



BCV-1203 Barcode Verification System Users Guide Version 1.2





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i Revision History

Version	Date	Page	Description
1.0	09/28/2009	All	Initial Release
1.1	11/04/2013	All	Updated for BCV-1203
1.2	11/30/2015	All	Updated added Relay Output Mode Setup

ii Reference Documents

1.0 Introduction

The BCV-1203 is a barcode verification system designed to verify barcodes for a variety of machine applications. The system can connect with a variety of Datalogic barcode scanners. It can also connect with other barcode scanners which can customize data output. The BCV-1203 can connect to up to 4 barcode scanners and 4 presence sensors and provides 2 relay outputs to accommodate a number of verification and control scenarios. The system includes a full graphic touch screen display for user interaction.

2.0 Hardware Connections

2.1 A/C Power

The BCV-1203 is powered by 90-264 VAC power 50-60 Hz. A standard power cord is provided and can be connected to a standard 110 VAC outlet. Alternatively the power cord and cord grip can be removed and replaced with a conduit fitting for direct connection to facilities or machine power. No external power switch is provided on the BCV-1203. The system will be powered and operational as long as power is provided to the box. Internally there is a 3 amp circuit breaker on the incoming AC power. The box includes screw latches and is not safety interlocked. Incoming power should be removed before opening the box for service.



Figure 1 –110 VAC Input

2.2 Scanner Ports

The BCV-1203 supports up to 4 barcode scanners. The scanners connect through 4 DB25 ports on the bottom of the box. The 4 female DB25 ports connect directly to 24 volt Datalogic scanners with DB25 male connectors.

Adapters can be used to connect 5 volt Datalogic scanners with other connectors. The following Datalogic scanner models are supported.

Model	Adapter Cable
DS2100N	None
DS2400N	None
DS4800N	None
Matrix 200	None
Matrix 400	None
DS1100	CAB-BCV-11A
DS1500	CAB-BCV-15A
DS2200	CAB-BCV-22A

Table 1 –Supported Scanners

The BCV-1203 may also be customized to accept a specific scanner directly without an adapter cable. The BCV can be configured to communicate with a specific type of scanner on each port.

The 4 ports connect internally to two RS485 ports on the BCV controller. The 4 scanners, are programmed to communicate over RS485 using MUX32 protocol, and each is programmed to a different address (1-4).

Port 1 doubles as a programming port. Scanners connected to this connector can be programmed through the BCV to the appropriate parameters to work with the BCV, including MUX32 protocol and a specific address 1-4.

2.2 Presence Sensor

The BCV-1203 has connections for up to four sensors. The BCV accepts sinking (NPN) sensor inputs. The sensors are wired to the inputs of the internal controller and also to the trigger inputs of the scanners.

The four sensor inputs are connected to terminal blocks 1, 2, 3, and 4 respectively. Also available are terminal blocks for +24V and 0V to power the sensors.

The BCV can be configured to associate a specific sensor to each scanner. This allows one sensor to be used for more than one scanner port. The BCV can also be configured to operate in automatic mode or triggered mode. The configuration options are described in detail below. Note each sensor input is wired to the corresponding scanner trigger input. So if triggered mode is used, sensor input 1 is used to trigger scanner 1. Sensors can be wired to multiple inputs if a single sensor is to trigger multiple scanners.

2.3 Relay Outputs

The BCV-1203 includes 2 relays. Each relay includes 2 normally open and 2 normally closed contacts.

14 – NC	11 – COM	12 – NO
24 – NC	21 – COM	22 – NO

When the system is running the relays are energized. Relay 1 is de-energized with a Wrong Read event on any of the enabled channels. Relay 2 is de-energized with a No Read or Missed Sensor event on any of the enabled channels. The parameters to determine the trip conditions are configured for each channel.

