ABR Sales Training Manual

A training walkthrough to teach how to perform a basic demo of an ABR reader without a PC, collect critical application specs using the Application Checklist, select the correct reader and accessory part numbers, and test readability using the Barcode Manager software.

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BANNER®

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1. Basic Smart Teach Demo

Objective: To understand the function of the Smart Teach button and LED's on the ABR reader housing, and how to demo it to quickly read almost any common barcode type.

Warning - This process does not work for these barcode symbologies: Postal codes, Pharmacode, MSI, Standard 2 of 5, or Matrix 2 of 5. Use Barcode Manager software to read these barcodes.

Recommended Sample Barcodes:

From ABR3000 Quick Start Guide:

Smart Teach Interface

Smart Teach is designed to improve ease of installation and maintenance. Status information is clearly presented by means of the five colored LEDs. The single push button provides access to the following modes.

• Test includes bar graph visualization to check static reading performance
• Aim/Autofocus turns on the laser pointers to aid positioning and focusing
• Setup self-optimizes and auto-configures image brightness parameters
• Learn automatically detects and recognizes a single code which is presented to it. Successive Learns will substitute the current code. To configure multiple codes, use the Barcode Manager Auto-learn procedure

Quick access to the following modes is provided by using the push button:
1. Press the button. The Status LED gives visual feedback.
2. Hold the button until the specific mode LED is on (Test, Aim/Autofocus, Setup, or Learn).
3. Release the button to enter the specific mode.
After the button is pressed, the cycle of LED activation is as follows:
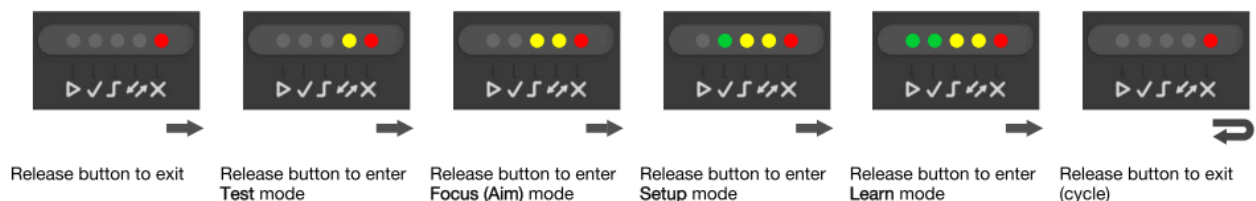
Focus/Aiming

The reader includes a built-in aiming system to aid in reader positioning. Access the aiming system through the Smart Teach Interface.

1. Power on the reader.
   During startup, all of the LEDs blink for one second. On the connector side of the reader near the cable, the **Power** LED (blue) indicates the reader is correctly powered.
2. Enter **Focus/Aim** mode by pressing and holding the Smart Teach button until the 🎵 **Focus/Aim** LED is on.

Figure 4. Smart Teach Interface: Aim Mode

3. Release the button to enter **Aim** mode.
   The aiming system turns on.
4. Place an application specific code in front of the reader at the reading distance indicated for your model, as described above, centering it a few mm to the left of the aiming system indicator as shown in the following figure.

Figure 5. Aiming Mode Using the Red Crosshairs

5. Exit **Aim** mode by pressing the Smart Teach button once. The aiming system turns off.

Setup

Once entered, the imager automatically performs the Image Acquisition parameter calibration for the specific code presented to it.

1. Enter **Setup** mode by pressing and holding the Smart Teach button until the ✅ **Setup** LED is on.

Figure 6. Smart Teach Interface: Setup Mode

2. Release the button to enter **Setup** mode.

   The ✅ **Setup** LED blinks until the procedure is completed. The **Setup** procedure ends when the Image Acquisition parameters are successfully saved in the reader memory, the ✅ **Setup** LED stops blinking, the ABR beeps once, and exits **Setup** mode.
3. If the calibration cannot be reached after a timeout of about 5 (five) seconds, ABR exits without saving the parameters to memory, the ✅ **Setup** LED stops blinking, and the ABR beeps once.

Learn

Once entered, the imager starts a procedure to automatically detect and recognize a single code[6] which is presented to it. Successive Learns will substitute the current code. To configure multiple codes, use the Barcode Manager Auto-learn procedure.

Exit **Learn** mode at any time by pressing the Smart Teach button once. After a short delay the Learn procedure is cancelled.

1. Enter **Learn** mode by pressing and holding the Smart Teach button until the ▷ **Learn** LED is on.

Figure 7. Smart Teach Interface: Learn Mode

2. Release the button to enter **Learn** mode.

   The ▷ **Learn** LED blinks until the procedure is complete. The Learn procedure ends when the Image Processing and Decoding parameters **for a single code** are successfully saved in the reader memory, the Green Spot is activated, the ▷ **Learn** LED stops blinking, the ABR beeps once, and exits **Learn** mode.

If you have an ABR7000 instead, the process is the same except for a few differences:

- The LED indicators are labeled differently:

- The laser alignment indicator is 2 dots to center the barcode on:

- The Aim/Focus procedure will also try to adjust the focus if you have a Liquid Lens Autofocus model ABR71L9-xxxx.

2. Barcode Application Checklist

Using this form to gather application details will make it much easier to get customers an accurate quote quickly. Please use it, by going through it with the end customer.

One of the most important items on the checklist is module width, or minimum bar width. For a 1D code it might take a scope to measure this, or an ABR with printed calibration page (in manual). For a 2D code you can estimate by measuring the whole code size and dividing by the number of elements in the grid, such as 14 in this example below.
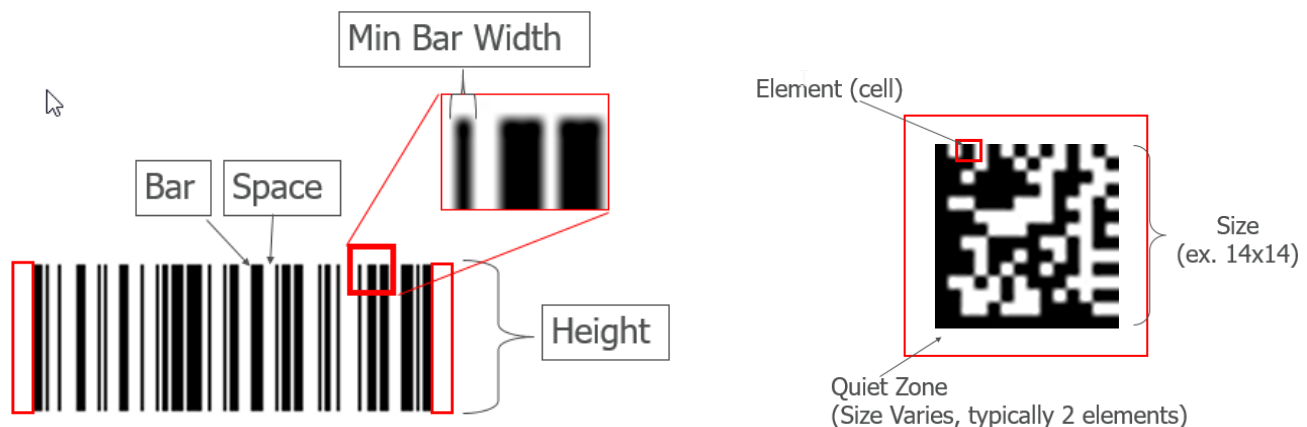
Barcode Application Checklist

This form will help plan the implementation of a barcode reading system by gathering the required information. It is recommended to provide a representative range of actual barcode samples with this document.

