



CARDINAL®



SB600

Remote Display

**Installation and Technical Manual
(includes SB600RI with Remote Input)**

TABLE OF CONTENTS

INTRODUCTION	Page 1
SPECIFICATIONS	Page 1
FEATURES	Page 2
Standard	Page 2
Optional	Page 2
INSTRUMENT COMPATIBILITY	Page 2
AUTO-LEARN FEATURE	Page 2
MULTIPLE DISPLAYS	Page 3
SITE PREPARATION	Page 4
INSTALLATION	Page 5
Unpacking	Page 5
SB600 Dimensions	Page 5
SB600 Components and Gland Layout	Page 5
Mounting the SB600	Page 6
Wall Mounting	Page 6
Mounting on Cardinal Scale's 10 ft or 12 ft High Pole	Page 7
Accessing SB600 Controller Board and AC Power Connections	Page 10
AC Power Connection	Page 11
SB600 CONTROLLER BOARD	Page 12
Jumper Setting Table	Page 12
Status LED's and Display	Page 13
Jumpers	Page 13
Connectors	Page 13
Switches	Page 13
SERIAL CABLE INSTALLATION	Page 14
RS-232	Page 14
20mA Current Loop	Page 15
RS485/422	Page 16
CURRENT Cardinal Indicators 20mA Current Loop Connections	Page 17
LEGACY Cardinal Indicators 20mA Current Loop Connections	Page 19
SETUP AND CONFIGURATION	Page 20
Enter Setup Mode	Page 20
Default to Factory Settings	Page 20

TABLE OF CONTENTS, CONT.

SB600RI (REMOTE INPUT)	Page 30
RE-INSTALLING THE ACCESS PANEL	Page 32
OPTION CARD CONFIGURATION	Page 32
START ERRORS AND STATUS MESSAGES	Page 33
DEMO MODE	Page 34
Enter Demo Mode	Page 34
TEST MODE	Page 35
Enter Test Mode	Page 35
PART IDENTIFICATION	Page 36
Front, Back, Section A-A, Section L-L, Section B-B, and Section G-G Views	Page 36
Parts List for Front, Back, Section A-A, Section L-L, Section B-B, and Section G-G Views	Page 37
Back Removed, Guards and Back Removed, Section C-C, and Detail E Views	Page 38
Parts List for Back Removed, Guards and Back Removed, Section C-C, and Detail E Views	Page 39
Section D-D, Detail F, Detail K, and Detail M Views	Page 40
Parts List for Section D-D, Detail F, Detail K, and Detail M Views	Page 41

PRECAUTIONS

Before using this instrument, read this manual and pay special attention to all "WARNING" symbols:



IMPORTANT



**ELECTRICAL
WARNING**



**STATIC
SENSITIVE**

Static Electricity Precaution



CAUTION! This device contains static sensitive circuit cards and components. Improper handling of these devices or printed circuit cards can result in damage to or destruction of the component or card. Such actual and/or consequential damage **IS NOT** covered under warranty and is the responsibility of the device owner. Electronic components must be handled only by qualified electronic technicians who follow the guidelines listed below.



WARNING! ALWAYS use a properly grounded wrist strap when handling, removing or installing electronic circuit cards or components. Make certain that the wrist strap ground lead is securely attached to an adequate ground. If you are uncertain of the quality of the ground, you should consult a licensed electrician.



ALWAYS handle printed circuit card assemblies by the outermost edges.

NEVER touch components, component leads or connectors.

ALWAYS observe warning labels on static protective bags and packaging and never remove the card or component from packaging until ready for use.

ALWAYS store and transport electronic printed circuit cards and components in anti-static protective bags or packaging.

FCC Compliance Statement

This equipment generates uses, can radiate radio frequency, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been designed within the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user will be responsible to take whatever measures necessary to correct the interference.

You may find the booklet "How to Identify and Resolve Radio TV Interference Problems" prepared by the Federal Communications Commission helpful. It is available from the U.S. Government Printing Office, Washington, D.C. 20402. The stock number is 001-000-00315-4.

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Disclaimer

While every precaution has been taken in the preparation of this manual, the Seller assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from use of the information contained herein. All instructions and diagrams have been checked for accuracy and ease of application; however, success and safety in working with tools depend to a great extent upon the individual accuracy, skill and caution. For this reason, the Seller is not able to guarantee the result of any procedure contained herein. Nor can they assume responsibility for any damage to property or injury to persons occasioned from the procedures. Persons engaging the procedures do so entirely at their own risk.

INTRODUCTION

Thank you for your purchase of our Cardinal SB600 Remote Display. It was built with Cardinal quality and reliability at our factory in Webb City, Missouri. This manual will guide you through installation, and operation of your display. Please read it thoroughly before attempting to install your display. Also, make certain that you pay attention to the warnings that appear in this manual. Failure to read and follow these instructions and warnings may result in damage to the display and/or bodily injury. Please keep this manual available for future reference.

SPECIFICATIONS

Character Height:	6-inch (15.25 cm)
Display Type:	Graphical, 256 full-color RGB with high-performance LED lamps
Number of Pixels:	80 x 16 for 1,280 LEDs with built-in large and small fonts
Annunciators:	Units (lb, kg, T, t) and Mode (G, N)
Ambient Light Levels:	Total darkness to direct sunlight
Display Capacity:	-99999 to 999999
Viewing Range:	Up to 250 Feet (76 Meters)
Viewing Angle:	140 degrees (+/- 70 degrees)
Data Input:	RS-232, RS-422/485, 20ma Current Loop (active or passive), wireless (2XX-SNAP), Serial Fiber Optic (2XX-SFP-G)
Enclosure Type:	Weatherproof IP65-rated 18 Ga. Stainless Steel
Power Requirements:	SB600/SB600RI, 90 to 130 VAC (50/60 Hz), 100 watts max. SB600EU/SB600UK, 180 TO 264 VAC (50/60 Hz) 100 watts max.
Ambient Temperature:	-15 to +130 °F (-26 to +54 °C)
Ambient Humidity:	5 to 100 percent
Product Dimensions:	43" L x 10" W x 4.75" D (109 cm L x 25 cm W x 12 cm D)
Net Weight:	26 lb (12 kg)
Shipping Dimensions:	48" L x 18" W x 7" D (122 cm L x 46 cm W x 18 cm D)
Shipping Weight:	33 lb (15 kg)
Country of Origin:	USA

FEATURES

Standard

- Auto-Learn feature (automatically selects input protocol).
- Alpha descriptors for units.
- On-board intensity sensor automatically adjusts to ambient light with 10 Levels of brightness (total darkness to direct sunlight).
- 6-inch (15.25 cm) high Red/Green traffic light and four-way directional arrows standard.
- Daisy-chain multiple units for viewing multiple axles and total weight simultaneously.
- The SB600 can scroll and display messages from a programmable indicator or PC application.
- Support for 2XX-SNAP (SnapStream Option Card), and 2XX-SFP-G (Serial Fiber Optic Option Card).

Optional

- Remote inputs to control the traffic lights on the SB600 by a remote device.
NOTE: Requires Model SB600RI with Remote Input.

INSTRUMENT COMPATIBILITY

Utilizing the Auto-Learn feature, the SB600 display can be driven by the following Cardinal weight indicators and by most weight indicators from other manufacturers.

Current Models:

185/185B, 190/190A, 204, 200, 212/212X, and 825
205, 210, 210FE, 212G/212GX, 225 (with USB)

Legacy Models

180, 204S, 215, 220, 777 Series, 778 Series and 788 Series
Non-USB 205, 210, 210FE, 212/212X, 212G/212GX, 225

AUTO-LEARN FEATURE

The display interface can auto-learn most serial protocols (automatically selects input protocol). The interface auto detects baud rates between 2400 and 19200 baud with the following settings:

Baud rate	2400 to 19200
Character format	all standard ASCII characters

MULTIPLE DISPLAYS

The SB600 display has been designed to be linked or daisy-chained to other SB600 displays allowing multiple lines of weight data to be displayed while being driven by a single serial port on the weight indicating instrument. Typical applications might consist of three displays showing Gross, Net and Tare weights from a single indicator or four displays showing the weight from each of three platforms and a total weight also from a single weight indicator.

Figure No. 1, illustrates a typical RS-232 installation consisting of four displays to show the weight from each of three platforms and a total weight driven by a single serial port on the weight indicator.

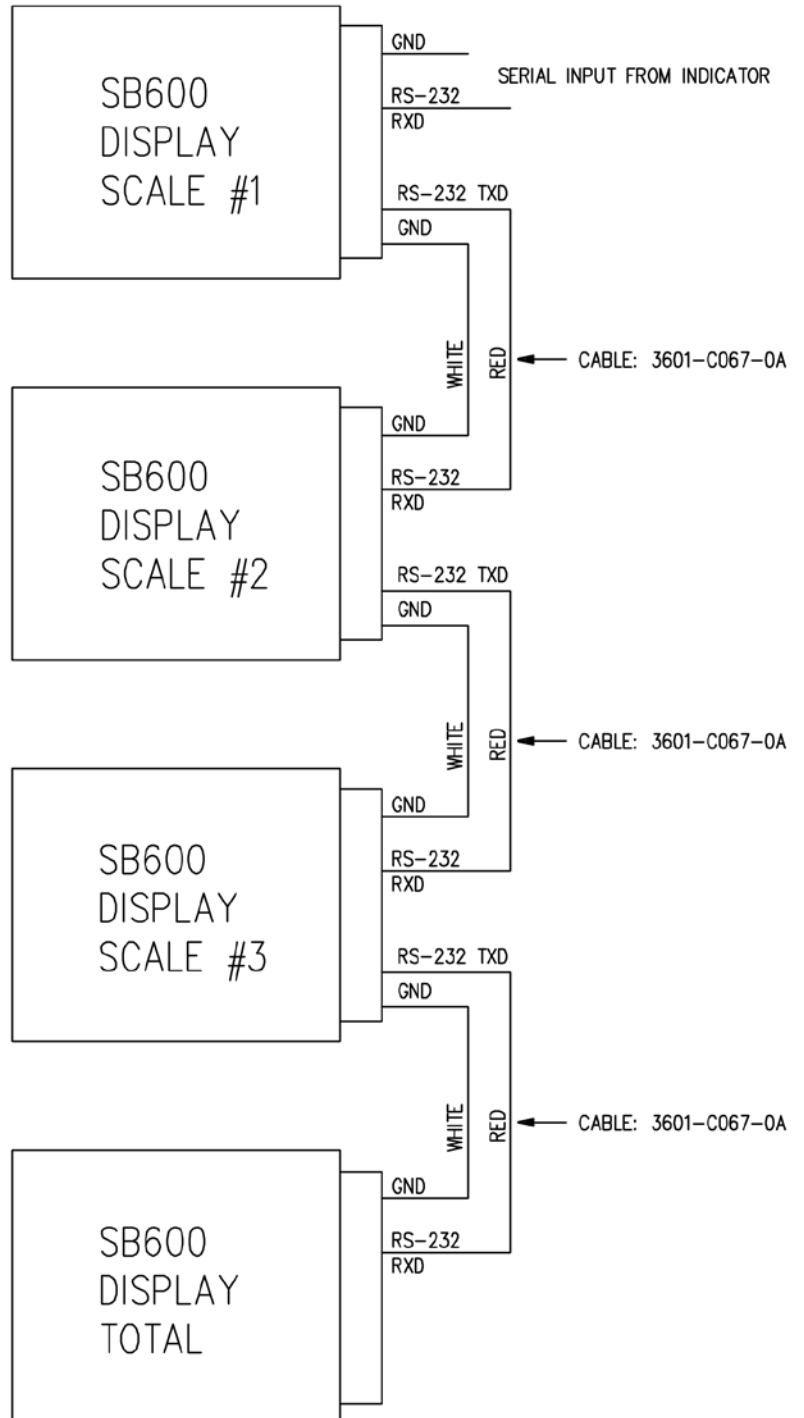


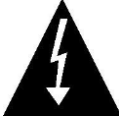
Figure No. 1

SITE PREPARATION

Electrical Power

The SB600 and SB600RI remote display has been designed to operate from 90 to 130 VAC at 50/60 Hz, 100 watts maximum.

The SB600EU and SB600UK remote display has been designed to operate from 180 to 264 VAC at 50/60 Hz, 100 watts maximum.



WARNING! To avoid electrical hazard and possible damage to the display, DO NOT, under any circumstance, cut, remove, alter, or in any way bypass the power cord-grounding prong.

