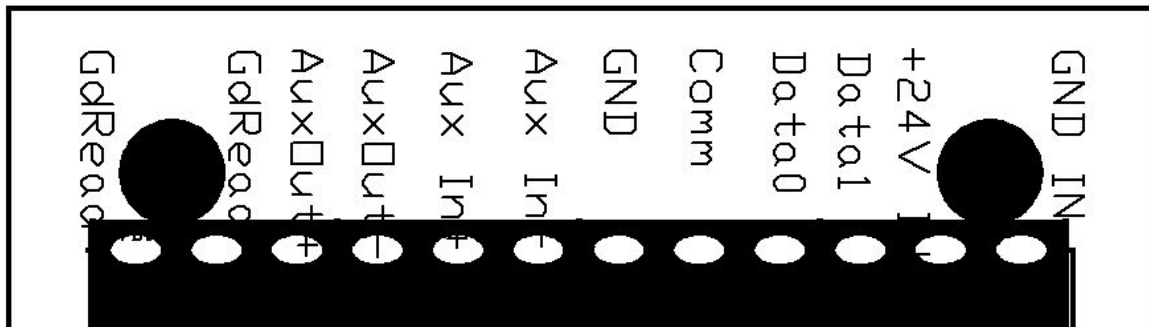
Wiring Terminal Block

Main Power Switch

Beeper On/Off Switch



Wiring Connection Definitions



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

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 required for reliable communication

Optional Vehicle Detect input to reader (Not Required)

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

Output Relay for Gate Operator used in Standalone Operation

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

Wiring Connection Details

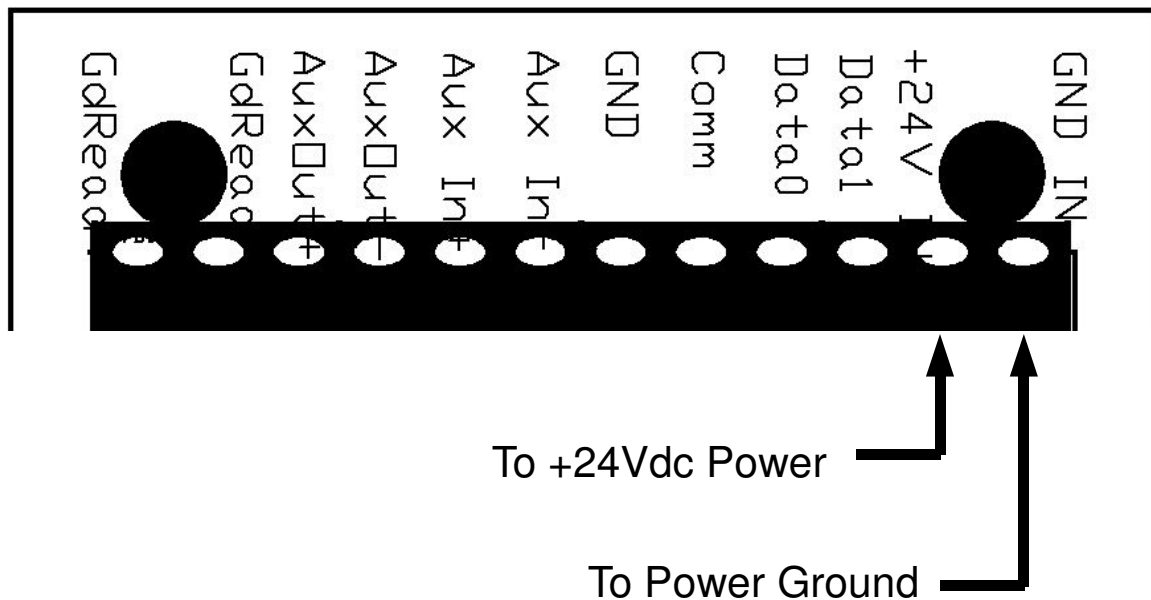
Power Input Terminals

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 input must supply 1.5 Amps to the Reader for proper operation. Recommend 18AWG copper cable for runs up to 200'.



Wiring Connection Details

Wiegand Communication Terminals

Data1

Data0

Comm

Wiegand communication from the BA-440 can be run two different ways; optoisolated or direct connection. The Optoisolated connection has several advantages, provided the Access panel or telephone entry system supports it. To use the Optoisolated connection the access panel or telephone entry system must provide voltage to the Data0 and Data1 connections on the reader. Be sure to connect Wiegand communications to the access panel as shown on page 20 before proceeding with the following test.