Date	Project Name	Budget

Contact Information		
Contact	**Company**	**Phone / Email**
Customer		
Integrator		
Distributor		
Rep/ASM/SAE		
Banner Engineering		

Task Description

Basic Function Description:	Number of reading stations?	Number of readers per station?

Barcode Motion

Type of Conveyor system? ❑ Roller ❑ Belt ❑ Other_____	Width of Conveyor System?	Conveyor speed at reading point? ❑ Steady _____ ❑ Variable (max: _____) ❑ Indexed (cycle timing:_____)

Dimensions of conveyed items? Notes about shape:		Maximum rate in products per minute?	Number of barcodes per reading cycle?

Reading System Requirements

Reading perspective? ❑ From side ❑ From in front ❑ From above ❑ From below ❑ Others:_____	Barcode Position? Variation in depth/distance (from side of conveyor): Variation in height:	Variation in barcode angle (0-90deg)? where ▊ and ▊ = 90deg

Barcode Specifications

Barcode Symbologies:	
❑ Interleaved 2/5 ❑ UPC-A ❑ UPC-E ❑ EAN ❑ Code 39 ❑ Code 128 ❑ Code 93	❑ Datamatrix (ECC200) ❑ QR ❑ PDF417 ❑ Postal ❑ Pharmacode ❑ Other_____

Check Digit (only if using Interleaved 2/5 Symbology)?

❏ Present

❏ Not Present

Number of Characters?

❏ Fixed _____

❏ Variable

Overall Barcode Dimensions? (not counting background area or quiet zone)

Length:_____

Height:_____

Narrowest Bar Thickness (module width)?

Orientation (Only if 1D code, and as seen from side)?

❏ Ladder   Direction of Travel

❏ Picket Fence   Direction of Travel

Code Carrier Material?

❏ Paper or Label

❏ Cardboard

❏ Plastic

❏ Metal

❏ Other_____

Barcode Color?

Bars_____

Spaces_____

Trigger Signal?

❏ Sensor

❏ Host System/Software

❏ Free Running

Communications Interface?

❏ Ethernet TCP/IP

❏ EtherNet/IP

❏ PROFINET

❏ Modbus/TCP

❏ Serial

❏ Discrete Outputs

❏ USB HID Keyboard Data

Environmental Rating Required?

❏ IP65 or less

❏ IP67

❏ IP69K

Ambient Temperature?

Supply Voltage?

Additional Notes or Diagrams:

3.   Selecting a Reader Model

First verify the ABR is right for you instead of previously existing options by considering these factors:

Reasons you might want an iVu instead of an ABR:

-if you want PC-less Setup and monitoring
-If you need a C-mount lens, such as for reasons like extremely long range reading or special filters
-UV lighting (and other colors as well)
-IP67 for a lower price than ABR7000

Reasons you might want a TCNM instead of an ABR:

-If you like laser readers for the simplicity of setup, and don't need 2D or Ethernet
-Maybe speed/price combination such as needing >400 codes per minute at $1500 list price

How to select the right model of ABR based on reading capability
Use the reading area graphs in the chapters titled "Reading Features" of the ABR3000 and 7000 hardware manuals to determine whether a certain barcode size and type will work for a given distance.

The far range limits of these graphs are generally based on the resolution guidelines of having at least 1.3 pixels per element (PPE) for 1D codes, and 2.4 pixels per element width for 2D codes for reliable decoding. These PPE minimums should be doubled if reliable code quality grading is desired. This is an important spec to consider in all barcode applications when deciding how far away to mount the reader.

For reading distances over 7-8" or machined metal or other DPM codes definitely go to the 7000.

For example, if someone fills out the application checklist with Barcode Symbology = UPC A, Narrowest Bar Thickness = 0.013" AKA 13mil, and Variation in Depth = 5", meaning they would like to be able to read the code over that span of distance, such as from 2" to 7".

Let's start by checking the ABR3000 manual, going to the Reading Features chapter, going to the Reading Diagrams ABR3106-WSxx high resolution model 1D codes section, and turning to the Code 128 13 mils page. The performance on all 1D codes will be similar, so there isn't a UPC specific graph. You should see this graph:

ABR 3000 Series Barcode Reader

Code 128 0.33 mm (13 mils)
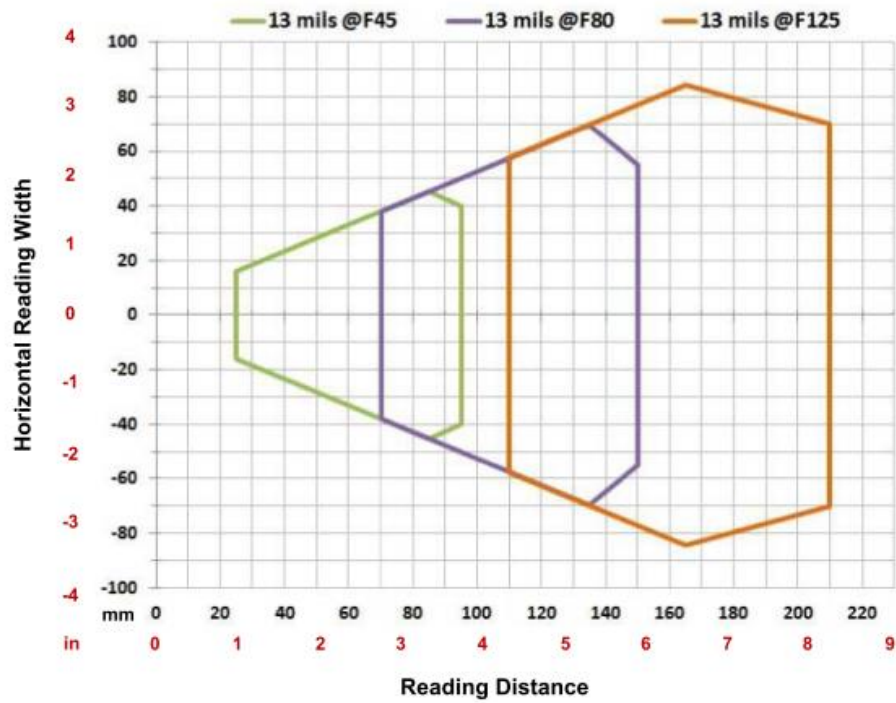
Figure 108. Code 128 0.33 mm (13 mils)

Hardware Settings			
Code Symbology	Code 128		
Code Resolution	0.33 mm (13 mils)		
Tilt Angle	0°		
Skew Angle	15°		
Focusing Distance (mm)	45	80	125

Software Parameters			
Illuminator Lighting	Very High Power Strobed		
Exposure Time (µs)	400	600	700
Gain	10	20	25

What this tells you is that the reader can read the code at 2" distance, and at 7" distance, but if you look closely at the different colored shapes in the graph you will see that it achieves those distances only at separate focus and brightness (exposure and gain) settings. The graphs for the other ABR3000 models are similar in this way.