- The power for the display should be on a separate circuit from the distribution panel. This circuit should be dedicated to the exclusive use of the display.
- The wiring should conform to national and local electrical codes and ordinances and should be approved by the local inspector to assure compliance.
- For permanently connected equipment, a readily accessible disconnect device must be provided external to the equipment.
- For pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible
- **It is the responsibility of the customer** to have a qualified electrician install the proper service disconnect that conforms to national electrical codes and local codes and ordinances.

Electrical Noise Interference

To prevent electrical noise interference, make certain all other wall outlets for use with air conditioning and heating equipment, lighting or other equipment with heavily inductive loads, such as welders, motors and solenoids are on circuits separate from the display. Many of these disturbances originate within the building itself and can seriously affect the operation of the display. These sources of disturbances must be identified and steps must be taken to prevent possible adverse effects on the display. Examples of available alternatives include isolation transformers, power regulators, uninterruptible power supplies, or simple line filters.

INSTALLATION

Unpacking

Before beginning installation of your SB600 remote display, make certain it has been received in good condition. Carefully remove the display from the shipping carton and inspect it for any evidence of damage (such as exterior dents or scratches) that may have taken place during shipment. Keep the carton and packing material for return shipment if it should become necessary. **NOTE:** It is the responsibility of the purchaser to file all claims for any damages or loss incurred during transit.

SB600 Dimensions

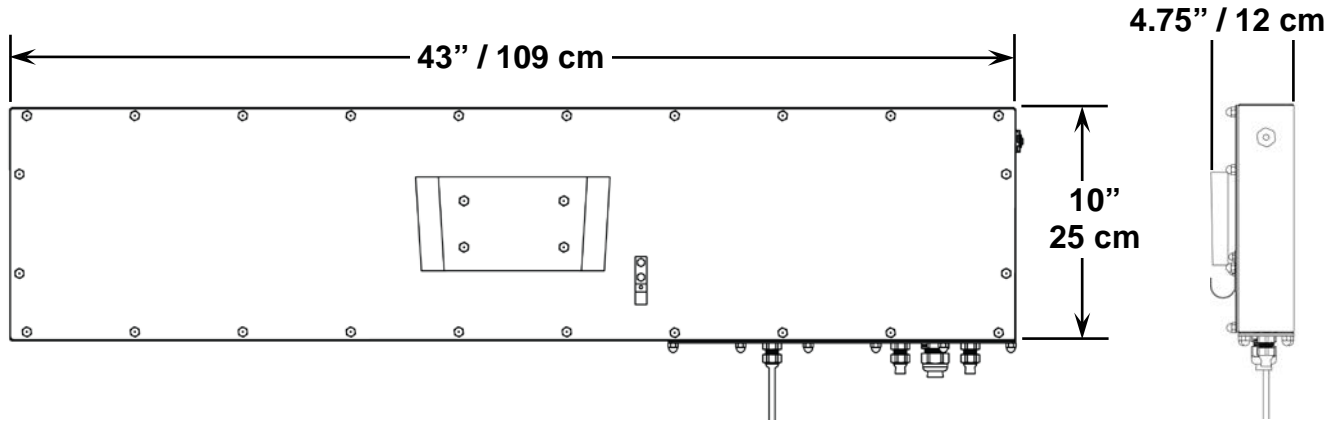


Figure No. 2 – External Dimensions

SB600 Components and Gland Layout

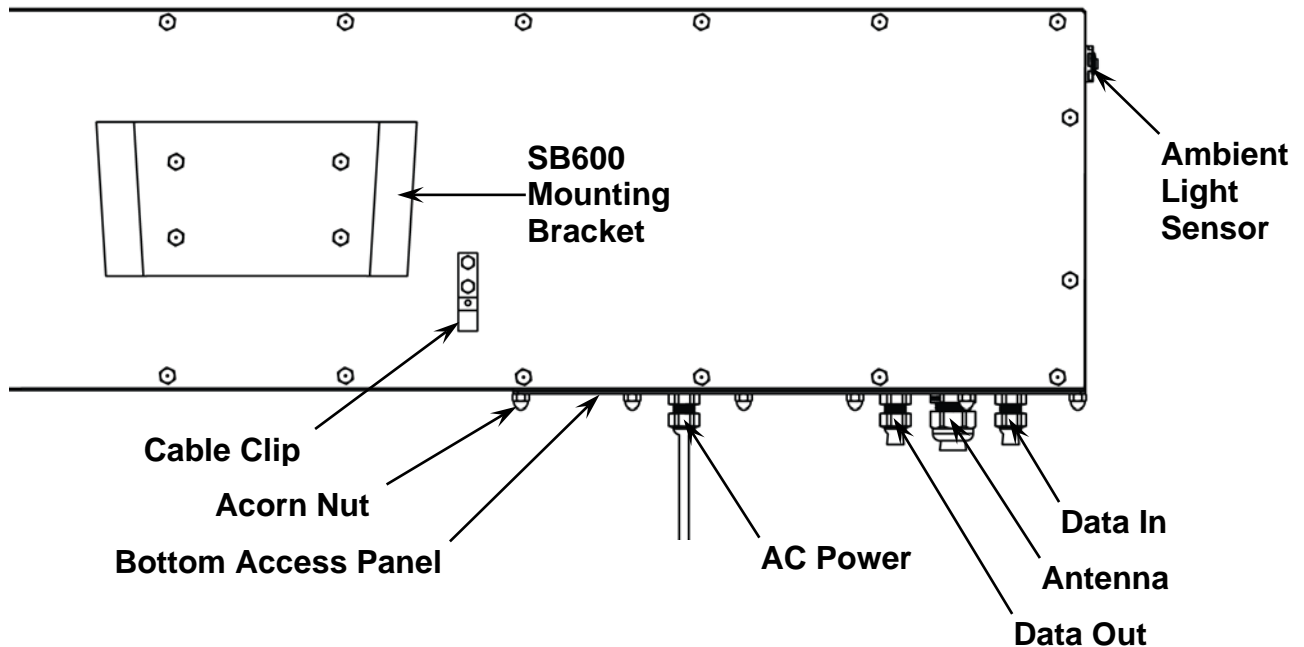


Figure No. 3 – Components and Gland Layout

INSTALLATION, CONT.

Mounting the SB600

The SB600 display includes a two-piece bracket that is used to mount it on a wall or other flat vertical surface. The two-piece bracket along with *two* purchased U-bolts, can also be used to mount the SB600 to Cardinal Scale's 4.5-inch OD 10-foot high mounting pole with base plate (8100-D028-0A), or 12-foot high mounting pole with base plate (8100-D028-1A). The mounting brackets have a security feature to lock the SB600 in place with tabs and/or a padlock.

Wall Mounting

The SB600 Mounting Bracket is installed on the SB600 at the factory. The SB600 Pole Bracket is installed at the site by the scale dealer or customer. Refer to Figure No. 4 for the pole bracket hole layout. When wall mounting, first, make sure the mounting surface is strong enough to support the display. Carefully layout the pole bracket mounting hole locations and then drill and install the anchor bolts. After installing the pole bracket, align the mounting bracket on the back of the SB600 with the pole bracket, and then slide the mounting bracket down into the pole bracket until the top of the two brackets are flush with each other and the SB600 bracket is resting against the bottom stops in the pole bracket.

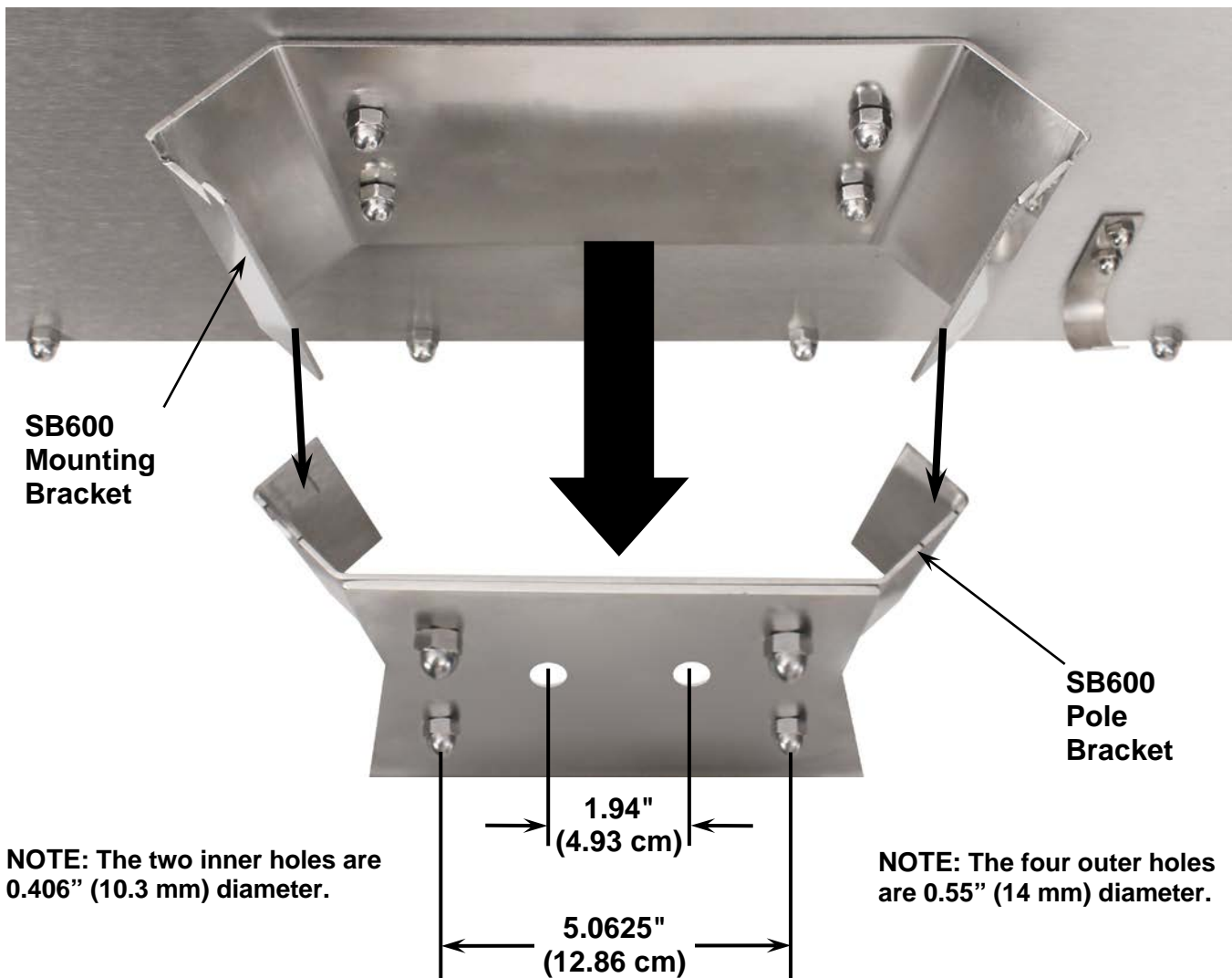


Figure No. 4 – Pole Bracket Hole Dimensions

INSTALLATION, CONT.

Mounting on Cardinal Scale's 10 ft or 12 ft High Pole

The SB600 remote display can be mounted to Cardinal Scale's 4.5-inch OD 10-foot high mounting pole with base plate (POLE-120), or 4.5-inch OD 12-foot high mounting pole with base plate (POLE-144), using the two U-bolts included with the POLE-120 and POLE-144, and the SB600 Pole Bracket included with the remote display.



Figure No. 5 – SB600 Mounted on Cardinal Pole

The SB600 pole bracket has been designed with four 0.55-inch holes, spaced to accept the two 4.5-inch Clamping U-bolts to secure the bracket to the pole. The U-bolts included with the POLE-120 and POLE-144 are zinc-plated steel that complements the stainless steel finish of the SB600 Pole Bracket.

1. Assemble the two clamping U-bolts, and then slide both U-bolts onto the pole in the approximate mounting position and spacing for the holes in the pole bracket.