To check compatibility with Optoisolated communications connect the access panel as shown on page 20. With the access panel powered on, measure from the Data0 and Data1 terminals to Comm with a voltmeter. There will be about +5Vdc at each Wiegand line when using access panels that support the Optoisolated connection.

If no voltage is measured from Data0 or Data1 to Ground the Optoisolated connection will not function. Instead, the BA-440 must be configured for a direct Wiegand connection. See page 21 for details on how to configure the BA-440 for direct Wiegand connection.

Wiring Connection Details

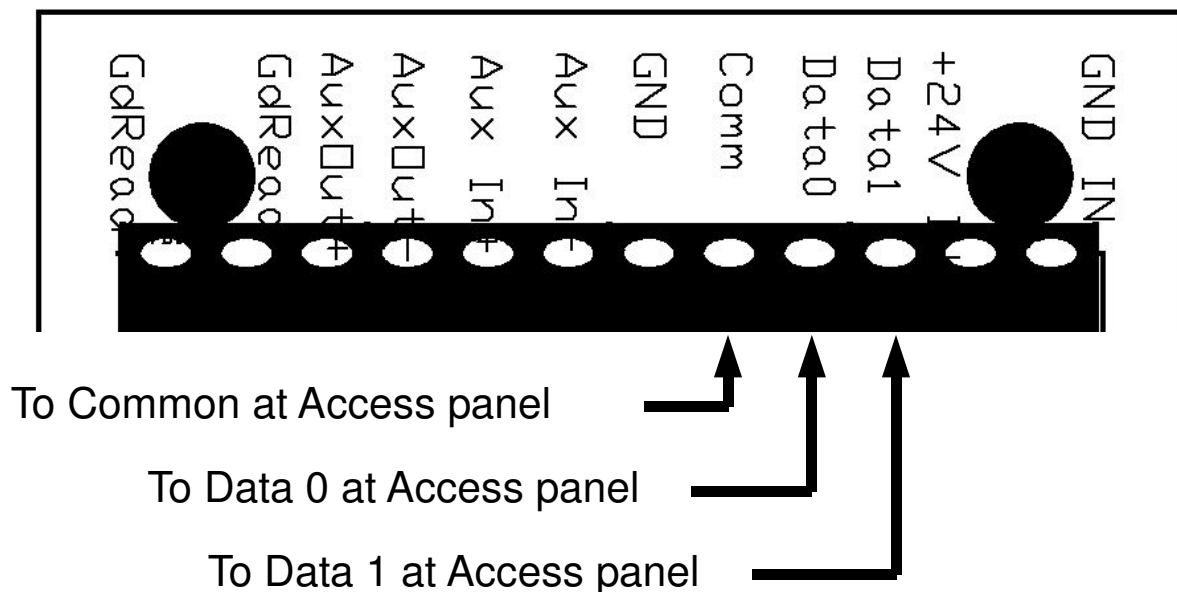
Wiegand Communication Terminals

Data1
Data0
Comm

Optoisolated Connection (Preferred)

The Wiegand output communication terminals are marked as Data1, Data0 and Common. The normal configuration for Wiegand communication from the BA-440 is optoisolated, 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. 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 Common and Data0, then Common and Data1. There should be approximately 5Vdc present on the Data0 and Data1 terminals.