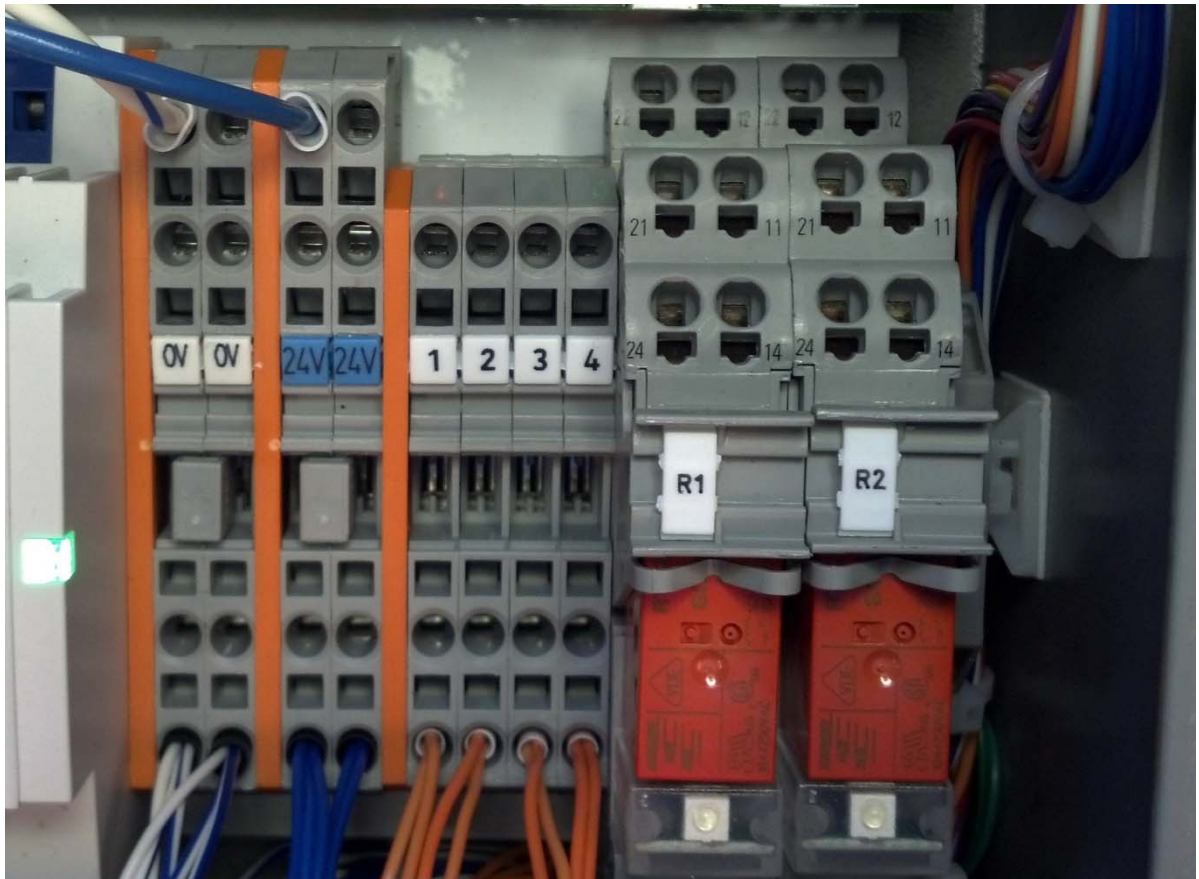


Figure 2 – Terminal Blocks and Relay Connections

3.0 Operation

The BCV-1203 includes a graphical touch screen panel for users to interact with the system. It also includes a 3 position key switch to enter the setup and reset modes.

On power up a splash screen showing the software version and revision is displayed. If everything is healthy the system will automatically switch to the main screen after 5 seconds. The splash screen shows the code revision and the build date.

Figure 3 - Splash Screen



3.1 Setup Mode

The system must be configured before it is operational. Until the scanners are setup and the verify codes are taught the output relays are both de-energized. The main screen will show all 4 scanners grayed out if no scanners are enabled. If scanners are enabled, but the verify codes have not been configured, it will show the scanners as not configured. If the system is not communicating to an enabled scanner the scanner field will be highlighted in red.

To setup the scanners, and teach the verify codes switch the key switch to the setup position. The main setup screen will be displayed. If no scanners are enabled, all four scanner fields are grayed out.

If the system has been pre-configured and the scanners pre-programmed, the advanced setup and programming steps can be skipped. Continue with section 3.1.3.

3.1.1 Scanner Program Mode

The scanners must be programmed with the correct parameters to work with the BCV. To program the scanners, from the main setup screen select the Advanced button, and then from the Advanced setup screen select the Program button. This will display the Program screen.