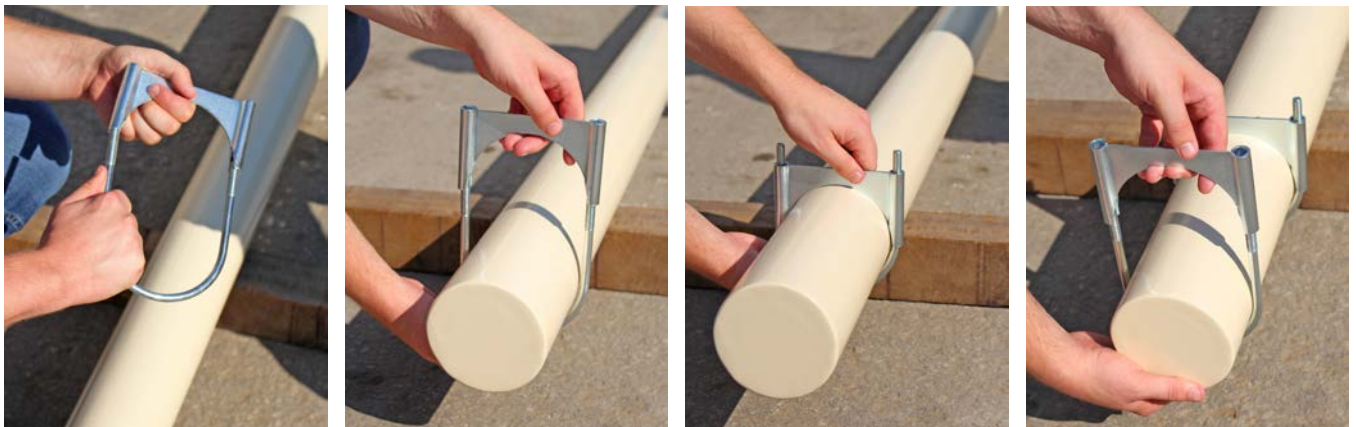


Figure No. 6 – Assemble and Install Clamping U-bolts on Pole

INSTALLATION, CONT.

2. Place the pole bracket over the U-bolts, and install the four serrated-flange locknuts finger-tight to hold the bracket in position. Ensure the bracket is properly oriented on the pole, and then using a 9/16 deep-well socket and ratchet, completely tighten the nuts to secure the bracket to the pole.



Figure No. 7 – Install Pole Bracket on Pole



IMPORTANT! Visually check both sides of the pole to ensure the U-bolts are completely tightened against the pole.

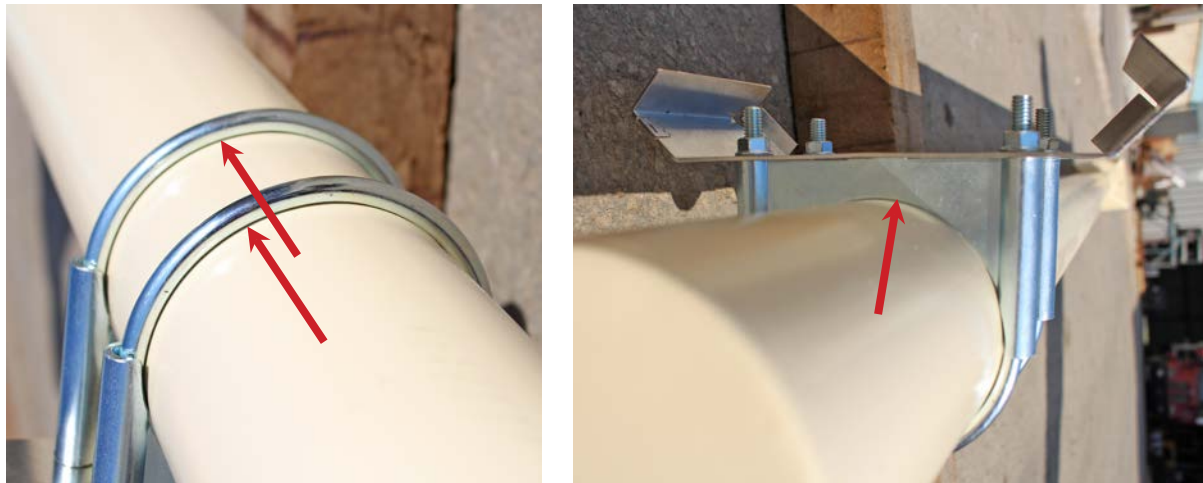


Figure No. 8 – Visually Check that U-bolts are Tight Against Pole

INSTALLATION, CONT.

3. With the pole installed, align the bracket on the back of the SB600 with the bracket on the pole. Lower the SB600 until the top of the two brackets are flush with each other.

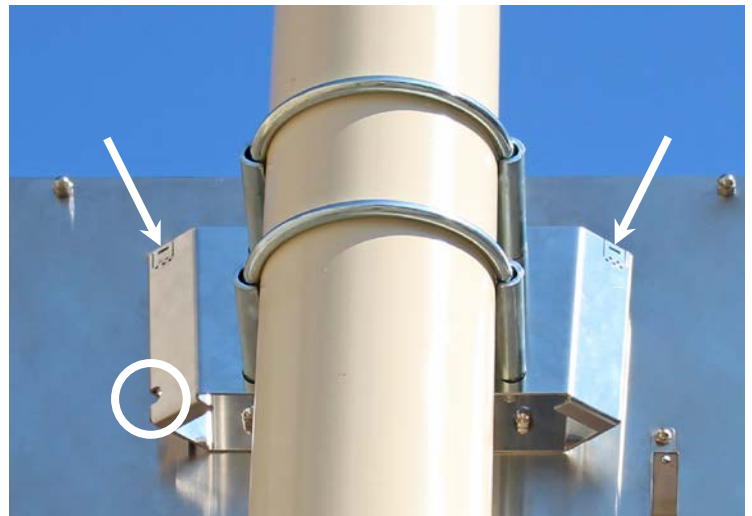


Figure No. 9 – Align Brackets and Slide Together

4. To ensure the SB600 is correctly installed in the pole bracket, visually check to see that the SB600 bracket is completely down and resting against the bottom stops in the pole bracket.
5. To secure the SB600 in the pole bracket, there are tabs on each end of the bracket that can be bent over to secure the SB600 in place. Simply insert a flat-blade screwdriver in the slot and lift up and forward towards the SB600. To further secure the SB600 in the pole bracket (*and to prevent theft*) both brackets have a security hole in which a padlock can be installed.



**Figure No. 10
Ensure Brackets are Together**



**Figure No. 11
Location of Tabs and Padlock Hole**

INSTALLATION, CONT.

Accessing the SB600 Controller Board and AC Power Connections

Referring to Figure No. 12, continue by removing the twelve acorn nuts from the Bottom Access Panel, and fully lower the panel exposing the controller board and the AC power terminal block. With the controller board exposed, gently pull it down to gain access to the P6 terminal block and the configuration switches.

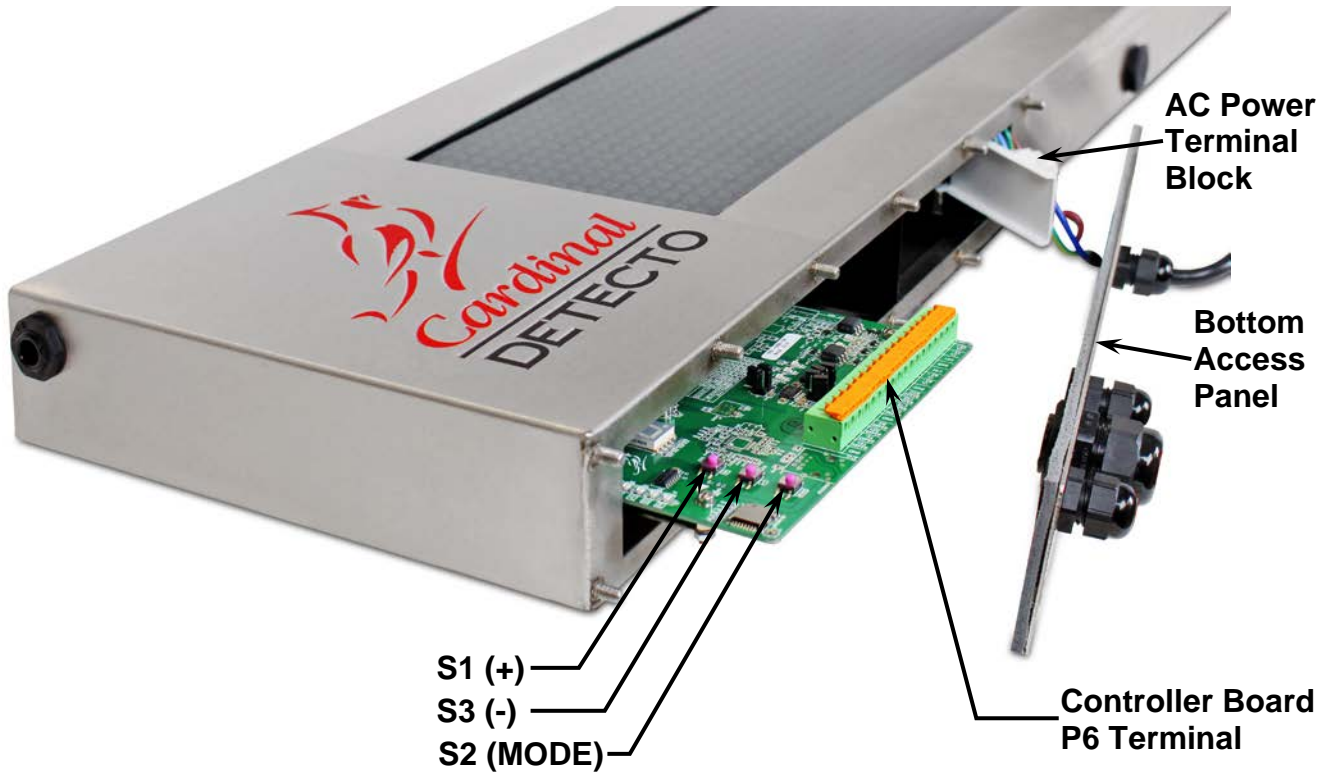


Figure No. 12

INSTALLATION, CONT.

AC Power Connection

1. Referring to Figure No. 3 for an illustration of the gland connectors, bring the AC power into the enclosure.
2. With the AC wiring in the enclosure, remove approximately 1/4 inch (6.35 mm) of insulation from each conductor.
3. To connect each wire to the AC power terminal block, first loosen each of the three screw terminals then insert each wire into the proper terminal and securely tighten the screws. Refer to the wiring color code table below, Figure No. 13 and the labels in the display enclosure for the correct terminal connections.

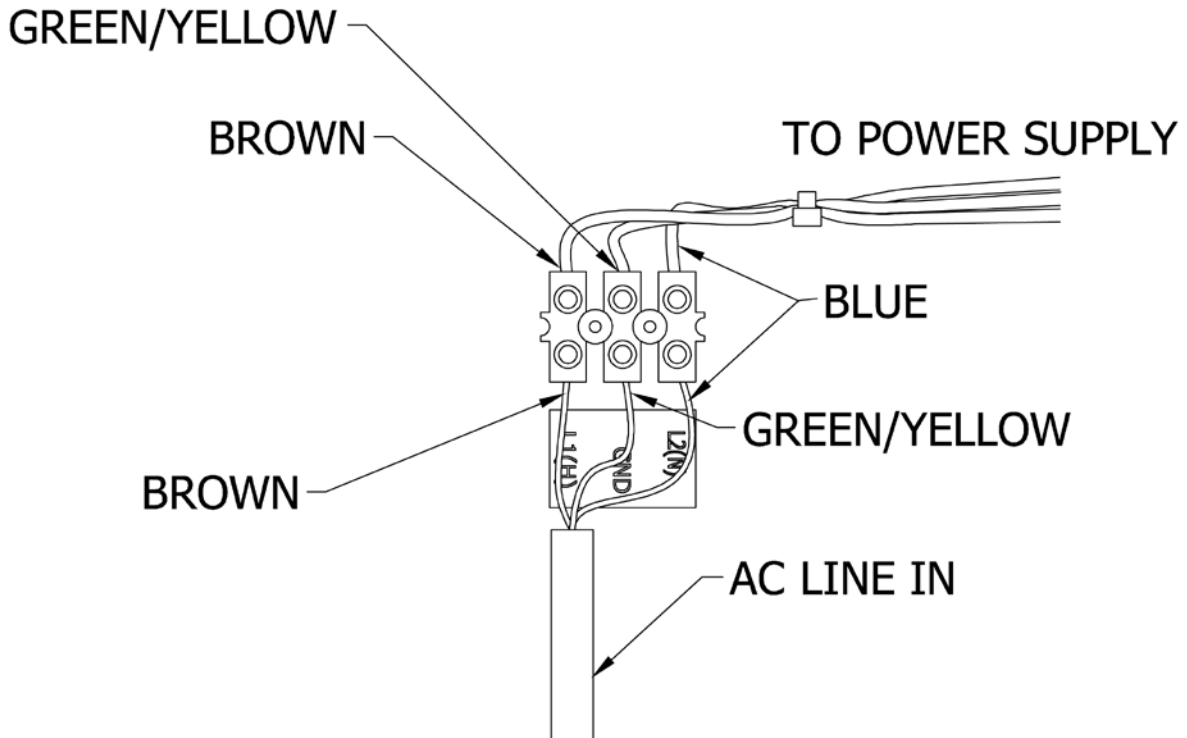


Figure No. 13

115VAC WIRING COLOR CODE TABLE

Function	U.S. Code	International Code
L1 (H) - Hot	Black	Brown
L2 (N) - Neutral	White	Blue
GND - Ground	Green	Green/yellow striped

- For permanent installations or non-reversible plugs, a single pole protection device to interrupt L1 (H) must be provided.
- Some plugs/socket systems are reversible (L & N). In this case an external dual protection device must be provided.