Wiring Connection Details

Wiegand Communication Terminals

Data1
Data0
Comm

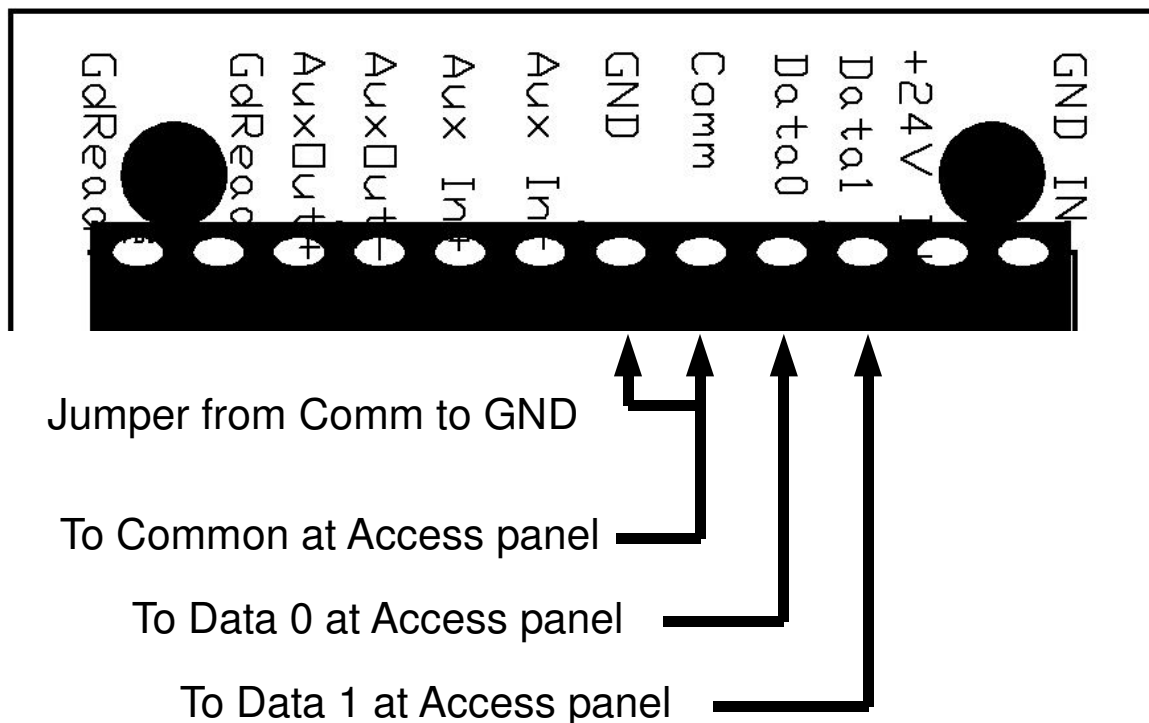
Direct Connection (if Optoisolated connection cannot be used)

In some cases the Optoisolated Wiegand communication cannot be used. Generally this is due to the Access panel or telephone entry not providing voltage on the Data0 and Data1 lines.

To change the Wiegand connection from optoisolated to direct:

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

This causes the BA-440 to provide voltage on the Data0 and Data1 lines and connects the Common reference to the reader Ground.