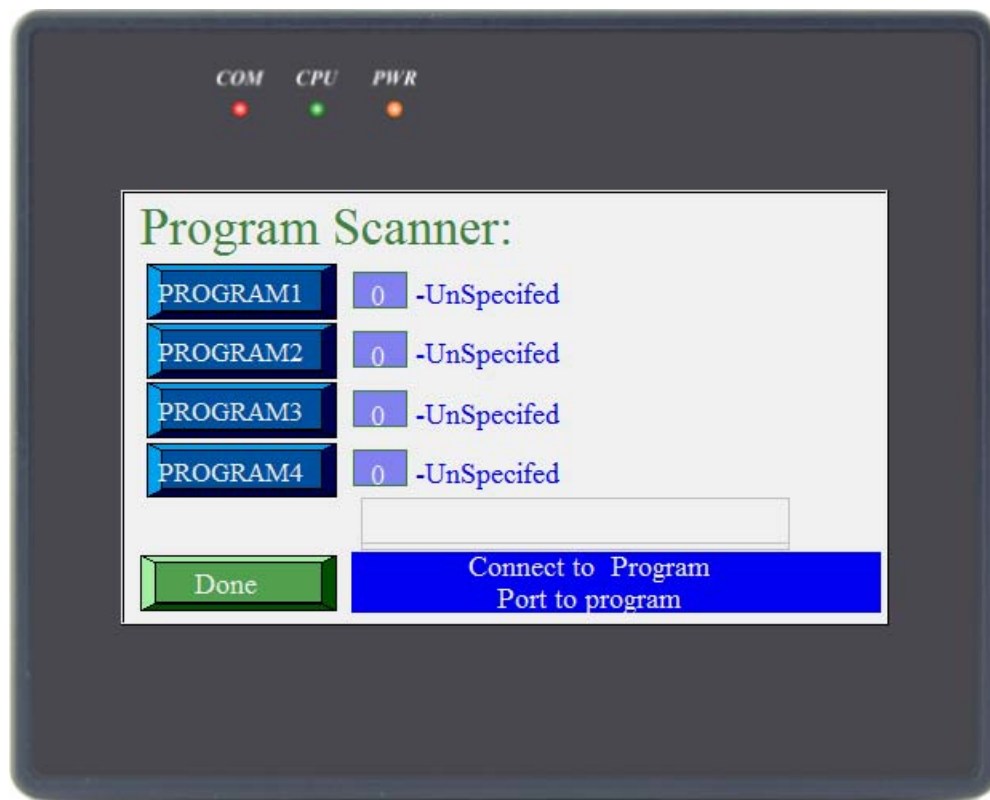


Figure 4 – Program Scanner Screen

The scanners must be programmed with appropriate parameters to communicate to the BCV. These include programming them to communicate over RS485, with the MUX 32 protocol, and with an address 1-4. The programming process is done via RS232 through the programming port, **Port 1** (only port 1 can be used to program the scanners). Each scanner to be used with the BCV must be plugged into port 1. Then by pressing the appropriate **Program** button (1-4), the scanner will be programmed to communicate with the BCV with the

respective address. If successful, **Program Successful** is displayed. The BCV automatically detects the type of scanner connected and programs it with the correct parameters. It sets the type to the scanner detected.

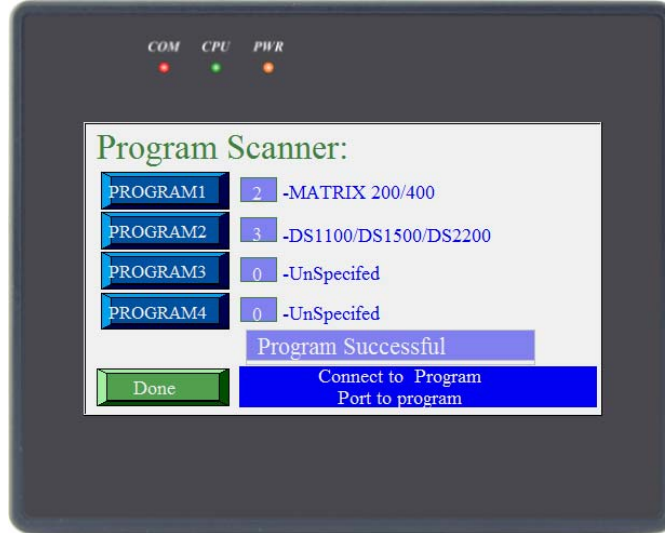


Figure 5 – Program Successful

If the programming fails, an error message is displayed.