SB600 CONTROLLER BOARD

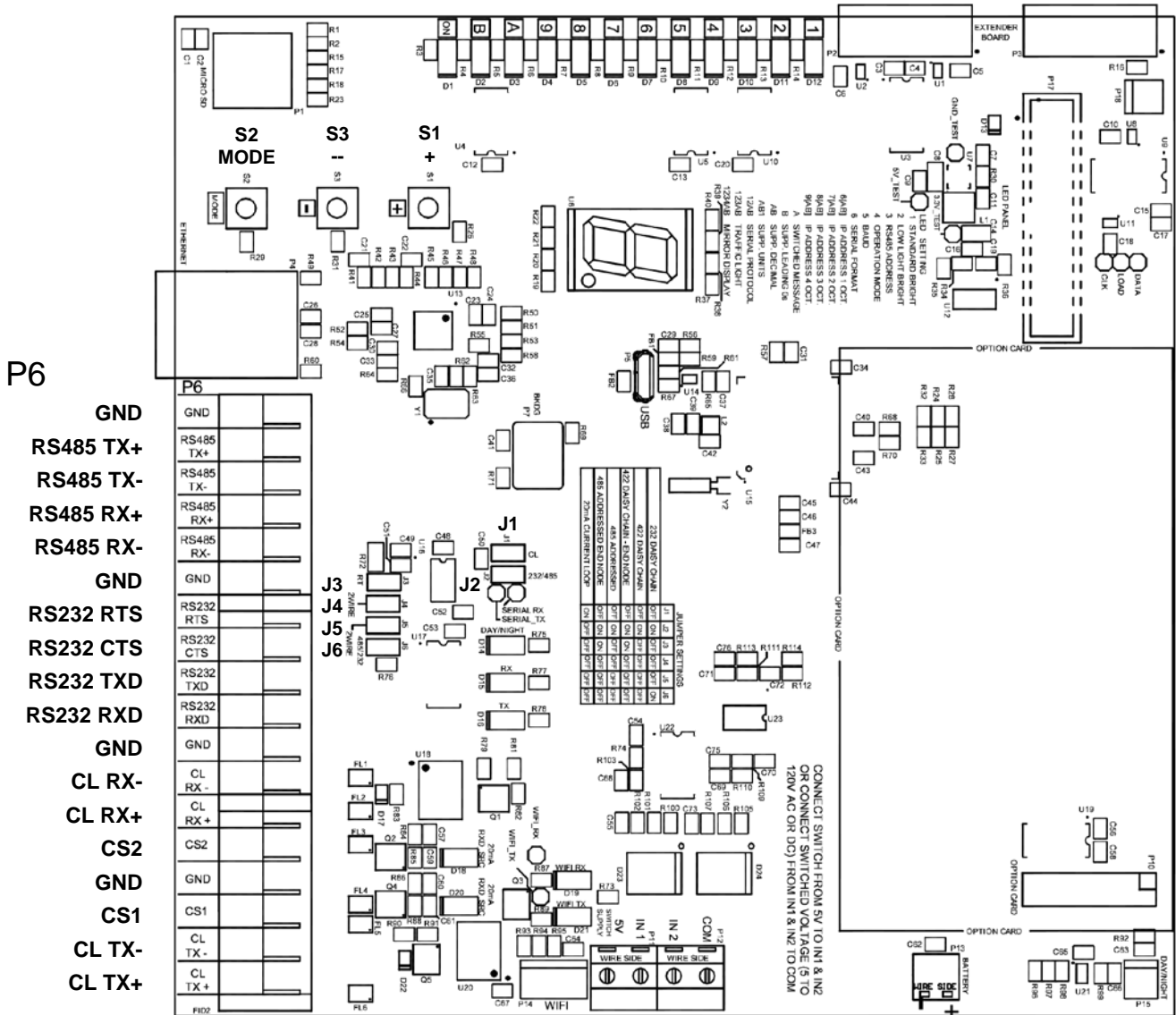


Figure No. 14

Jumper Settings Table

	J1	J2	J3	J4	J5	J6
232 DAISY CHAIN	OFF	ON	OFF	OFF	OFF	ON
422 DAISY CHAIN	OFF	ON	OFF	OFF	OFF	OFF
422 DAISY CHAIN - END NODE	OFF	ON	ON	OFF	OFF	OFF
485 ADDRESSED	OFF	ON	OFF	OFF	OFF	OFF
485 ADDRESSED END NMODE	OFF	ON	ON	OFF	OFF	OFF
20mA CURRENT LOOP	ON	OFF	OFF	OFF	OFF	OFF

SB600 CONTROLLER BOARD, CONT.

STATUS LEADS AND DISPLAY

D1 to 12 = (1 to 9, A, B) Turned on to show the current setup parameter.

D14 = Turned on to indicate display is operating in the day mode.

Turned off when the display is operating in the night mode.

D15 = Turned on to indicate display is receiving.

D16 = In a multi display daisy-chained configuration, D16 flashes when the display is sending data to the next display in the chain.

U6 = A 1-digit seven segment LED.

In the Setup mode, U6 is used to show the current value of the setup parameter indicated by which LED, D1 to 12 (1 to 9, A, B) is turned on.

When the display is running, U6 is used to indicate the baud rate number the controller is using. Refer to the table below.

U6 Baud Rate Table

<i>1</i> = 2400	<i>2</i> = 4800	<i>3</i> = 9600	<i>4</i> = 19,200
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JUMPERS

J1, J2 = Receive mode selection jumper. J1 = Current Loop, J2 = RS232, RS485/422

J3 = RS485/422 termination selection. ON = terminate, OFF = unterminated.

NOTE: The last display on the RS485 bus must have terminating jumpers installed, and the displays in the middle of the bus must have terminating jumpers removed.

J4 = RS485 2-wire or 4-wire selection. ON = 2-wire (half duplex), OFF = 4-wire (full duplex).

J5 = RS485 2-wire or 4-wire selection. ON = 2-wire (half duplex), OFF = 4-wire (full duplex).

J6 = RS232 or RS485/422 selection.

Install for RS232, Remove for RS485/422 or Current Loop.

CONNECTORS

P5 = USB connector – Used for Firmware (*Operating Software*) Updating

P6 = 18 terminal connector for serial cable connections. Refer to Figure No. 14.

P7 = Program (In System Programming) connector

P15 = Two pin connector for Day/Night sensor.

P17 = Power and display board connector

SWITCHES

S1 = (+) Used during programming to increment to the next parameter value.

S2 = (MODE) Press to begin Setup and Configuration mode. During setup, press to advance to the next setup parameter.

S3 = (-) Used during programming to decrement to the previous parameter value.

SERIAL CABLE INSTALLATION

RS-232

1. Loosen the gland connector for the serial cable. The gland connector for the serial cable is located on the bottom of the enclosure. Refer to Figure No. 3 for an illustration of the gland connector layout.
2. Slip the cable through the gland connector and into the enclosure.
3. Remove 2 inches (50 mm) of outer insulation jacket from the cable then remove 1/4 inch (6.35 mm) of insulation from each of the wires.
4. Referring to Figure No. 14 for the location of the terminal block and for correct terminal connections, connect each of the wires to terminal block.
5. After all terminations have been made, remove any excess cable from the enclosure and securely tighten the cable gland connector. Finger-tighten only! **DO NOT USE TOOLS!**
6. Install Receive mode jumper J2 and J6 for RS-232 operation. Remove current loop mode jumper, J1.

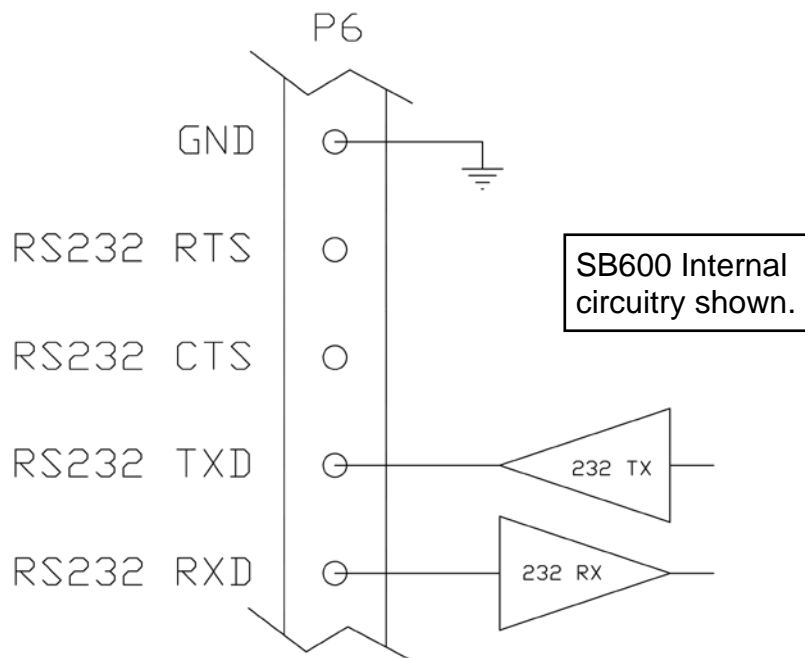


Figure No. 15

SERIAL CABLE INSTALLATION, CONT.

20mA Current Loop

1. Loosen the gland connector for the serial cable. The gland connector for the serial cable is located on the bottom of the enclosure. Refer to Figure No. 3 for an illustration of the gland connector layout.
2. Slip the cable through the gland connector and into the enclosure.
3. Remove 2 inches (50 mm) of outer insulation jacket from the cable then remove 1/4 inch (6.35 mm) of insulation from each of the wires.
4. Referring to Figure No. 14 for location of the terminal block and for correct terminal connections, connect each of the wires to the terminal block.
5. After all terminations have been made, remove any excess cable from the enclosure and securely tighten the cable gland connector. Finger-tighten only! **DO NOT USE TOOLS!**
6. Install the Receive mode jumper J1. Remove J2 and J6.