Connection Terminal Detail

Vehicle Detect Input Terminals

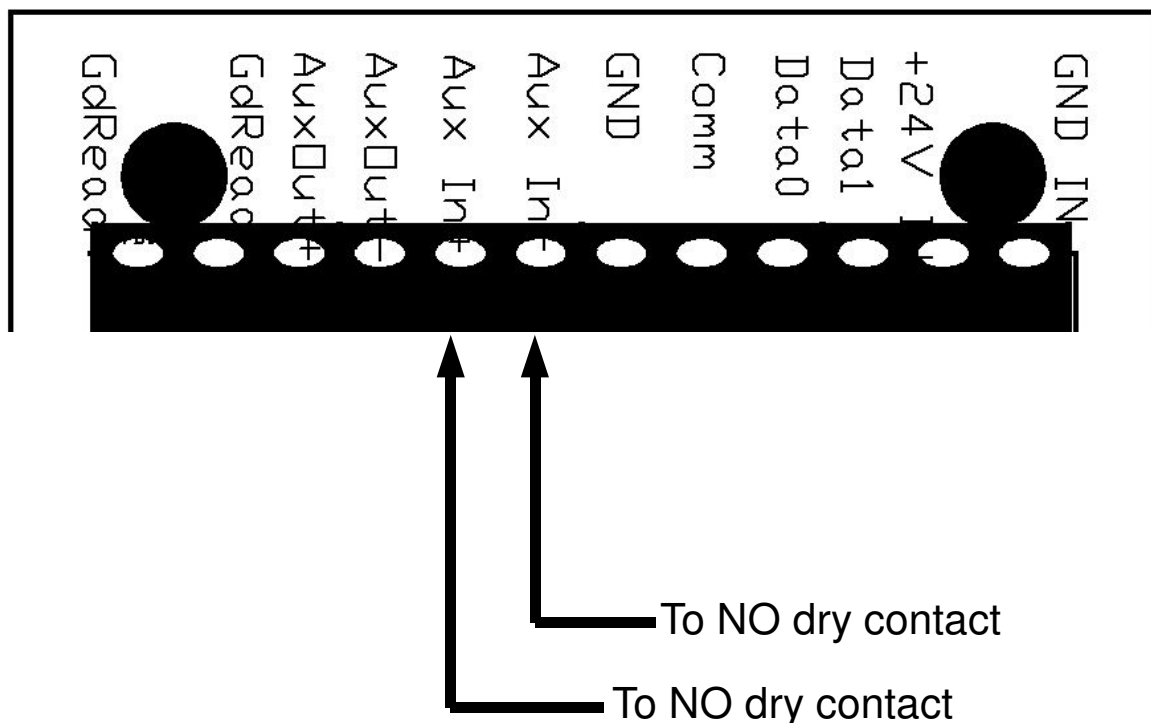
Aux In-

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 approximately a +5Vdc voltage with the connection Open. Closing the connection should result in a measurement of 0 VDC.



Connection Terminal Detail

Relay Output Terminals

AuxOut- **AuxOut+**

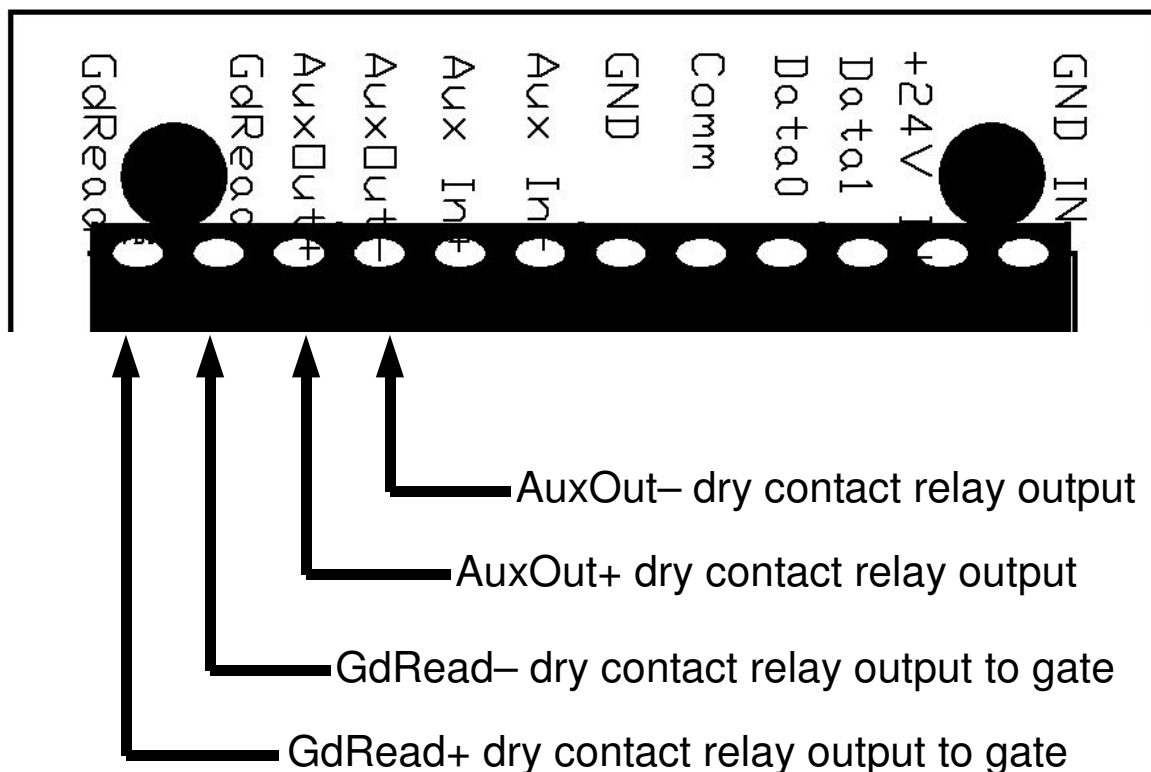
This is a dry contact output whose function changes depending on the reader configuration. See the Configuration manual for details.