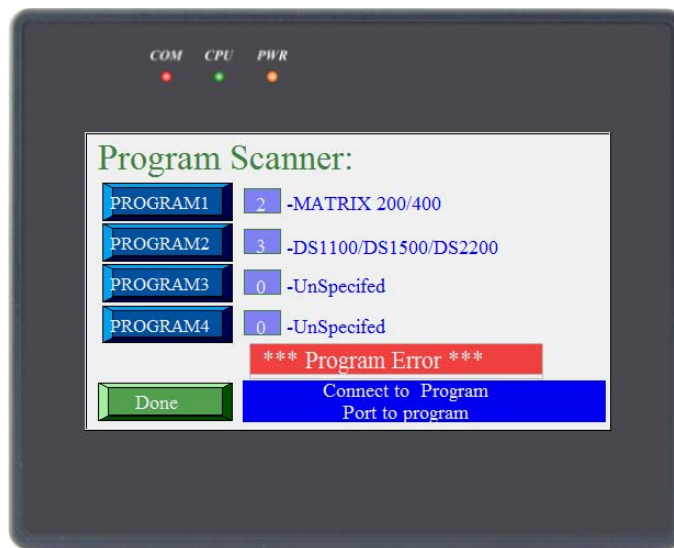


Figure 6 – Program Error

When using the DS1500 scanner, once the scanner is programmed to communicate over RS485, it will no longer communicate over RS232, and if programming is attempted the Program Error message will be display. Once programmed, the unit cannot be programmed again (for instance to a different address), unless it is set back to RS232 mode. Hold in the button on the top of the scanner while plugging it into the program port. The 40 light will turn on and then go out. This sets the unit to RS223 mode, and it can then be programmed.

When using the Matrix scanner, the scanner takes a minute to start. After plugging into the program port, be sure to wait until the lights on the top of the scanner come on before pressing the program button.

When all scanners have been successfully programmed to the correct address, plug them into the appropriate port and press Done. In the advanced setup screen there should be no communication errors if all scanners are programmed correctly and communicating.

3.1.2 Advanced Setup Mode

The Advanced Setup screen will display scanner bars as gray until the scanners are enabled.



Figure 7 – Advanced Setup - Disabled

Select the enable field for each of the scanners which are to be used. The gray bars will disappear. If the scanner is not communicating the NO COM error will be displayed. This usually indicates the scanner is not connected, or has not yet been programmed. To program the scanners select the Program button and refer to section 3.1.1.



Figure 8 – Advanced Setup – No Com

If the scanners are connected and programmed, there will be no communication errors.

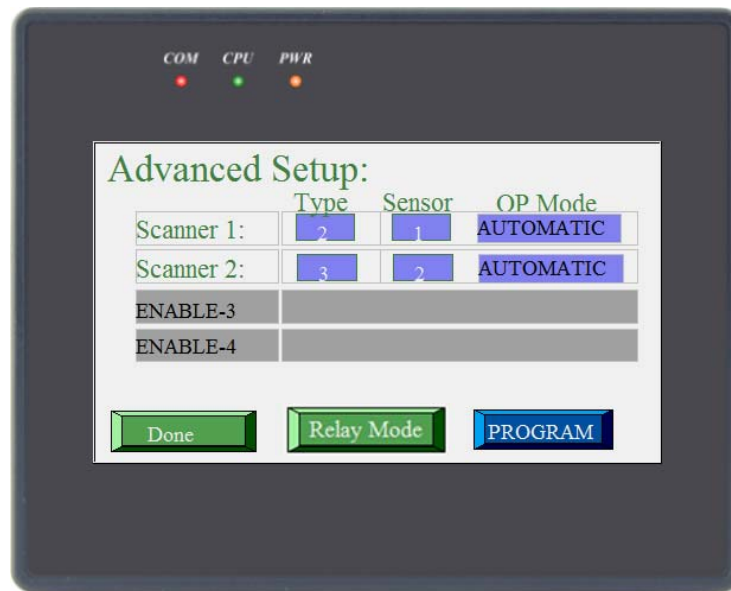


Figure 9 – Advanced Setup – Enabled

The type field selects the scanner type connected to each port. This is automatically configured when the scanner is programmed. It can be changed by selecting the type field if needed.

The sensor (1-4) associated with each scanner can be configured by selecting the Sensor field. This allows multiple scanners to be associated with one sensor. Note each sensor input is wired to the corresponding scanner trigger input. So if triggered mode is used, sensor input 1 is used to trigger scanner 1. Sensors can be wired to multiple inputs if a single sensor is to trigger multiple scanners.

The operating mode (Automatic, or Triggered) can be selected by selecting the Op Mode field.

In automatic mode codes are read and counted automatically when they pass in front of the scanner. The sensor input is used to count expected codes. If the sensor input pulse is seen without a code being read this is considered a no read.

In triggered mode, the sensor input triggers the scanner to read. The sensor should be adjusted so it triggers when the code is in front of the scanner. If the code is read when the sensor is triggered, it is recorded by the BCV. If no code can be read when the sensor is triggered a no read is recorded by the BCV. No codes are read in between sensor pulses.