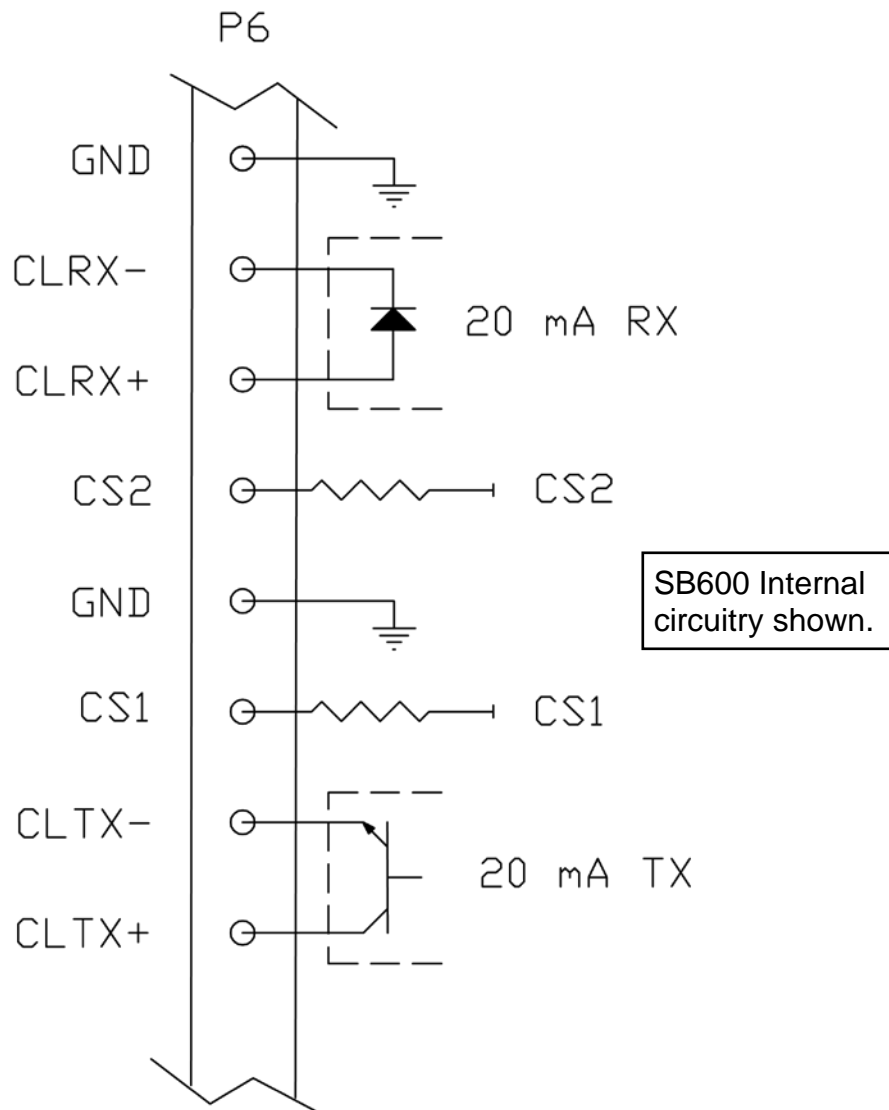


Figure No. 16

SERIAL CABLE INSTALLATION, CONT.

RS485/422

1. Loosen the gland connector for the serial cable. The gland connector for the serial cable is located on the bottom of the enclosure. Refer to Figure No. 3 for an illustration of the gland connector layout.
2. Slip the cable through the gland connector and into the enclosure.
3. Remove 2 inches (50 mm) of outer insulation jacket from the cable then remove 1/4 inch (6.35 mm) of insulation from each of the wires.
4. Referring to Figure No. 14 for the location of the terminal block and for correct terminal connections, connect each of the wires to the terminal block.
5. After all terminations have been made, remove any excess cable from the enclosure and securely tighten the cable gland connector. Finger-tighten only! **DO NOT USE TOOLS!**
6. Ensure that termination jumper J3 is set correctly. It must be ON for termination or OFF for unterminated operation.

NOTE: The last display on the RS422 bus must have terminating jumpers installed, and the display in the middle of the bus must have terminating jumpers removed.

7. Install Receive mode jumper J2. Remove J1 and J6.

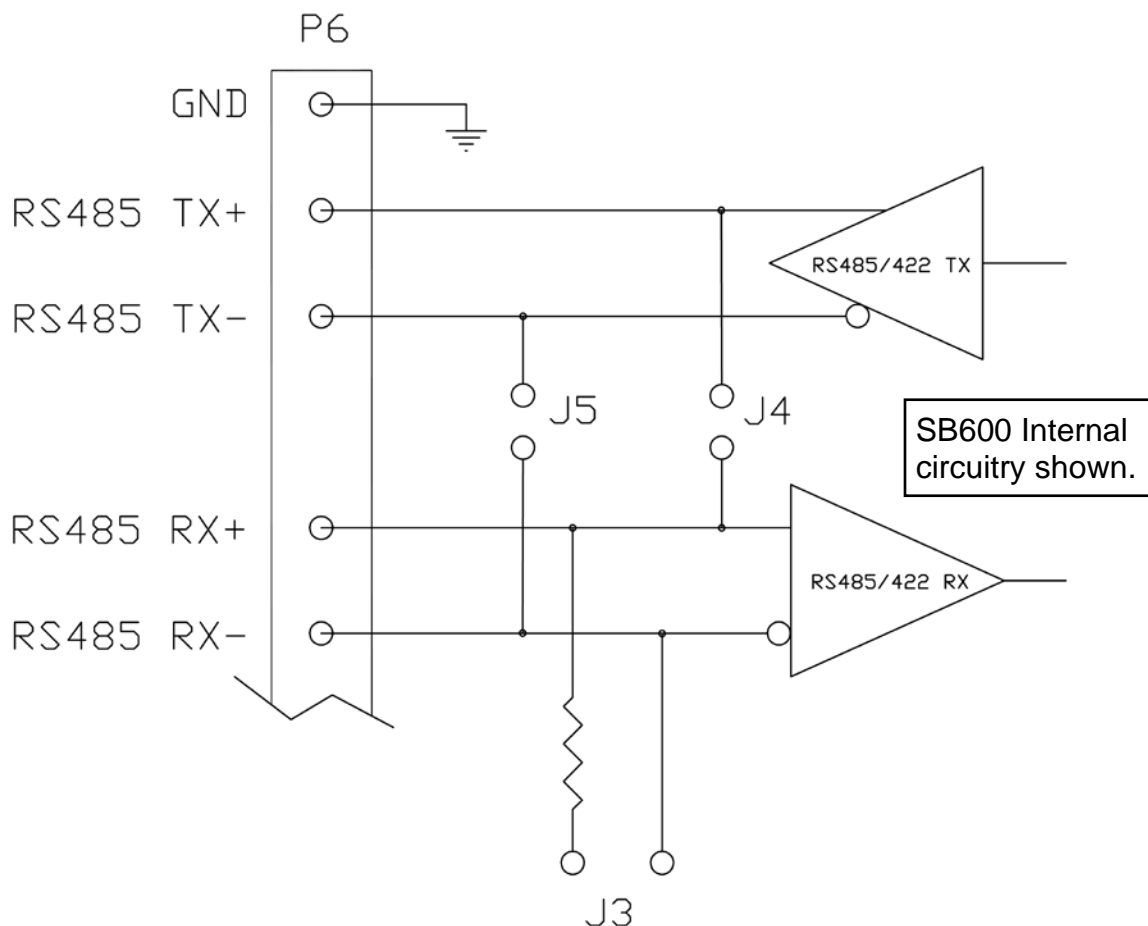


Figure No. 17

SERIAL CABLE INSTALLATION, CONT.

CURRENT Cardinal Indicators 20mA Current Loop Connections

185/185B (Serial RS-232 Only)

RS-232 ONLY	SB600
P6, TX	P6, RS232 RXD
P6, GND	P6, GND

190/190A (with 190-RS232 Option Card)

CARD (PASSIVE)	SB600
P4,6	P6, CLRX-
P4,7	P6, GND
n/c	JUMPER CS2 to CLRX+

200

PORT 1	SB600
P3, 3	P6, CLRX+
P3, 4	P6, CLRX-

PORT 2	SB600
P3, 6	P6, CLRX+
P3, 7	P6, CLRX-

205, 210, 210FE, 212/212X, 212G/212GX

PORT 0 (ACTIVE)	SB600
P13,2	P6, CLRX+
P13,6	P6, CLRX-
JUMPER P13,7 to P13,10	n/c

PORT 0 (PASSIVE)	SB600
P13,6	P6, CLRX-
P13,7	P6, GND
n/c	JUMPER CS2 to CLRX+

PORT 1 (ACTIVE)	SB600
P13,2	P6, CLRX+
P13,8	P6, CLRX-
JUMPER P13,9 to P13,13	n/c

PORT 1 (PASSIVE)	SB600
P13,8	P6, CLRX-
P13,9	P6, GND
n/c	JUMPER CS2 to CLRX+

SERIAL CABLE INSTALLATION, CONT.

CURRENT Cardinal Indicators 20mA Current Loop Connections

225

PORT 0 (ACTIVE)	SB600
P20,10	P6, CLRX+
P20,8	P6, CLRX-

PORT 1 (ACTIVE)	SB600
P20, 3	P6, CLRX+
P20, 4	P6, CLRX-
JUMPER P20, 5 to P20, 8	n/c

PORT 1 (PASSIVE)	SB600
P20, 4	P6, CLRX-
P20, 5	P6, GND
n/c	JUMPER CS2 to CLRX+

PORT 2 (ACTIVE)	SB600
P16, 1	P6, CLRX+
P16, 2	P6, CLRX-
JUMPER P16, 3 to P16, 9	n/c

PORT 2 (PASSIVE)	SB600
P16, 2	P6, CLRX-
P16, 3	P6, GND
n/c	JUMPER CS2 to CLRX+

825

PORT 2 (ACTIVE)	SB600
P21, 2	P6, CLRX+
P21, 5	P6, CLRX-
J3 INSTALLED J7 SHUNT:20mA	n/c

PORT 2 (PASSIVE)	SB600
P21, 1	P6, CLRX-
P21, 2	P6, GND
J3 REMOVED J7 SHUNT:20mA	JUMPER CS2 to CLRX+

SERIAL CABLE INSTALLATION, CONT.

LEGACY Cardinal Indicators 20mA Current Loop Connections

205, 210, 210FE, 212/212X, 212G/212GX (without USB)

PORT 1	SB600
P11, 3	P6, CLRX+
P11, 4	P6, CLRX-

PORT 2	SB600
P11, 6	P6, CLRX+
P11, 7	P6, CLRX-

215

PORT 1	SB600
P11, 3	P6, CLRX+
P11, 4	P6, CLRX-

PORT 2	SB600
P11, 6	P6, CLRX+
P11, 7	P6, CLRX-

220

220 PORT 1 (ACTIVE)	SB600
P10, 1	P6, CLRX+
P10, 2	P6, CLRX-
JUMPER P10, 3 to P10, 10	n/c

220 PORT 1 (PASSIVE)	SB600
P10, 2	P6, CLRX-
P10, 3	P6, GND
n/c	JUMPER CS2 to CLRX+

220 PORT 2	SB600
P10, 11	P6, CLRX+
P10, 10	P6, CLRX-

225 (without USB)

PORT 1 (ACTIVE)	SB600
P14, 3	P6, CLRX+
P14, 4	P6, CLRX-
JUMPER P14, 5 to P14, 8	n/c

PORT 1 (PASSIVE)	SB600
P14, 4	P6, CLRX-
P14, 5	P6, GND
n/c	JUMPER CS2 to CLRX+

PORT 2 (ACTIVE)	SB600
P18, 1	P6, CLRX+
P18, 2	P6, CLRX-
JUMPER P18, 3 to P18, 9	n/c

PORT 2 (PASSIVE)	SB600
P18, 2	P6, CLRX-
P18, 3	P6, GND
n/c	JUMPER CS2 to CLRX+

PORT 3 (ACTIVE)	SB600
P18, 12	P6, CLRX+
P18, 13	P6, CLRX-

778C

778C (PASSIVE)	SB600
COMA, 11	P6, CLRX-
COMA, 23	P6, GND
n/c	JUMPER CS2 to CLRX+

778C (ACTIVE)	SB600
COMA, 10	P6, CLRX+
COMA, 11	P6, CLRX-
JUMPER COMA, 23 to COMA, 24	n/c

SETUP AND CONFIGURATION

The SB600 display has been pre-configured at the factory and should not require configuration for use in most applications. In the event that the factory settings do not meet the requirements of your application, the following describes the steps to configure the remote display.

To gain access to the setup mode switches, remove the twelve acorn nuts from the Bottom Access Panel. Next, fully lower the bottom access panel exposing the bottom of the controller board. See Figure No. 12. With the controller board exposed, gently pull it down to gain access to the setup mode switches. Once you have access to the setup mode switch, proceed with the setup instructions. Note that the display must be in the normal operating mode (after auto-detect has completed) and after displaying the red Cardinal birds, model number, software revision, option card name if installed, and a blank screen for about three seconds.

Enter Setup Mode

To enter the setup mode, with the display ON, press and release the setup mode switch. LED1 will turn on, and the 7-segment LED (U6) will show the current value. Note that the front display will also show the current setup parameter and its value.

Default to Factory Settings

The Setup and Configuration settings can be returned to the factory settings by entering the setup mode and then pressing and holding the **MODE** switch for 10 seconds. The SB600 will display **DEFAULT** for three seconds, and then restart with the factory settings.

DAY INTENSITY LEVEL

LED 1 (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (–) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 9 may be selected.

LEVEL: 0 to 9 (0 = Dim, 9 = Bright)

NIGHT INTENSITY LEVEL

LED 2 (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (–) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 9 may be selected.

LEVEL: 0 to 9 (0 = Dim, 9 = Bright)

SETUP AND CONFIGURATION, CONT.