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

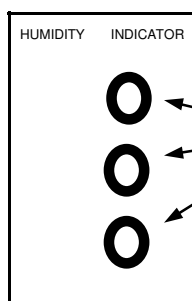


Finishing the BA-440 DualBeam Installation

After the Reader is mounted and the wiring is connected, the opening for 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.

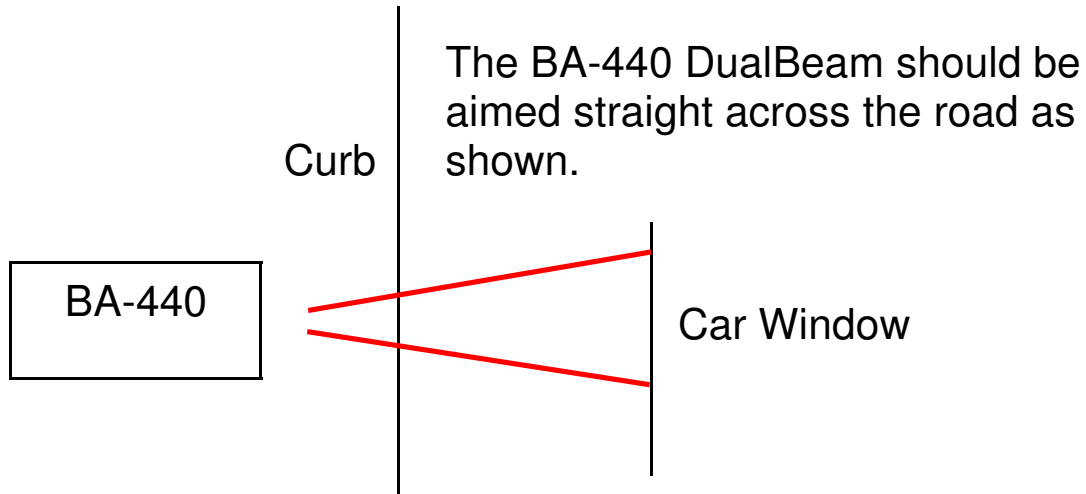
Then, open the plastic bag containing the desiccant pouches and remove them. Place the pouches and humidity indicator card flat on the bottom of the unit before installing the enclosure Hood. The desiccant will absorb moisture from the air in the Reader for approximately 6 months before becoming saturated. **Note: 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 the humidity card circles are all pink, change out the desiccant pouch and replace it with a fresh one. **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.

Mounting Angle



Powering Up the BA-440 DualBeam

When testing the BA-440 DualBeam it is useful to have a laptop computer on hand that can communicate with the reader. This allows the installer to take advantage of 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 gold mirror wheel (also known as the polygon) will spin

Approximately 15 - 30 seconds after the main switch is turned on:

- The laser should turn on

The BA-440 DualBeam is now ready to read barcodes.

LED Indicators

Look on the decoder circuit board, which is mounted on the opposite side from the wiring terminals. A column of LED indicators provide information on reader operations. From top to bottom they are:

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

Lsr Act (Yellow) - indicates when the laser is on

Rst Act (Green) - will light when the unit is being reset

Data0 Act (Red)

Data1 Act (Red)

These LED's indicate when the Wiegand communication lines (Data0 and Data1) are active. When the BA-440 DualBeam is not transmitting, the LED's should be off. If one or both of the LED's are on constantly there is a problem

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

DigLo (Yellow) - will light when data is flowing from receiver board

DigHi (Yellow) - will light when data is flowing from receiver board

Diag (Green) - will light when decoder is in programming mode

Heat (Red) - will light when heater is turned on

Sync (Green) - will light when gold wheel is spinning

Reading a test barcode:

Refer to page 28 for how the barcode must be held for the BA-440 DualBeam to read it. Pass the barcode through the laser line. The beeper should sound for approximately 1/4 second to show that the barcode was read. Also, the Gd Read LED (green) on the left edge of the decoder circuit board should also 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 first 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. If a different barcode number is read, you will hear the beeper and see the green LED indicator light. The only time you need to wait 1 second between reads is if you have only 1 barcode number to test with.

LED Indicators Continued...