3.1.3 Advanced Relay Mode Setup

The BCV-1203 has the ability to either one shot or latch the output relays. This configuration is entered by selecting Relay Mode in the Advanced Setup screen.

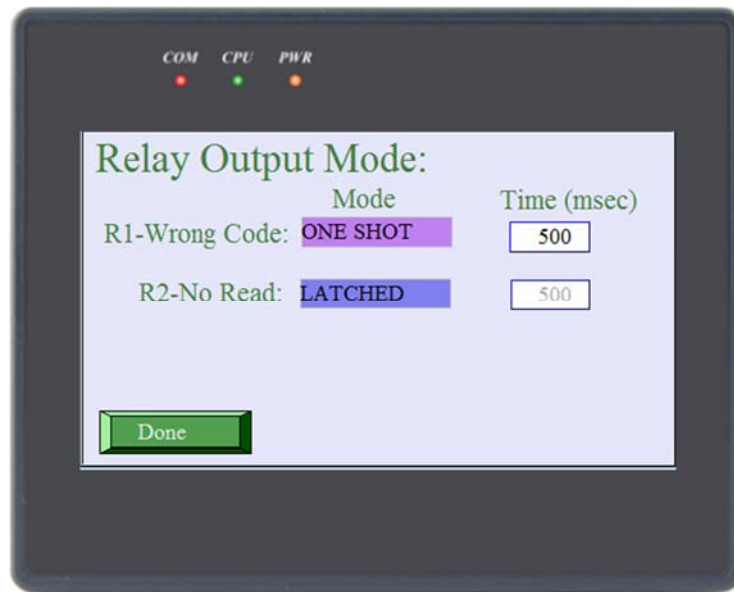


Figure 10 – Advanced Relay Mode Setup

In One Shot mode the relay will stay active for the amount of time entered in the Time box. In Latched mode the relay will stay active until the system is reset by the operator. If One Shot is selected a time from 0 - 999 msec must be selected.

3.1.4 Scanner Code Setup

From the main setup screen, each scanner needs to be setup by pressing the appropriate scanner button. This enters the code setup screen for the individual scanner.

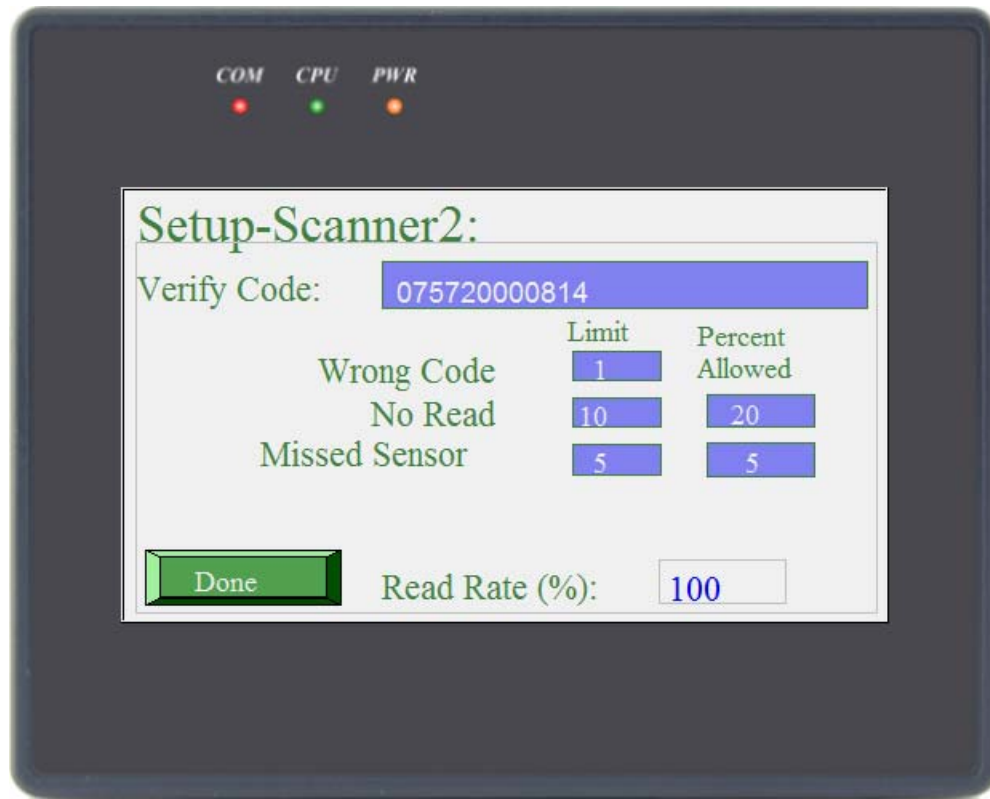


Figure 11 – Scanner Code Setup

When the setup for an individual scanner is selected the scanner is put into test mode, for most scanners. In test mode the scanner will attempt to read codes and send results including the read rate about once a second. The lights on the back of the scanner act as a bar graph indicating the read rate. On the screen the code (if one is read) will be displayed along with the read rate. While in setup mode the correct code should be placed in front of the scanner, and the scanner should be adjusted so the read rate is 100%. Alternatively codes can be passing the scanner at a slow speed during setup.