RS485 ADDRESS

LED 3 (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (–) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from OFF to F may be selected.

ADDR: OFF through F



NOTE: When using the RS485 protocol, data is only displayed if the correct address is detected.

The data format for the RS485 serial input is:

%ADDDDDDDDD<CR>

where:

A = address byte

D = byte of data for display (at least 9 bytes, decimal points and commas are considered part of the preceding digit and may be inserted at any location)

<CR> = carriage return

NOTES:

- The weight/units/mode information must be correctly positioned; no translation is performed on the data sent.
- If the address is set to 0 (zero), RS485 operation is disabled and the scoreboard will default to daisy chain operation if the RS485 protocol is used.
- In daisy chain operation, if the address is greater than 0, the scoreboard will decrement the address and send the data out the serial port to another daisy-chained scoreboard.

SETUP AND CONFIGURATION, CONT.

MODE OF OP (MODE OF OPERATION)

LED 4 (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (-) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 2 may be selected.

0: MESSAGE BOARD = Message-board format

1: SCOREBOARD = Normal scoreboard format (DEFAULT)

2: SCOREBOARD NO TIMEOUT = Scoreboard format with no timeout.

If MODE OF OP = 0, the data format for the serial input to the message board is:

%NDDDDDDDDDD<CR>

where: N = Panel number for a daisy chain configuration
D = Byte of data to display at respective location on the scoreboard
<CR> = Carriage Return

If MODE OF OP = 1 or 2, the data format for the serial input to the scoreboard is:

%NDDDDDDDUUMT<CR>

where: N = Panel number for a daisy chain configuration
D = Byte of data to display at respective location on the scoreboard
UU = Units (lb, kg, T, t)
M = Mode (G = Gross or N = Net)
T = Control character for the traffic light.
Valid characters for T are:

For the Valid characters for T, refer to the list on the next page.

SETUP AND CONFIGURATION, CONT.

MODE OF OP (MODE OF OPERATION), CONT.

LED 4 (on Controller Board)

If MODE OF OP = 1 or 2, the data format for the serial input to the scoreboard is:

%NDDDDDDUUMT<CR>

where: T = Control character for the traffic light.

Valid characters for T are:

G or g or C	=	Green Circle. (Notice: Capital letter for Green except for g)
R or r or c	=	Red Circle. (Lower case letter for red except for r)
S	=	Down green arrow (Green South)
s	=	Down red arrow (Red South)
N	=	Up green arrow (Green North)
n	=	Up red arrow (Red North)
W/w	=	Left arrow (Green/Red)
E/e	=	Right arrow (Green/red)
A	=	1 st user image*
D	=	2 nd user image*
F	=	3 rd user image*
H	=	4 th user image*
I	=	5 th user image*
J	=	6 th user image*
K	=	7 th user image*
L	=	8 th user image*
" "	=	(space) = no lights on

<CR> = Carriage Return

* The SB600 remote display together with the PC based program *SB Imaging Software*, allows users to design custom characters or graphic images to display on the SB600. With the software installed on a PC or laptop, up to eight custom characters or graphic images can be created, and then sent to the SB600 using a RS232 cable and the built-in download capabilities of the program. With the *SB Imaging Software*, the SB600 can easily be customized to display images that meet the specific requirements of the user's operation.

The Cardinal *SB Imaging Software* program is available after logging in to the Cardinal Scale web site. It can be downloaded from the Remote Displays, SB600 6-in LED product page, Resource Type, Software.

SETUP AND CONFIGURATION, CONT.

BAUD RATE

LED 5 (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (-) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 7 may be selected.

0: = Auto Baud *	3: = 9600	6: = 57,600
1: = 2400	4: = 19,200	7: = 115,200
2: = 4800	5: = 38,400	* Factory Default



If you are using the Auto Baud feature you will see **BD: ?** at the beginning of the test. This test can only complete if there is data communication coming down the line. If the SB600 cannot determine the baud rate it will display **BD: FAIL**. If it passes it will display **BD: 9600**. If no data is being transmitted to the SB600 then **BD: ?** will continue to be displayed. If **BD: FAIL** occurs the SB600 will try to determine the baud rate again one second later.

SERIAL FORMAT (FOR TRANSMIT ONLY)

LED 6 (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (-) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and complete setup and configuration. Values from 0 to 2 may be selected.

- 0: (7, E, 1) = 7 data, even parity, 1 stop bit
- 1: (7, O, 1) = 7 data, odd parity, 1 stop bit
- 2: (8, N, 1) = 8 data, no parity, 1 stop bit



NOTE: If the Baud Rate is set for Auto Baud, the serial format is automatically detected from one of the above formats. At the beginning of the test, using the auto baud feature you will see **SF: ?**. If the SB600 cannot determine the serial format it will display **SF: FAIL**

SETUP AND CONFIGURATION, CONT.

SWITCHED OP (OPERATION MESSAGE SETTING)

LED A (on Controller Board)

The SWITCHED OP setting enables switched operation utilizing a customer supplied remote toggle switch and does not require serial input to display the message pairs below. The messages are driven from the current-loop input on the terminal block. Note that when SWITCHED OP is enabled (set to 1 to 9), the serial input to the SB600 is disabled. Also, note that the factory default value is 0 (serial input is enabled).

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (-) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 9 may be selected.

- | | |
|--|----------------------|
| 0: DISABLED (Serial Input Enabled)* | 5: WALK/WAIT |
| 1: OPEN/CLOSED | 6: LEFT/RIGHT |
| 2: GO/STOP | 7: UP/DOWN |
| 3: ON/OFF | 8: ENTER/EXIT |
| 4: START/STOP | 9: SPACES/*** |

*** Factory Default**



To use the switched operation, Receive Mode jumper J1/J2, must be ON the CL pins (J1). In addition, on the P6 terminal connector, jumper terminals CS2 and CL RX+ together and then connect the operation toggle switch across terminals CL RX- and GND. Refer to Figure No. 14 for the location of J1/J2, P6 and the connection descriptions.

SUP. LEAD ZERO (SUPPRESS LEADING ZEROS)

LED B (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (-) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values of 0 or 1 may be selected

- | | |
|-------------------------------|--|
| 0: NO = No Suppression | 1: YES = Suppress Zeros (DEFAULT) |
|-------------------------------|--|

SETUP AND CONFIGURATION, CONT.

SUP. DEC. AT 0 (SUPPRESS DECIMAL POINT AT LOCATION 0)

LED A AND B (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (–) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values of 0 or 1 may be selected

0: NO = Allows a decimal point after the least significant digit of weight

1: YES = Prevents a decimal point from displaying to the right of the least significant byte of weight (DEFAULT)

SUP. ANNUNC (SUPPRESS ANNUNCIATORS – lb, kg, T, t, G, N)

LED A, B AND 1 (on Controller Board)

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (–) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values of 0 or 1 may be selected

0: NO = No suppression. The annunciator is displayed (DEFAULT)

1: YES = Suppress the annunciator display

SETUP AND CONFIGURATION, CONT.

SERIAL DEV. TYPE (SERIAL DEVICE TYPE)

LED 1, 2, A AND B (on Controller Board)

The SERIAL DEV. TYPE setting allows setup to override the Auto-Learn serial format feature. To select a format manually, set SERIAL DEV. TYPE to a number listed below. Note that the factory default value is 0 (Auto-Learn is enabled).

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (–) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 9 and A to C may be selected.

0: AUTO-LEARN¹

1: SB600

2: SB500

3: SB400

4: SB200

5: COMPUTER

6: IQ355

7: SMA

8: WI110

9: AIRBORNE

A: FAIRBANK²

B: TOLEDO³

C: MESSAGE

¹ Utilizing the Auto-Learn feature, the SB600 display can be driven by most weight indicators. Refer to the INSTRUMENT COMPATIBILITY section of this manual.

² Format: <STX><Status1><Status0><Sign><XXXXXX><ETX>

NOTE: <Status1><Status0> will be ignored. The SB600 will only display weight values and negative values.

³ When operating with Toledo format, users must make sure there is NO checksum, NO Tare weight and there must be Start and Stop characters for the string (since Toledo indicators allow adjustments on those requirements).

SETUP AND CONFIGURATION, CONT.

TRAFFIC LIGHT

LED 1, 2, 3, A AND B (on Controller Board)



IMPORTANT! Traffic light control requires the model SB600RI (with Remote Input). Contact the factory for details before placing your order.

The TRAFFIC LIGHT setting allows setup to configure the scoreboard to control the traffic light through the serial stream or from 1 or 2 inputs.

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (-) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 3 may be selected.

0: SERIAL STREAM = Traffic light controlled through serial stream

1: INPUT 1 RED = Input 1 is used and Red is default off

2: INPUT 1 GREEN = Input 1 is used and Green is default off

3: INPUT 1 AND 2 = Both inputs 1 and 2 are used

Input 1 turns on Red and input 2 turns on Green

SETUP AND CONFIGURATION, CONT.

MIRROR IMAGE

LED 1, 2, 3, 4, A AND B (on Controller Board)

The MIRROR IMAGE setting allows the user to specify how many seconds the scoreboard will remain the same until switching back and forth between normal display and mirror image display.

The 7-segment LED (U6) and the scoreboard will show the current value. If the setting displayed is acceptable, press the **MODE** switch to save it and advance to the next setup parameter.

Otherwise, using the (+) switch to increase the value or the (–) switch to decrease the value, select the new setting and then press the **MODE** switch to save it and advance to the next setup parameter. Values from 0 to 9 and A may be selected.

0: DISABLED

1: to A: = 1 to 10 Seconds

LIGHT RELAY TIMER (TRAFFIC LIGHT RELAY TIMER)

LED 1, 2, 3, 4, 5, A AND B (on Controller Board)



IMPORTANT! Traffic light control requires the model SB600RI (with Remote Input). Contact the factory for details before placing your order.

The LIGHT RELAY TIMER setting allows a pushbutton to be used as a switch. When the pushbutton is pressed the Scoreboard will change the traffic light to green for a set number of seconds. The number of seconds is a settable parameter.

To use the relay timer:

- Set TRAFFIC LIGHT = 1 or 2 (1 for Red being default off, 2 for Green being default off)
 - If TRAFFIC LIGHT = 0 then the serial stream is used to drive the traffic light and the timer is ignored.
 - If TRAFFIC LIGHT = 3 then the timer is ignored because two separate switches are used to drive Red and Green ON/OFF.
- Set LIGHT RELAY TIMER = X
 - X denotes the number of seconds to stay Green before turning back to Red
 - X ranges from 0-Z (where A = 10, B = 11, ..., Z = 35)

SAVING

Setup and configuration have been completed. The scoreboard will reset, display the red Cardinal birds, the software revision, pause and then display the model number.

SB600RI (REMOTE INPUT)

The SB600RI with Remote Input allows a remote device to control the traffic lights on the SB600 remote display. The SB600RI saves you time, space and money by integrating traffic control and display functions in a single remote display.

There are two methods to wire the SB600RI for Traffic Light Control Operation.

Method One

The first requires only wiring a switch or switches to the terminals on the controller board. For this simple switch control, refer to Figure No. 18 and the following steps:

1. Wire the switch between the terminals labeled “5V SWITCH SUPPLY” and “IN 1”.
2. If a second input is needed for “RELAY 1 AND 2” mode, wire a second switch between “5V SWITCH SUPPLY” and “IN 2”.
3. **DO NOT** connect any wires to the “COM” terminal for Method One.