Longer focal length lenses are better at tolerating a large depth of field, they allow being farther away and so the distance variation is a smaller percentage change. The ABR3000 comes in 6 and 9mm lens models, so let's go longer and compare to the ABR7112 12mm lens model. There is no 12 mil Code 128 graph in the manual, but there is a 12 mil graph which will be close enough to tell us what we need:
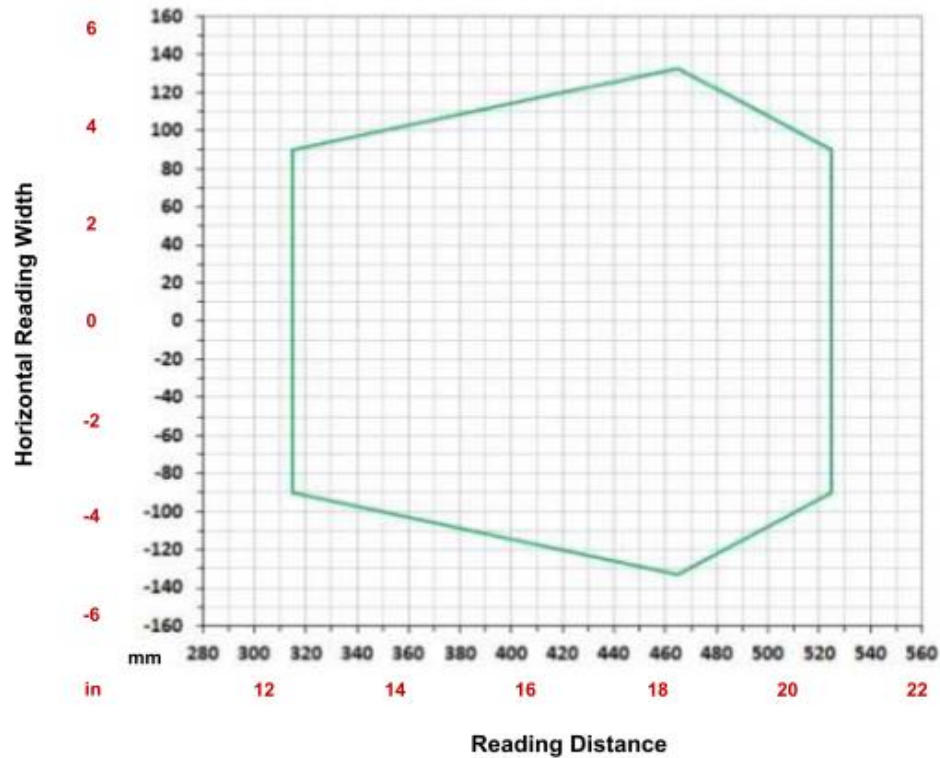
Code 128 0.30 mm (12 mils)

Figure 133. Code 128 0.30 mm (12 mils)

Hardware Settings	
Code Symbology	Code 128
Code Resolution	0.30 mm (12 mils)
Tilt Angle	45°
Skew Angle	15°
Focusing Distance (mm)	415

Software Parameters	
Internal Lighting	Very High Power Strobed
ABR7112-RSE2	
Exposure Time (µs)	250
Gain	9

This tells us that this model can read a 12 mil 1D code from about 12" to almost 21", so it would be a better fit for this application.

Other Reasons you might want an ABR7000 vs. 3000

Speed:
-Faster processor (15-20% shorter decode time on most applications)
-Faster image acquisition, almost twice as fast at megapixel resolution

Optics:
-Better lighting, more configurable, such as having special DPM light models
-You can keep light on constant, not strobed, if operators are annoyed
-Longer range focusing, longer focal lengths
-Auto-focus models

Features:
-ID-Net for multi-head systems
-If you want IP67 AND IP65 instead of just IP65
-External Memory modules for backup

Additional Less Important Features:
-Extra 3rd output (not available through TCNM-ACBB1)
-Auxillary serial port
-If you need protocol indexing (advanced software feature for taking in data from other sources and combining it)
-If you want image polarity inversion
-A lot more memory for internal image saving, ABR3 only stores about 2 images.
-Red feedback LED instead of just a green
-The Input LED's in TCNM-ACBB1 box work / polarity insensitive inputs (3000 also can't do NPN through box)

4. Accessory / Cable Selection

4.1   TCNM-ACBB1 and TCNM-ACMK-100

TCNM-ACBB1 (same part as used for TCNM laser scanners already) connection boxes are useful accessories for connecting devices like input sensors, other readers, discrete output signals to host system, and the serial port. They also serve as a place to mount the optional TCNM-ACMK-100 (coming soon, not available yet, and also doesn't work with ABR3000) memory module, which allows you to backup all configuration settings on a reader, and download those settings when you plug in a new replacement reader without needing a laptop.

TCNM-ACBB1 also gives you indicator LED's to show the status of inputs and outputs 1 and 2, however watch out when using ABR3000, the input LED's will not light up with these models even when they are working.

With ABR7000, which has one more output than the ABR3000 the only catch is that the TCNM-ACBB1 does not have a terminal for output 3, so you cannot use that output with a TCNM-ACBB1.

Memory module and connection box

4.2   External Power Supply

TCNM-ACBB1 connection boxes are IP65, intended to be able to be mounted outside of a control panel, near the reader, to save on cabling. If an IP65 external power supply would be helpful to go next to the TCNM-ACBB1, consider this accessory power supply PSB4MK-24-06-Q0Q5:
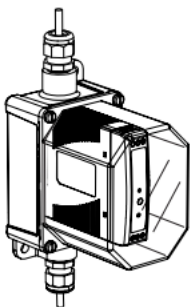
- Industry accepted low cost 24 V dc power supply
- Universal input (85–264 V ac) accepts 120–370 V dc
- Protection from short circuit, overloads, and over-voltage
- Can be installed on DIN rail TS-35/7.5 or 15
- NEC class 2/LPS compliant
- LED indicator for power ON and DC OK active signals
- Wide operating temperature range (-20º to +70° C [-4° to +158° F])
- Cooling by free air convection
- Can be used in NEMA-4X applications when used with the BENC4 environmental enclosure

There are 2 cables recommended for connection of these power supplies:

SM30CC-306-WP   Mini-style QD to 110VAC plug, 6ft for PSB4 power supply box
MQDMC-401   4-pin male 1ft M12 cable for connecting DC side of PSB4 pwr supply box
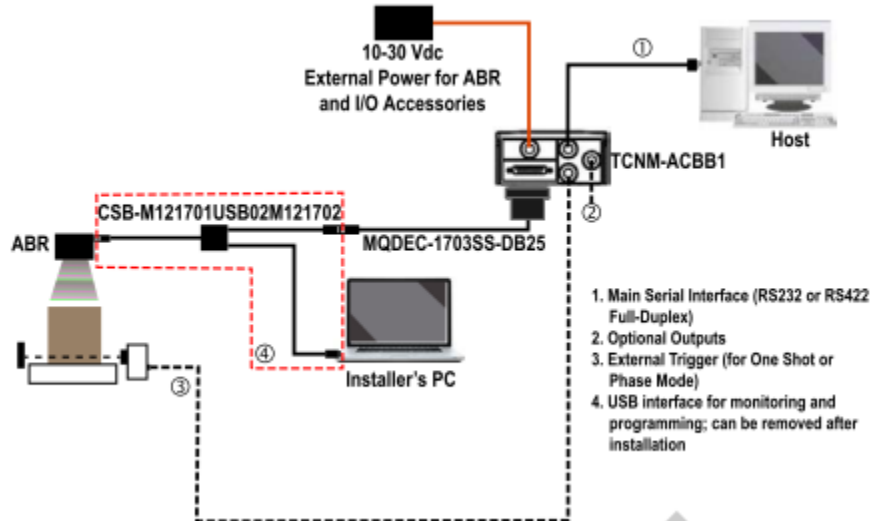
4.3   Cable Layouts - ABR3000 USB Models