Matrix scanners do not enter test mode when being setup. The scanner will read codes positioned in front of the scanner and these will be displayed on the screen. There is no bar graph display on the scanner, and the read rate will always show 0%. The beeps produced by the scanner are an indication of its ability to read the code.

The relay trip limit parameters can be adjusted if desired. There are three different trip conditions which are monitored by the BCV. These are for a Wrong Code, No Reads, and Missed Sensors

The **Wrong Code Limit** value defines the number of wrong reads on this scanner which will cause the wrong read trip condition. The wrong read trip condition de-energizes relay 1. Typically this value is set to 1 (the default value), so that reading one wrong code will cause the trip. If this value is set to 5, the trip will not occur until 5 wrong codes have been read. Once the wrong limit trip occurs, the relay is de-energized and the condition remains until a reset is performed, regardless of good reads following the condition.

The **No Read Limit** and **No Read Percent Allowed** values adjust the operation of the no read trip condition. In automatic mode, a no read occurs if the sensor count increments and no code is detected by the scanner. In triggered mode a no read occurs if no code can be read when the sensor is triggered.

Likewise the **Missed Sensor Limit** and the **Missed Sensor Percent Allowed** adjust the operation of the missed sensor trip condition. In automatic mode a missed sensor event occurs if a code is detected by the scanner, without an increment of the sensor count. There is no missed sensor event in triggered mode.

Both the no read and missed sensor trip conditions de-energize relay 2.

The **Percent Allowed** value defines the percentage of no reads or missed sensors expected or tolerated. For systems where there is not exactly one sensor pulse per barcode, this should be set to represent the expected ratio of codes to sensors. For instance if there are 4 sensor pulses for every 5 barcodes, the **No Read Percent Allowed** value should be set to 20%. This means we expect 1 no read for every 5 good reads. If there are 5 sensor pulses for every 4 barcodes, the **Missed Sensor Percent Allowed** value should be set to 20%. This means we expect 1 missed sensor for every 5 codes read. These values can be adjusted further to tolerate additional no reads or missed sensors, for cases where the sensor may not be triggered every time, or not every code will be read. If typically there is 1 sensor pulse for every barcode read, however, we can tolerate missing 1 out of every 5 barcodes, the **No Read Percent Allowed** value should be set to 20%.

The **Limit** value defines the number of times the percentage must be exceeded to cause the trip condition. If the **No Read Percent Allowed** value is set to 20% and the **No Read Limit** value is set to 5, and we have more than 1 no read per 5 codes for more than 5 times in a row, the no read trip condition will occur and relay 2 will be de-energized.

Any of the **Limit** values (Wrong Code Limit, No Read Limit, or Missed Sensor Limit) can be set to zero, to disable the trip event. The conditions are still monitored, but there is no limit, so the relay is never tripped as a result of the count. If there is no sensor for this scanner, the **Missed Sensor Limit** can be set to 0, and the relay will not be tripped for missed sensors.

To monitor the no read and missed sensor conditions internal counters are maintained in the BCV. Every time the event is detected the counter is incremented by one minus the percent allowed value (if the percent allowed value is 20% the counter is incremented by 0.80). Every time a good condition is detected the count is decremented by the percent allowed value (if the percent allowed value is 20% the counter is decremented by 0.20). If this counter exceeds the limit value the trip condition occurs. If subsequent good conditions occur, and cause the counter to decrement below the limit value the trip condition will be cleared and relay 2 will be re-energized.

These values can be changed by touching the number box. This brings up a keypad allowing a new value to be entered.

Pressing the Done button concludes the setup for this scanner and returns to the main setup screen.

Once a scanner is setup the main setup screen shows the verify code highlighted in blue. Also shown in the main setup screen is the total number of codes. If the system has been in run mode, this shows the total codes counted for that scanner.