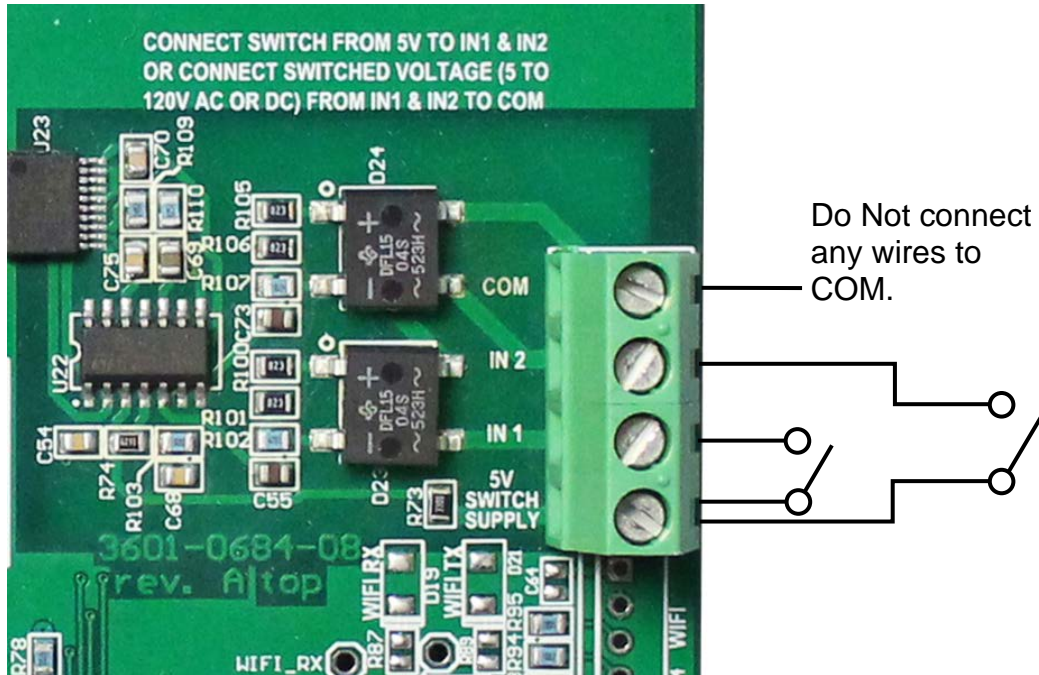


Figure No. 18

SB600RI (REMOTE INPUT), CONT.

Method Two

The second method to wire the SB600RI for traffic light control is with a switched voltage source. For this method, refer to Figure No. 19 and the following steps:

NOTE: The traffic light control input will allow anywhere from 5V to 120V AC or DC for input.

1. For single relay control, the switched voltage should be wired into the “IN 1” terminal of the control board.
2. The ground or common should be wired to the “COM” terminal on the controller board.
3. If a second input is needed for “RELAY 1 AND 2” mode, wire the second switched voltage into the “IN 2” terminal of the control board.
4. **DO NOT** connect any wires to the “5V SWITCH SUPPLY” in Method Two or you may damage the SB600RI controller board.

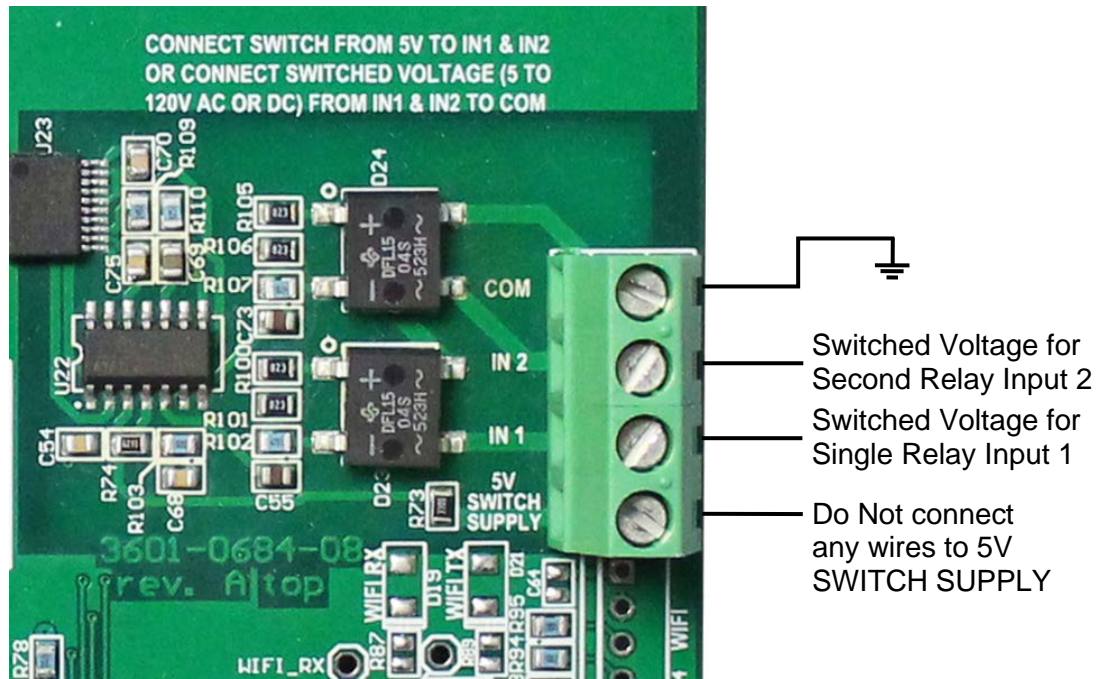


Figure No. 19



Cardinal Scale Mfg. Co. recommends that the cable length for all configurations of the traffic light control be kept under 300 feet (91 meters).

NOTE: The traffic light control cable should be 24 AWG wire (minimum) rated at the traffic light control input voltage being used, (5V AC or DC) up to (120V AC or DC).

RE-INSTALLING THE ACCESS PANEL

After all terminations have been made, and setup and configuration have been completed, gently push the controller board back up into the enclosure.

Remove the excess cable from the enclosure and securely tighten each of the cable gland connectors on the access panel.

- Do not over-tighten these connectors but make certain they are snug.
- **DO NOT USE TOOLS!** Finger-tighten only!

Make certain no cables or wires are exposed between the enclosure and access panel, and that the hinged AC power terminal is pushed up into the enclosure, then place the access panel and on the enclosure.

Install the twelve acorn nuts removed earlier, starting with the acorn nut on left corner (facing from bottom of enclosure) and then move to the one on the right. Move to the next acorn nut on the left and repeat this process until all fourteen acorns are installed. See Figure No. 20.



IMPORTANT! The acorn nuts should be torqued to 20 to 25 in-lb (2.3 to 2.8 Nm).

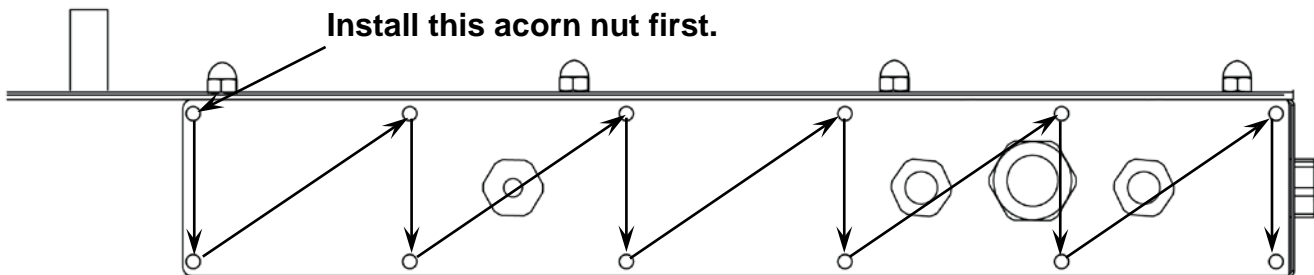


FIGURE NO. 20

OPTION CARD CONFIGURATION

This mode is automatic and is set to be in higher priority than serial communication. That means if the controller board has an option card attached, the controller board will display

OPT: CARDNAME (OPTION and the CARD NAME)

after the Rev version and SB600 welcome message for 2 seconds and then display weight. During this mode, the controller board will only look for data from the option card and will ignore serial data.

Currently support option cards include:

- 2XX-SNAP – SnapStream card
- 2XX-SFP-G – Serial Fiber Optic Option Card

START ERRORS AND STATUS MESSAGES

The SB600 Remote Display is equipped with software that tests various portions of its circuitry and verifies proper operation when powered ON. Should a problem be detected, a message will be displayed. The following lists the messages displayed and their meaning:

Display	Meaning
BD: FAIL	The Auto-Baud feature could not detect the baud rate of the indicator. Verify the baud rate of the indicator serial port is set for 2400 to 19200 baud and try again. If error continues, manually set the baud rate of the remote display and indicator.
SF: FAIL	The Auto-Baud feature was unable to automatically detect and select a Serial Format. Verify indicator serial output is one of the three Serial Formats listed in Setup and Configuration and try again. If error continues, manually set Serial Format of the remote display and indicator.
NO COMM	<p>On some indicators, the serial output will stop when displaying an error code or if in an "input" mode. When the serial input to the remote display stops for any reason, after 3 seconds this message will be displayed.</p> <ul style="list-style-type: none"> • Correct the error condition on the indicator. • Cancel or complete the input operation on the indicator. <p>This message will be displayed if the Auto-Learn was unable to detect the baud rate and/or serial format of the indicator.</p> <ul style="list-style-type: none"> • Refer to the BD: FAIL and SF: FAIL errors above. <p>This message could also indicate the serial connection between the indicator and the remote display has been lost.</p> <ul style="list-style-type: none"> • Check for a loose, broken, or disconnected serial cable between the indicator and the remote display.

DEMO MODE

The SB600 Remote Display is equipped with software that demonstrates its' various display capabilities. To perform the Demo mode, access to the setup mode switches is required.

1. To gain access to the setup mode switches, remove the twelve acorn nuts from the Bottom Access Panel.
2. Next, fully lower the bottom access panel exposing the bottom of the controller board. See Figure No. 12.
3. With the controller board exposed, gently pull it down to gain access to the setup mode switches.
4. Once you have access to the setup mode switches, follow the instructions below.

Enter Demo Mode

1. With the display ON, press and hold the (+) and (-) switches for about 5 seconds until the display shows `TEST2 MOD`.
2. Release the (+) and (-) switches. The display will show `LIGHTING`. If required, use the (+) and (-) switches to adjust the brightness level.
3. Press the **MODE** switch to begin the first demo. Note that the demos vary from about 10 seconds to 30 seconds long, and when each demo is finished will loop around and repeat.
4. To advance to the next demo, press and hold the **MODE** switch. When the current demo finishes, the demo program checks to see if the **MODE** switch is being held down. If it is, the demo program will advance to the next demo and you can release the **MODE** switch.
 - Demo 1: Flag waving
 - Demo 2: Scrolling Message ("CARDINAL SCALE : SB600 : CARDINAL DETECTO")
 - Demo 3: Simulated truck pulling onto scale, then off, then negative weight value
 - Demo 4: Directional arrow options that can be used in a *custom* program
 - Demo 5: Multi-weight display simulation
 - Demo 6: Color range demonstration (*Note that this demo is very bright.*)
5. To exit the Demo Mode, remove power to the SB600.
6. When finished performing the Demo Mode, follow the instructions in the RE-INSTALLING THE ACCESS PANEL section to correctly re-install the bottom panel.

NOTE: The Demo Mode can be stopped at any time by removing power to the SB600.

TEST MODE

The SB600 Remote Display is equipped with software that allows a technician to test each row, column and color of the LED panels. To perform the Test mode, access to the setup mode switches is required.

1. To gain access to the setup mode switches, remove the twelve acorn nuts from the Bottom Access Panel.
2. Next, fully lower the bottom access panel exposing the bottom of the controller board. See Figure No. 12.
3. With the controller board exposed, gently pull it down to gain access to the setup mode switches.
4. Once you have access to the setup mode switches, follow the instructions below.

Enter Test Mode

1. With the display ON, press and hold the **MODE**, (+), and (–) setup mode switches for about 5 seconds until the display shows **TEST MODE**.