These diagrams from the hardware manuals show how the accessories are used to complete the system, in various layouts.
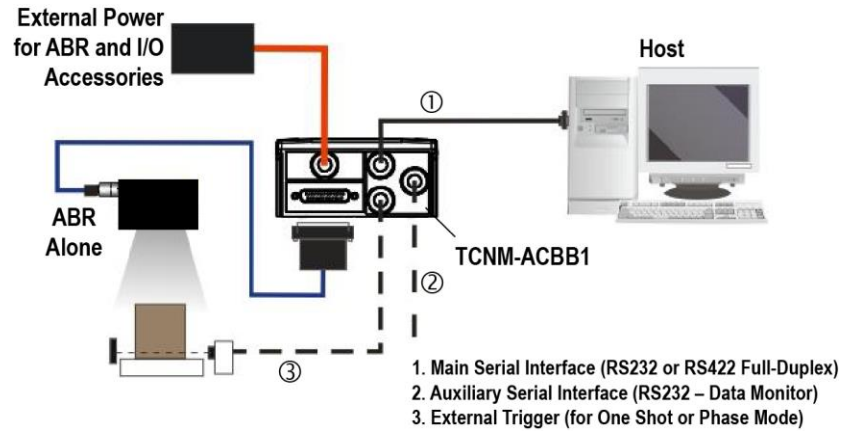
1. USB only, Point to Point
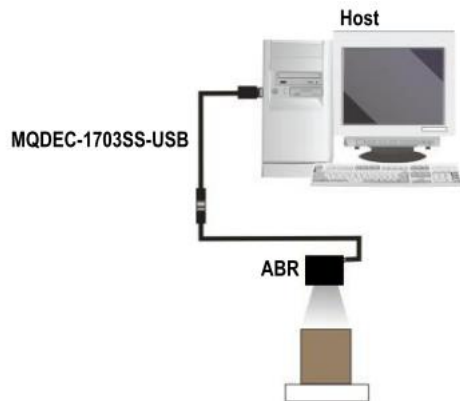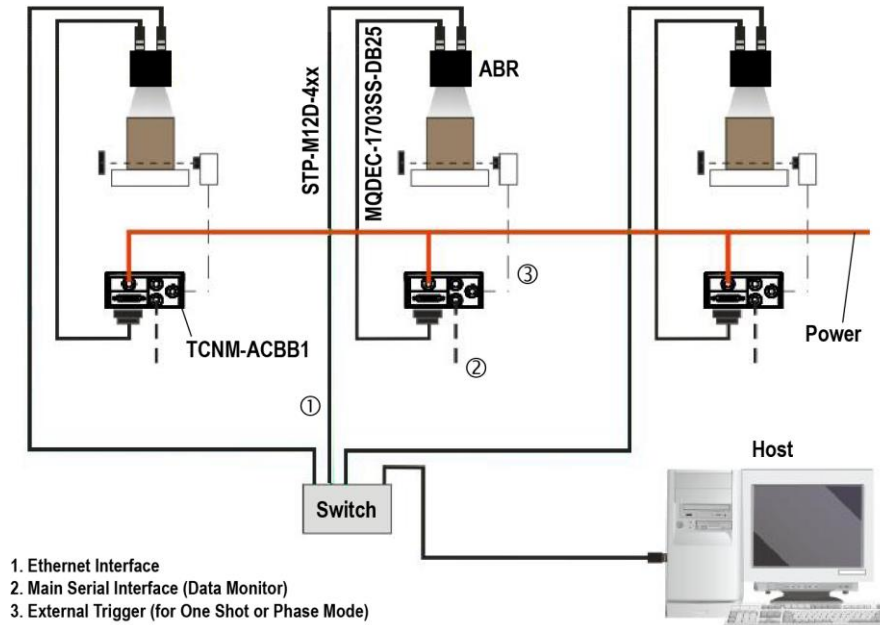

2. USB Programming with I/O and or Serial Connection

4.4   Cable Layouts - ABR3000 / 7000 Ethernet Models
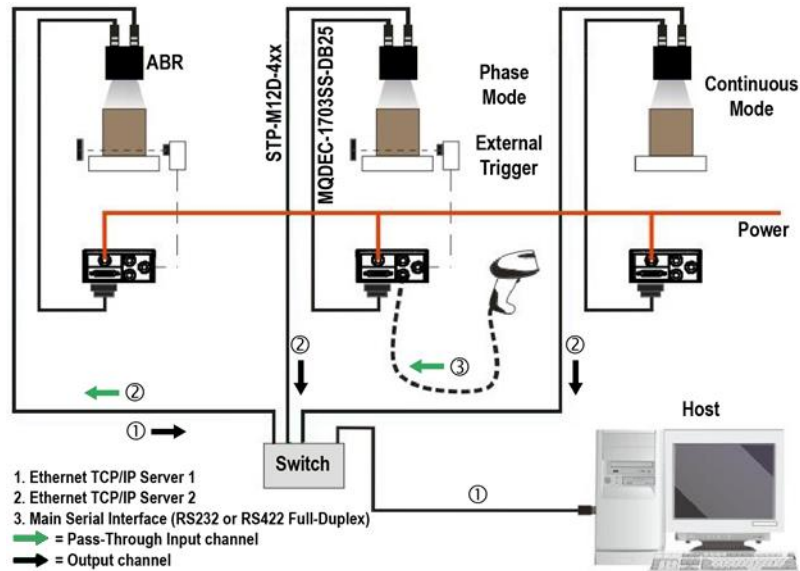
1. Serial only, Point to Point

External Power for ABR and I/O Accessories

Host

①

ABR Alone

TCNM-ACBB1

②

③

1. Main Serial Interface (RS232 or RS422 Full-Duplex)
2. Auxiliary Serial Interface (RS232 – Data Monitor)
3. External Trigger (for One Shot or Phase Mode)