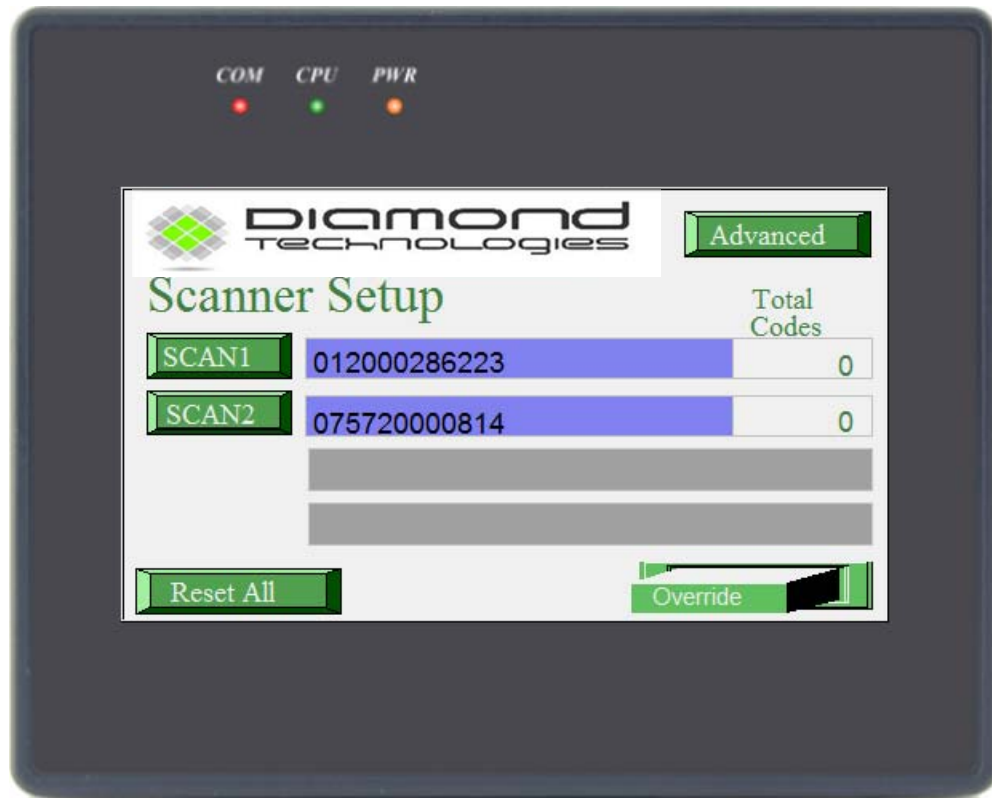


Figure 12 – Main Setup Screen

The Reset All button can be used to reset all fault conditions, and all counts to start a new run. This can also be done from the reset mode.

The Override switch can be used to put the BCV in override mode. In override mode the relays are always energized and the codes are not read. In run mode a System Override banner is displayed at the bottom of the main screen.

When switching out of setup mode (switching the key switch back to run), the configuration is stored in flash in the controller. If the BCV is powered down before switching the switch back to the run position, the configuration will not be remembered.

After cycling power to the BCV, the verify codes must be configured in setup mode before the system will run. The main screen will show Not Configured for the scanners until a verify code is set using setup mode.

3.2 Run Mode

Turning the key switch back to the Run position puts the system in run mode. While in run mode the relays will be energized as long as the trip events have not been met, and the system will be counting labels and verifying codes.



Figure 13 – Main Screen

The main run screen shows the status of all 4 scanners and the output relays. The status of the output relays is indicated by the lights in the upper right corner. Green indicates the relays are energized. Yellow and red respectively indicate the No Read and Wrong relays are de-energized. The Codes value indicates the number of labels counted by the sensor. The Good value indicates the number of codes read that match the verify code. The No Read value indicates the number of no reads (i.e. no code was read in between successive sensor triggers). The Wrong value indicates the number of codes read that did not match the verify code. If either the no read limit or wrong read limit has been exceeded those numbers will be highlighted in yellow or red respectively.

At the bottom of the screen fault conditions and errors will be displayed if they exist.

The entire status bar for a scanner will be shown in red if the scanner is not communicating. Note if any scanner is not communicating, this will affect performance and may cause the other scanners to report no reads.

A detailed screen for an individual scanner can be displayed by pressing the scanner button.