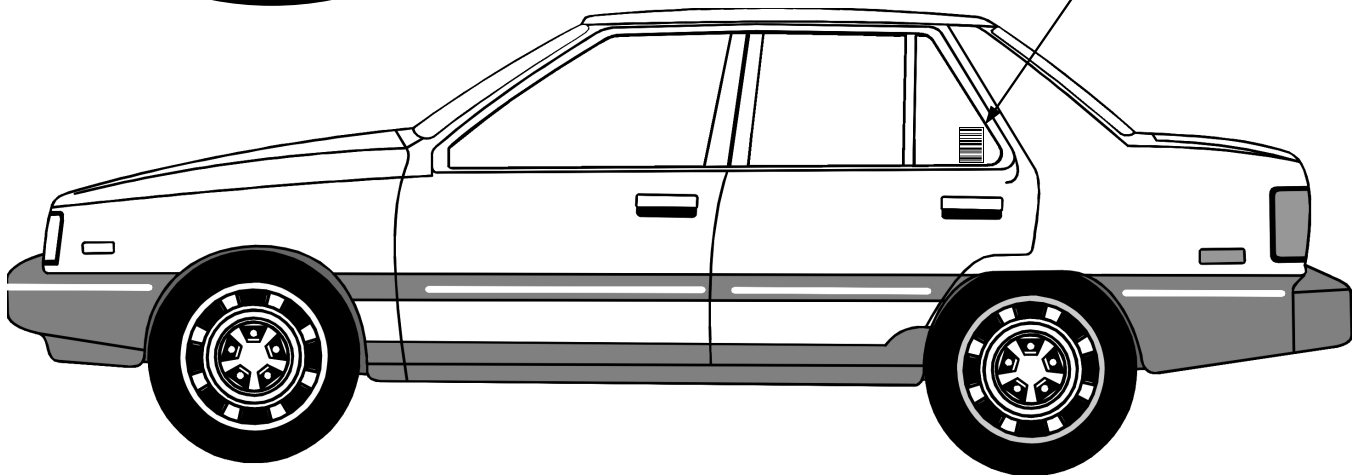
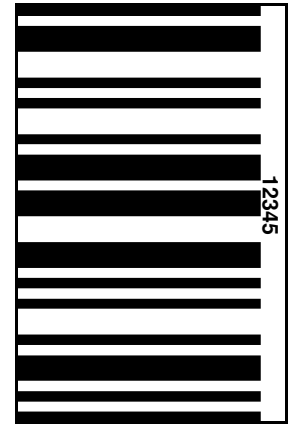
As you pass the barcode through the laser line also watch the two red LED's (Data0 Act and Data1 Act) that show the status of the Wiegand data lines. When the barcode is read, both should "flash" or "flicker" red very quickly. These "flashes" indicate that the BA-440 DualBeam has sent out the Wiegand communication pulses for the barcode.

Note: These "flashes" are very fast - to be certain to see them look directly at the indicators and shade them from the Sun if necessary. At this point the BA-440 DualBeam is ready for operation.

Barcode Label Placement on Vehicles



YES

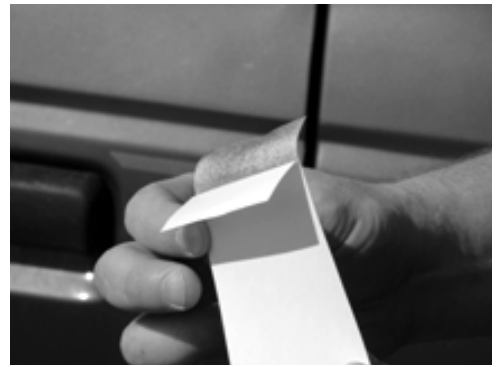


1. Always place the decals on the same side of the vehicle that the reader is on.
2. Apply to the outside of the window glass. Decals will not read reliably through the glass.
3. Orient decal with the stripes running horizontal. (as shown).
4. The bottom of the decal should be at least 36 inches above the ground.
5. The top of the decal should be no more than 65 inches above the ground.
6. Prepare the window before applying the decal by scrubbing with SoftScrub or other mild abrasive cleaner. Do not use glass cleaners, most contain silicone and will interfere with adhesion.

Applying Barcodes



**1. After cleaning window surface,
Peel decal back 1 inch from backing**



**2. Bend decal backing at least
90°**



**3. Line up decal vertically on window,
Press firmly on top where the backing
was peeled back.**



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



5. Hold backing with other hand



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

7. Decal is now applied.