2. Ethernet Network

STP-M12D-4xx

MQDEC-1703SS-DB25

ABR

③

TCNM-ACBB1

Power

②

①

Host

Switch

1. Ethernet Interface
2. Main Serial Interface (Data Monitor)
3. External Trigger (for One Shot or Phase Mode)

3. Pass-Through

ABR

STP-M12D-4xx

MQDEC-1703SS-DB25

Phase Mode

External Trigger

Continuous Mode

Power

Host

② ③ ②

①

② Switch ①

1. Ethernet TCP/IP Server 1
2. Ethernet TCP/IP Server 2
3. Main Serial Interface (RS232 or RS422 Full-Duplex)
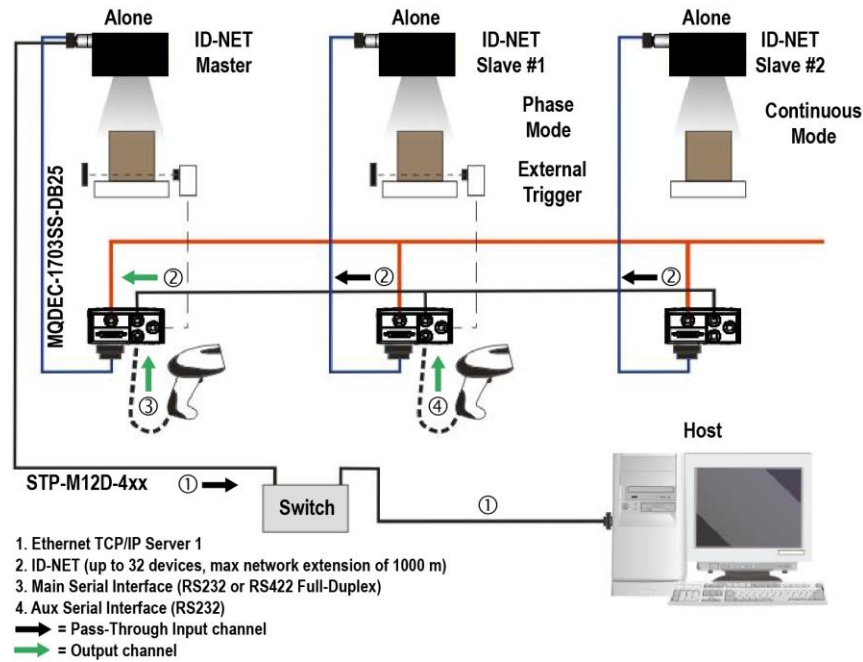= Pass-Through Input channel
= Output channel

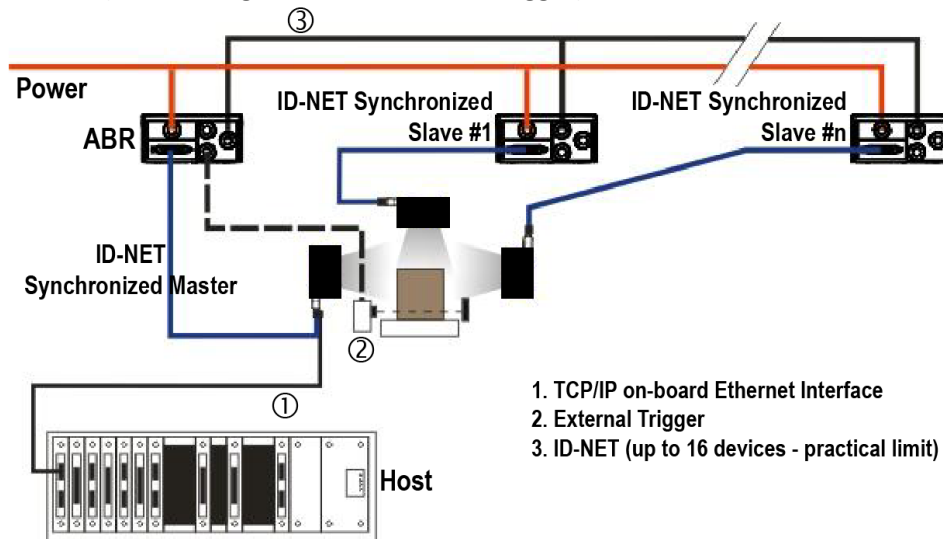# 5. Multi-head ID-NET System Layouts (ABR7000 only)

Every ABR7000 has 2 ID-NET wires, labeled ID-NET+ and ID-NET-. If you connect these wires to one or more other ABR7000's, they can be configured to share their data and trigger signals to allow one master reader to report the overall result data to the host system. This is useful in cases like when a barcode might be on the front or back of a box, and you need to have one reader on each side, but you only want one result reported. It can also be used to reduce the number of Ethernet connections needed permanently, although it is still recommended to use an Ethernet cable on each reader during programming to view images and optimize its reading settings.

1. ID-Net Multidata (separate reading stations)

Alone — ID-NET Master
Alone — ID-NET Slave #1 — Phase Mode — External Trigger
Alone — ID-NET Slave #2 — Continuous Mode

MQDEC-1703SS-DB25

② (Output channel)
② ②

③ ④

Host

STP-M12D-4xx ① Switch ①

1. Ethernet TCP/IP Server 1
2. ID-NET (up to 32 devices, max network extension of 1000 m)
3. Main Serial Interface (RS232 or RS422 Full-Duplex)
4. Aux Serial Interface (RS232)
➡ = Pass-Through Input channel
➡ = Output channel

2. ID-NET Synchronized (one reading station, one shared trigger)

Power

ABR

ID-NET Synchronized Slave #1
ID-NET Synchronized Slave #n

③

ID-NET Synchronized Master

②

① Host

1. TCP/IP on-board Ethernet Interface
2. External Trigger
3. ID-NET (up to 16 devices - practical limit)

6.   Install Barcode Manager

From Quick Start Guide:

Administrative rights are required to install the Barcode Manager software.

Important: Install Barcode Manager on a Windows® XP7, 7, 8, or 108 computer. Barcode Manager does not currently support Windows Embedded (often used in industrial PCs and/or PLCs).

1. Download the latest version of Barcode Manager from www.bannerengineering.com.
2. Navigate to and open the downloaded file.
3. Run Barcode Manager_Setup.exe to access the installation screen.
4. Follow the onscreen installation procedure.
After the installation is complete, the Barcode Manager entry is created under Start > Programs > Banner Engineering. A desktop icon is also created.

7.   Getting Connected to Device

From Quick Start Guide:

The following configuration procedure assumes that a laptop computer running Barcode Manager is connected to a factory default reader through the Ethernet port. The Barcode Manager user interface opens and displays a list of all the devices belonging to the Local Area Network (LAN).
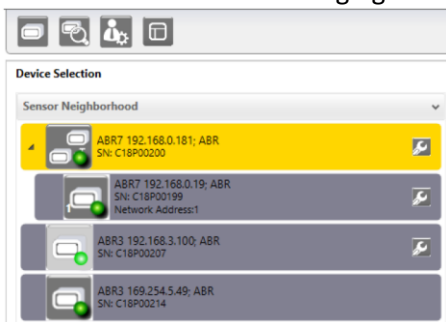
The Barcode Manager discovery feature also shows devices not belonging to the LAN and displays them in light gray.

The following is an example configuration for Windows® operating system version 7, 8, or 10.

1. Confirm the network connections. Changing the Local Area Connection (LAN) properties of the programming computer to be compatible with the ABR device on the network may be required for connection.
a) Click the Start button, then on the Start menu, click Control Panel or search for Control Panel.

b) In Control Panel, click Network and Internet, then click Network and Sharing Center, and then click Change adapter settings.

c) Right-click on the connection that you want to change, then click Properties. If you are prompted for an administrator password or confirmation, enter the password or provide confirmation.

d) In the connection properties, click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.

e) In the Internet Protocol (TCP/IPv4) Properties, select Use the following IP address.

f) Make sure that the IP address is 192.168.3.1, and the subnet mask is 255.255.255.0.
The IP address must be compatible with the default device address 192.168.3.100.