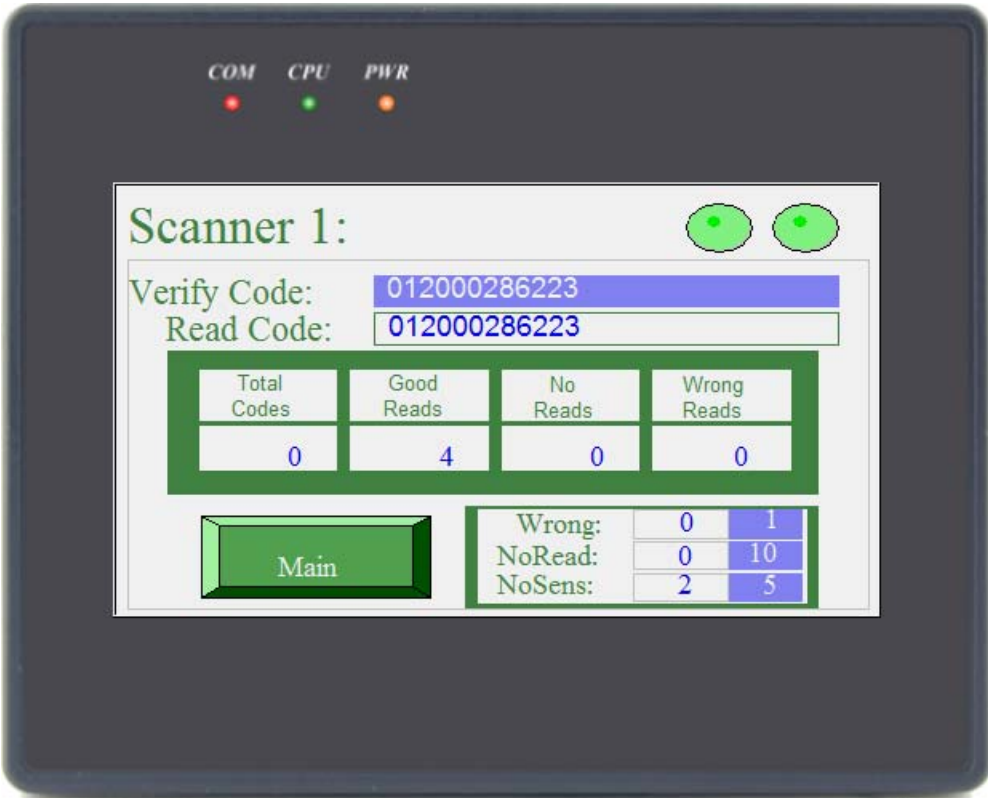


Figure 14 – Scanner Detail Screen

The verify code is shown highlighted in blue at the top and the last read code underneath. This can be referred to in order to determine the cause of a wrong read. The counts are displayed in the middle. The table in the bottom right shows the status of the wrong, no read, and missed sensor conditions. Highlighted in blue are the configured limits, with the current values in to the left. If the current values reach the limit, the trip will occur, and the value will be highlighted in red or yellow. The status of the two relays is shown in the upper right.

Pressing the Main button returns to the main run screen.

3.3 Reset Mode

To reset any fault conditions turn the key switch to the Reset position. The Reset screen will be displayed.



Figure 15 – Reset Screen

The status of the relays is again shown by the lights in the upper right corner. For each scanner the status is shown with no read fault conditions in yellow and wrong read fault conditions in red. The COM light for each scanner to the right indicates the status of communications, and will be green if the scanner is communicating properly. Any error or fault conditions will be shown at the bottom of the screen.

A fault condition for an individual scanner can be reset by pressing the scanner button. Alternatively all fault conditions on all scanners can be reset by pressing the All Scanners button.

Resetting the fault conditions does not reset any counts. After all fault conditions are reset, the system can be returned to run mode, and operation can resume from the current counts. If the Reset All button is pressed all the counts are reset and a new run can be started. This is equivalent to pressing the Reset All button in the setup screen.

4.0 Maintenance and Troubleshooting

4.1 Scanner Communications Errors

If any scanner is not communicating properly a scanner communications error will be displayed.



Figure 16 – Main Screen – Communications Failure

This will occur if the scanner is unplugged from the BCV, the scanner is not programmed correctly for this port, or can be an indication of a scanner or controller failure. If communications to the scanner is re-established the error message will disappear and operation can resume. A communications failure is shown on most screens either as the red bar or as a red light. A communications failure with one scanner will affect the performance of the system and may cause no reads on other scanners. Communications failures should be repaired before running the system.

If a scanner needs to be replaced the new scanner must be programmed with the correct parameters and address (see section 3.1.2).

4.2 Screen Communications Error

A communications failure between the HMI screen and the BCV controller displays the error message as shown.



Figure 17 – Screen Communications Error

This is an indication of a failure in the controller, the display, or the cable connecting them.

5.0 Notes