2. As an alternate method, change the IP address of the device.

3. In Barcode Manager, click Find Devices .

The device displays in Sensor Neighborhood with a dark gray icon, meaning it is now part of the LAN and can be configured. The new IP address also displays.

4.Double-click or drag the device icon into the Selected Device Information Area. Details about the device display in this area. After device discovery, configure your device through Barcode Manager.

8. Automatic Setup and Image Adjustment

8.1   Automatic Setup and Focus Adjustment
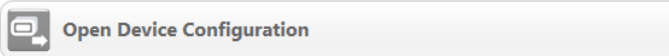
Objective: to understand the best procedures for achieving a well focused image, and attempting to read a barcode with Barcode Manager software.

Warning - On many simple calls, this is unnecessary, it may be best to just click the Web Monitor

 button to view live images on the Monitoring page of the web server interface in a web browser. Displaying images this way provides a faster performing demo, especially powerful at default settings where the reader is in continuous mode reading as fast as it can, beeping with each read to provide feedback on the performance. The reader can be adjusted using the Smart Teach button while viewing images in the web server, but once you open a configuration in Barcode Manager the Smart Teach interface will not function.

If you have a hard to read barcode or the customer requests to see the programming software, then proceed

by clicking Open Device Configuration

just be aware that the performance while in a configuration will be slower and the web server won't update until you leave the configuration by clicking Getting Started which returns to the home page of Barcode Manager.

Recommended Sample Barcodes:

1. Place a barcode in front of the reader at a slight angle, centered with the laser alignment beams.

2. Click Pause to stop live image captures.

3. Click Start Automatic Setup to open the Setup window. Check the 1D Codes, 2D Codes, and Include Image Filtering options to allow the most thorough search and optimization possible, or if you know which type you do not want to read de-select 1D or 2D to reflect this:

Automatic Setup

This procedure will perform Automatic Setup on current Image Setting parameters.

Choose between Static and Dynamic Tuning options:
◉ Static
○ Dynamic

Select which type of code symbology to search for.
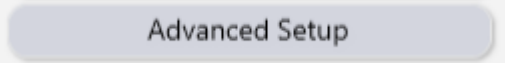If you're not sure select both. Only one code symbology will be found.
☑ 1D Codes
☑ 2D Codes
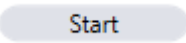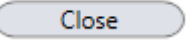
Include or exclude the use of image filtering.
Note: This can increase the time necessary to complete Automatic Setup.
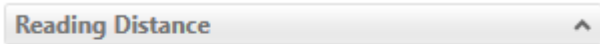☑ Include Image Filtering

Start   Stop   Close

4. Click Start ⬭Start to allow the reader to adjust its brightness, symbology and focus settings to optimize the acquired image of the barcode and the decoding settings. The Automatic Setup tries to find a barcode. As soon as it finds the first barcode, it optimizes settings for reading that barcode type and other types will be ignored. This process should take less than 30 seconds typically. If it takes longer, the code is likely out of focus or out of the field of view. When the Automatic Setup finishes, click Close ⬭Close . You should be able to see the barcode in the image with a green box around it to show that it read:


5. To further fine-tune the focus manually in case the Automatic Setup didn't choose the ideal position, or if you have a manual focus model, click Advanced Setup [Advanced Setup] .

6. Click Image Settings
7. Focus fine-tuning differs for Liquid Lens models and fixed lens models:

   a. For Liquid Lens (auto-focus) models:

   Adjust the Reading Distance [Reading Distance (mm) | 135] setting while watching the barcode image to optimize the focus if necessary. Click the Zoom In button 🔍 to increase the zoom level and drag the red thumbnail navigator box:
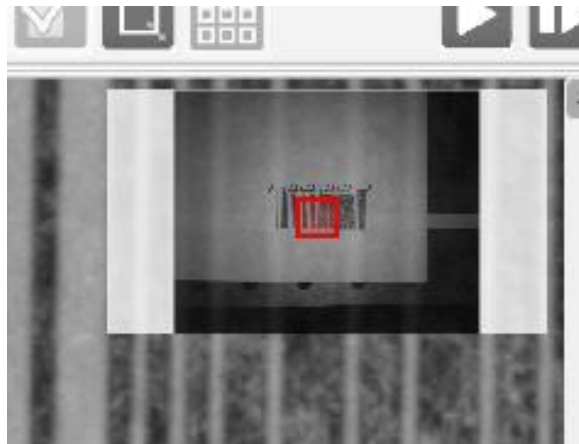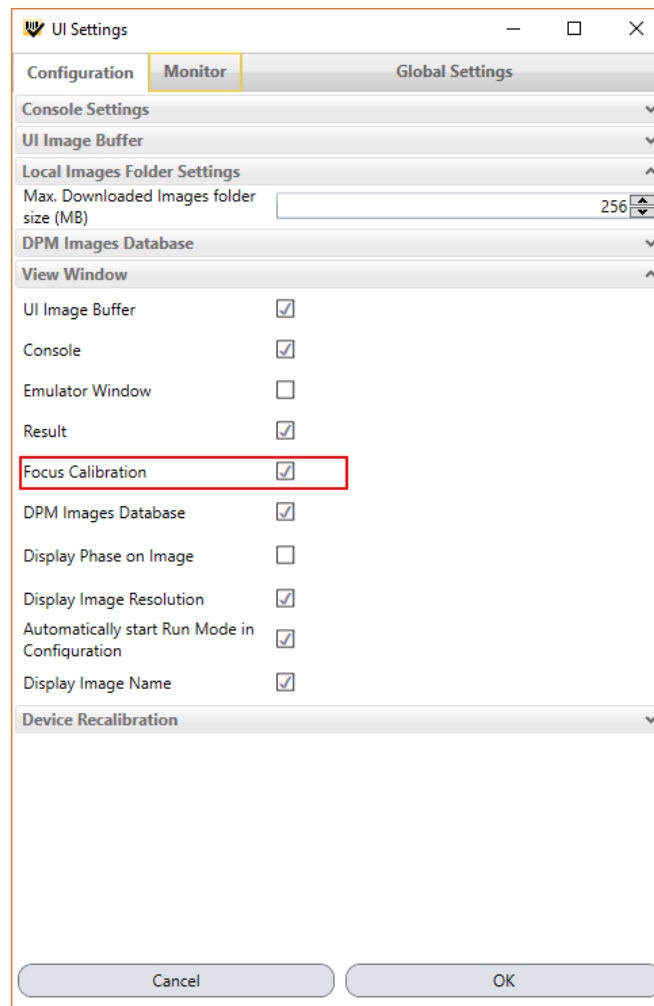
onto your barcode to get a close-up view of the barcode to watch for when the code edges look the most crisp.
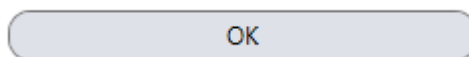
    b.   For manual focus models:
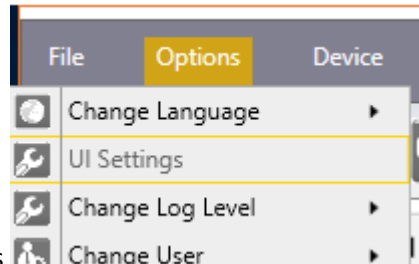
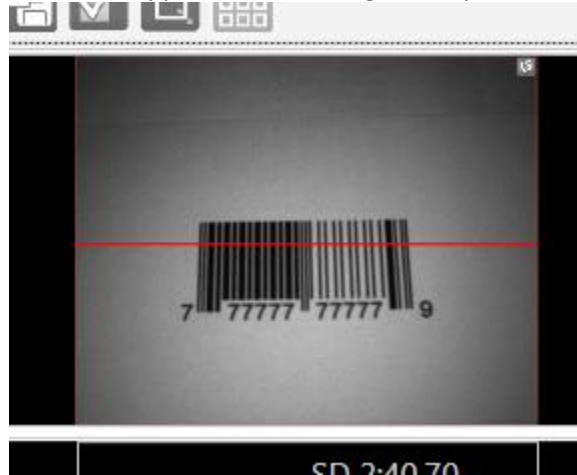Click Options > UI Settings and make sure that Focus Calibration is checked:


Then click OK to close the window.

Click Focus Calibration [Focus Calibration]

then drag the red horizontal line that appears on the image onto your barcode:

Watch the graph as you adjust the focus dial on the reader housing until the peaks of the graph are as long and skinny as possible. This is a graph of light intensity, so long steep peaks show high contrast, which is ideal for image decoding.
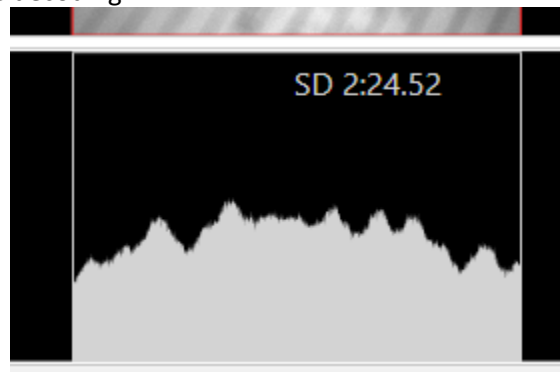

Worse Contrast
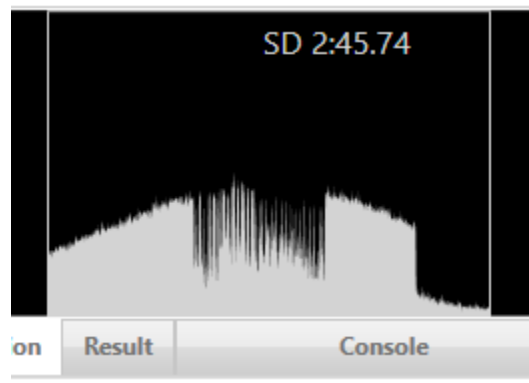
Better Contrast

8.2 Viewing Barcode Details

Now that we have the barcode reading, and the image focused, it's a good time to check our barcode PPE (Pixels per Element) to make sure it is meeting the recommended minimum guidelines of 1.3 pixels for 1D codes and 2.3 pixels for 2D codes.

Click on Result .

Click on the barcode symbology setup for the barcode you are currently reading, in this example UPCA

 .
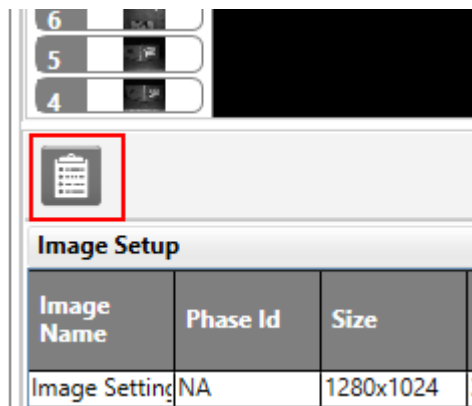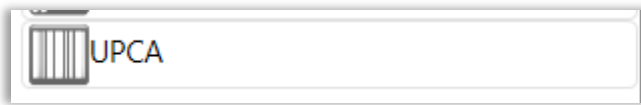
Click on the Clipboard icon .

Scroll down if necessary in the Result pane to check the PPE number for the selected barcode. 2.29 is fine, so we could still move the reader farther away if we needed to. We can also check the Decoding Time here to make sure the barcode reads fast enough for our needs.

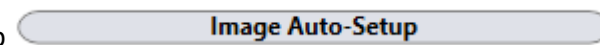| Symbology	CODE128
Data	97071
Number of Characters	5
Module Size (mils)	7.62
PPE	2.29
Decoding Time (ms)	0

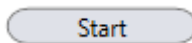## 8.3   Exposure Time and Gain Adjustment

1. Click on Image Settings .

2. Click Image Auto-Setup .

3. If you are setting up for a static reading presentation, you could select Static, but Dynamic is selected by default because most applications involve codes in motion. If you know what the line speed and code size are, you should enter it here

.

4. Click Start .

5. When it completes, Click Apply .

This process will set the exposure time equal to the Code Resolution divided by the Line Speed, and then adjust the Gain (though not Gain Multiplier) settings to optimize brightness from there. This is to automatically avoid blurring of the barcode edges. A more conservative recommendation would be trying to go with a shutter time about half of this resulting value to be safer about avoiding blur, by not allowing the barcode bars to get halfway to running into the next bar during acquisition.

The exposure time may have to be lowered if the barcodes are tilted significantly, making the apparent module size to the camera decrease.

If the barcode contrast is still not ideal, consider adjusting the Gain manually, raising the Gain multiplier if the barcode appears dark, or adjusting the Lighting settings in the next section of this training.

Note - The exposure time could be raised higher if the barcode is 1D and travelling with the lines pointing in the direction of travel.

Note – There is a Dynamic setting on the Automatic Setup window as well, but it does not function correctly.

8.4   Lighting Options

Objective: to understand the main lighting selection and configuration options.

1. Specular reflections

This is an image from an ABR3000 pointed straight down at a barcode test card:

Same barcode, same distance, same shutter time, with ABR3000 polarized model, which has a polarizing filter that eliminates specular reflections:

The loss of brightness from a polarizing filter is why you are often better off just angling a standard unpolarized reader to avoid specular reflections. The manual recommends a 10 to 15 degree angle to avoid specular reflection.
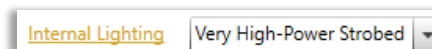
Same but with shutter time and gain increased to raise brightness:
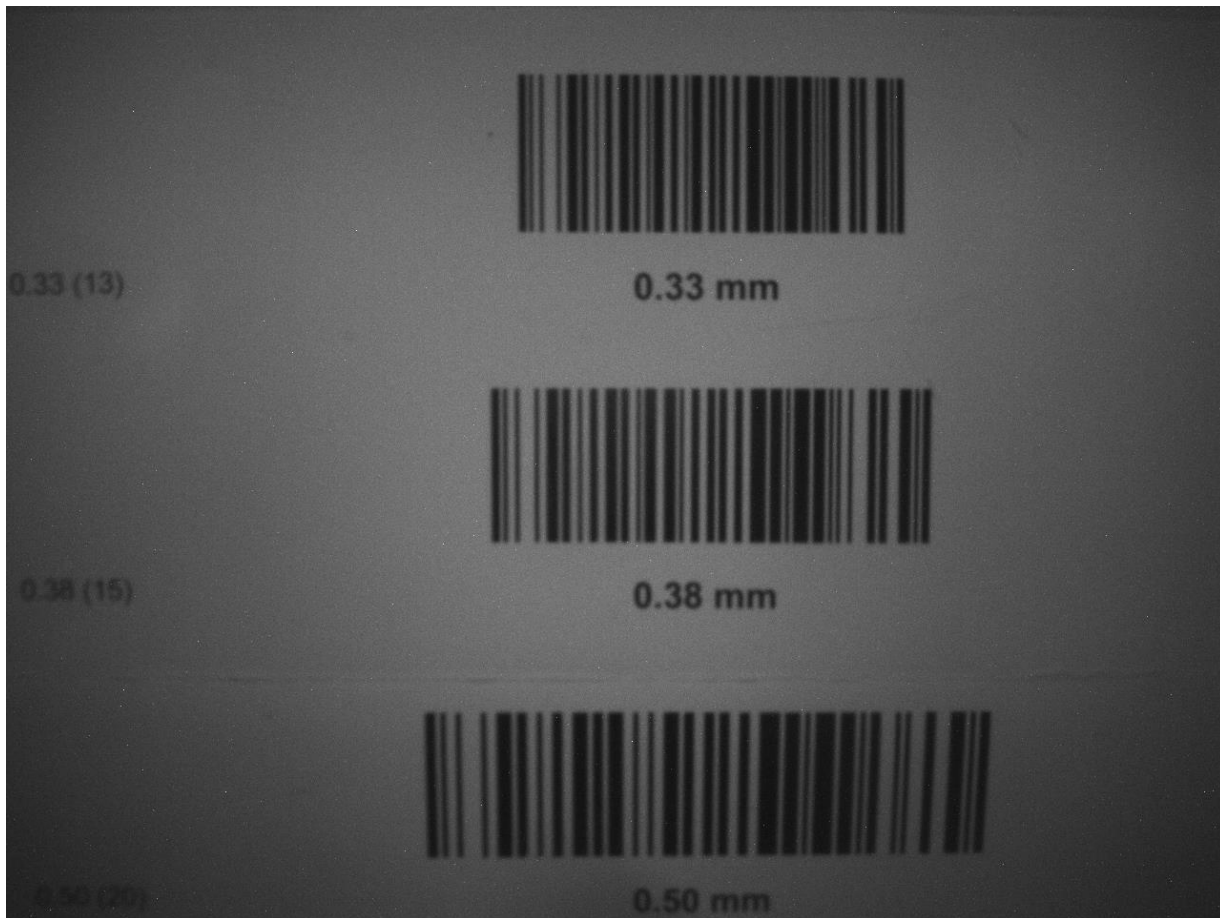
In this picture you can see that the specular reflections are removed perfectly.

Note - The ABR7000 does not have polarized models to order, but it is possible to cut adhesive polarizing film to apply to the front window.

2. Lighting Intensity Options

The "Internal Lighting" setting is found on the Image Settings Page of Advanced Setup. It Sets the operating mode of the internal lighting system. Possible values are:

Disabled: the built-in LED array is turned off all the time. This option can be useful if using an external lighting system;

Always On (Not available on ABR3000): the built-in LED array is turned on all the time at the lowest power level. This option is useful if the LED-array blinking (produced by Power Strobed lighting modes and rapidly occurring reading phases) disturbs the operator. This can actually be brighter than the Very High level, because it allows a longer exposure!

High-Power Strobed (Not available on ABR3000): the built-in LED array is on only during the image exposure time, at a higher power than Always On. <u>This can actually be brighter than the Very High level, because it allows a longer exposure!</u>

Very High-Power Strobed: the built-in LED array is on only during the image exposure time, at the highest power level. This is best for fast applications that require a short exposure.

NOTE: To avoid LED array overheating, for Power Strobed modes, the program automatically limits the range of allowed values for the Exposure Time parameter.

3. Multicolor DPM Lighting options
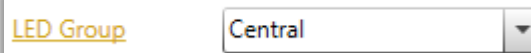
The LED Group setting   is only available on the ABR7000 Multicolor DPM lighting models, and it has 2 different set of LED's it can enable separately:
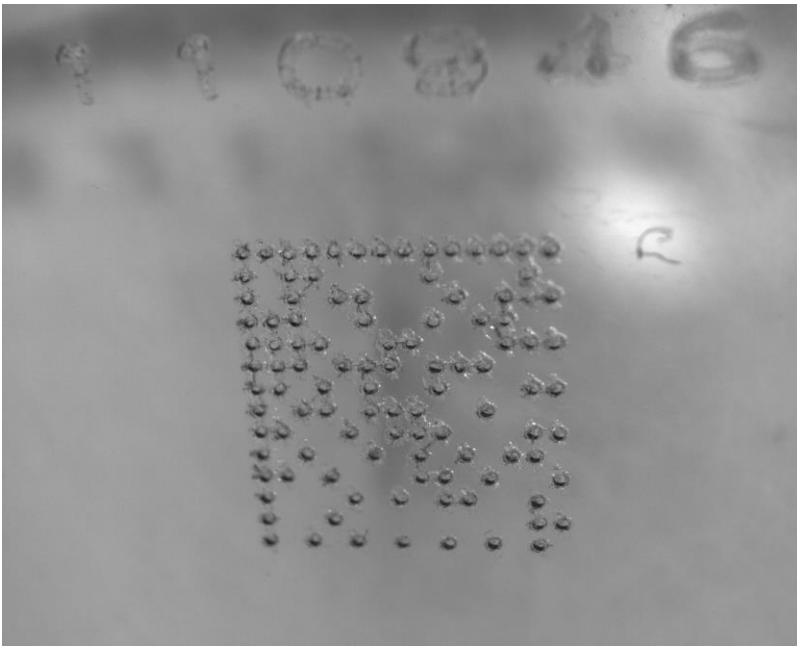
Central = the red bright field LED's in the center around the lens

External = the BLUE low-angle dark field rectangle of LED's around the outer edges of the lens

These low-angle LED's are the best for dot-peen codes like this one, which is readable even though it is on a glass part:

There is one more lighting setting just for these models, the Sector setting:

This enables disabling any quadrant of the LED's in case it generates a better image.

On a difficult to read code the Barcode Manager Auto-Setup procedure will try different combinations of lights to try to achieve the best image automatically, but if it doesn't succeed and end within a minute or two you are probably better off aborting and trying different lighting techniques manually.

At this point, either take a brief look at the pages under steps 2 and 3 of Barcode Manager:
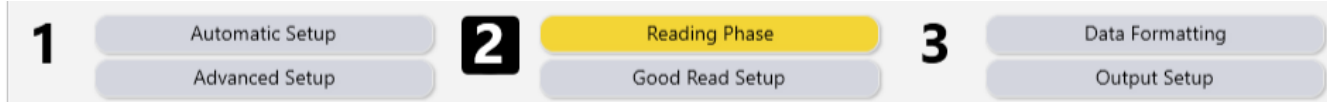
to have a look at how the I/O, timing and outputs are configured, or move on to the ABR Expert Training Manual for more detail.