2. Release all 3 switches. The display will turn on all LEDs very brightly, and then change to show:

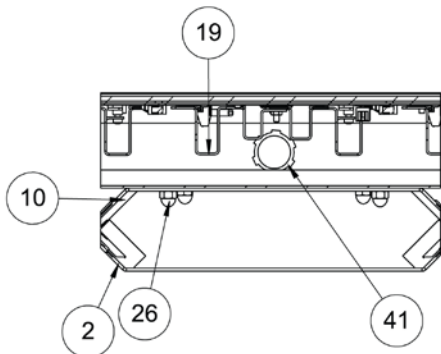
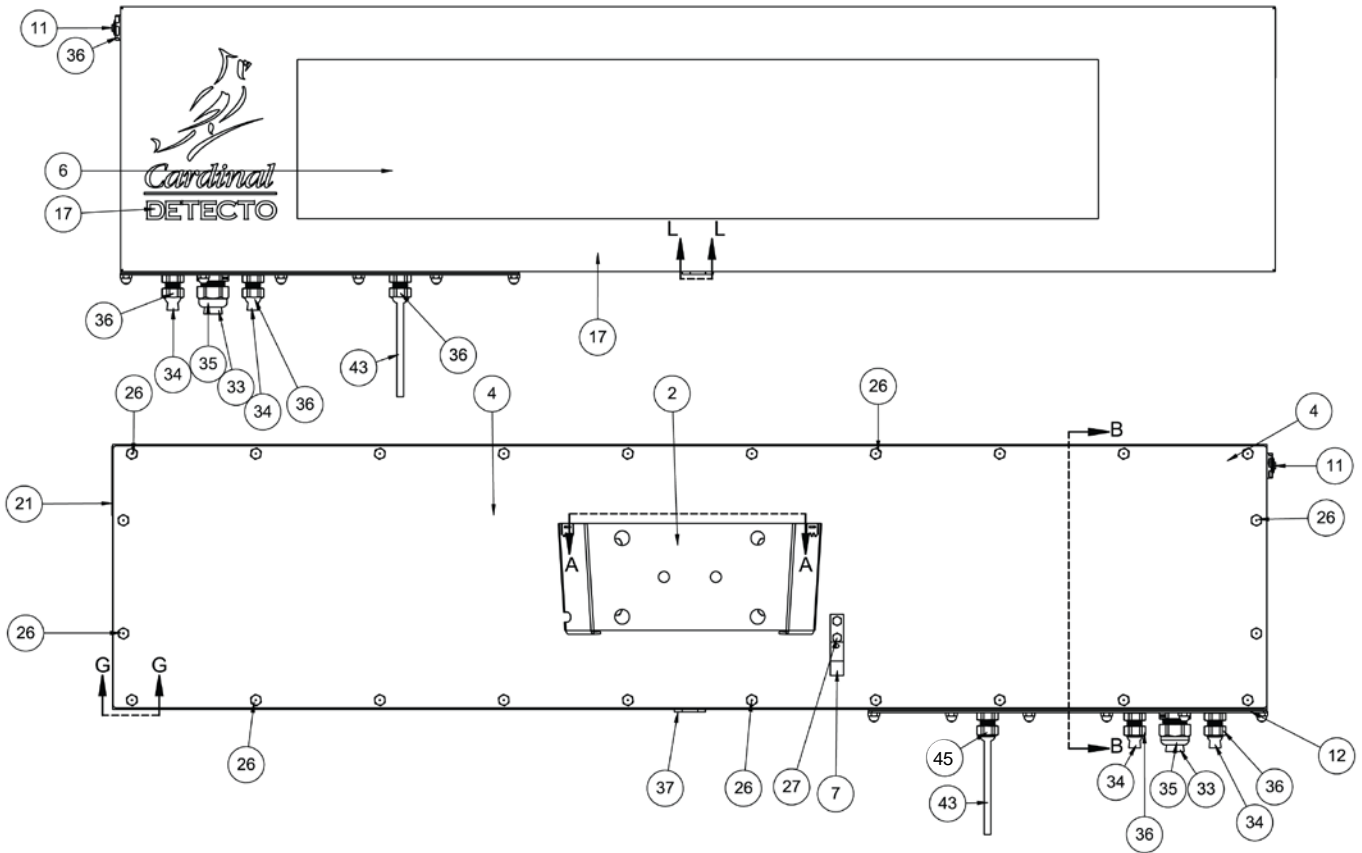
LED	LED	LED	LED	LED
1	2	3	4	5

3. To perform the tests, press the (+) and (–) switches to scan through the rows, columns and colors.
 - A. Pressing the (+) switch will begin on the top row and advance down the display through each row illuminating the RED color of the LEDs.
 - B. Continuing to press the (+) switch, the test will begin on the left column and advance to the right of the display through each column illuminating the RED color of the LEDs.
 - C. Continuing to press the (+) switch, the test will begin on the top row and advance down the display through each row illuminating the GREEN color of the LEDs.
 - D. Continuing to press the (+) switch, the test will begin on the left column and advance to the right of the display through each column illuminating the GREEN color of the LEDs.
 - E. Continuing to press the (+) switch, the test will begin on the top row and advance down the display through each row illuminating the BLUE color of the LEDs.
 - F. Continuing to press the (+) switch, the test will begin on the left column and advance to the right of the display through each column illuminating the BLUE color of the LEDs.
4. Pressing the (–) switch will perform the tests in *reverse*. It will first illuminate the top RED row, and then with continuous pressing, begin with a column of BLUE LEDs at the right of the display, and then advance left. Note that when testing the rows, it will begin at the bottom of the display and advance to the top.
5. To exit the Test Mode, remove power to the SB600.
6. When finished performing the Test Mode, follow the instructions in the RE-INSTALLING THE ACCESS PANEL section to correctly re-install the bottom panel.

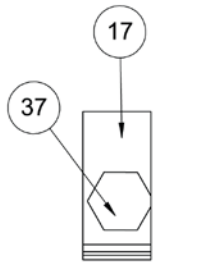
NOTE: The Test Mode can be stopped at any time by removing power to the SB600.

PART IDENTIFICATION

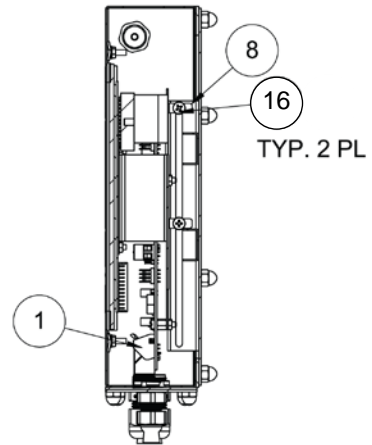
Front, Back, Section A-A, Section L-L, Section B-B, Section G-G Views



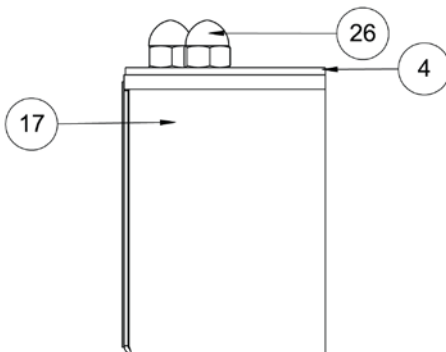
SECTION A-A



SECTION L-L



SECTION B-B
SLIDER MECHANISM DETAILS



SECTION G-G

PART IDENTIFICATION, CONT.

Parts List for Front, Back, Section A-A, Section L-L, Section B-B, Section G-G Views

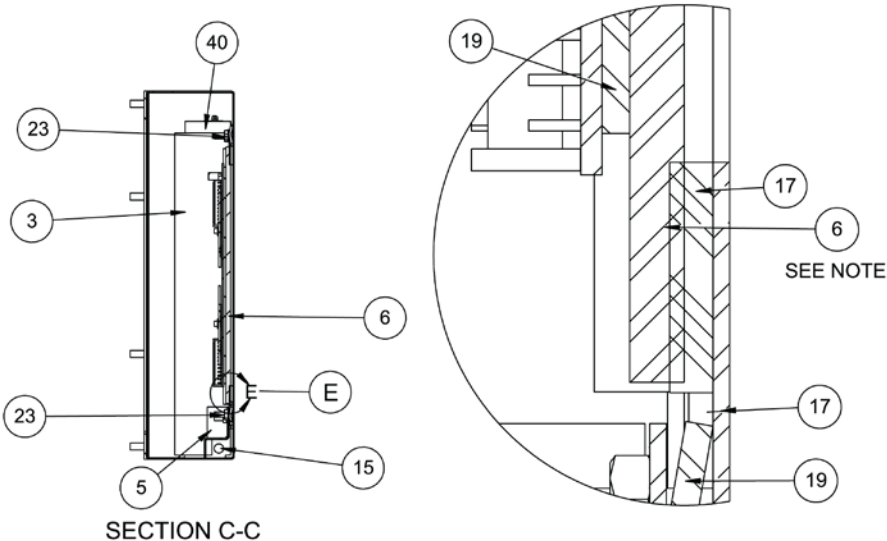
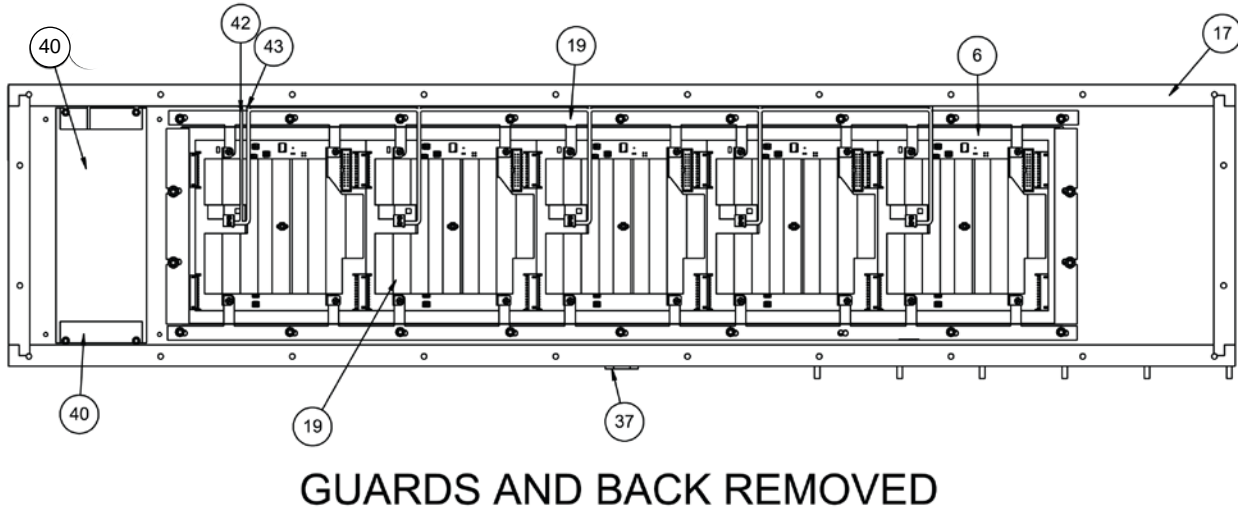
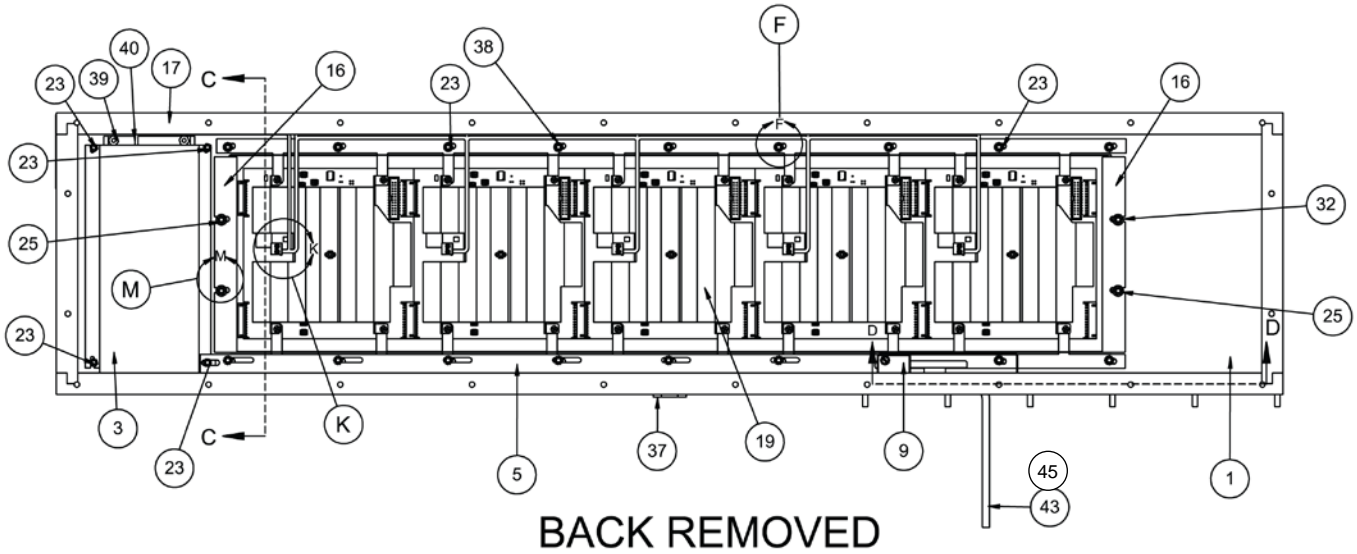
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	3601-0684-0A	PCB ASSY SB600 CONTROLLER
	1	3601-0684-1A	PCB ASSY SB600RI CONTROLLER w/TRAFFIC LIGHT CONTROL
2	1	3601-0701-08	SB600 POLE BRACKET
4	1	3601-0708-0A	SB600 BACK PANEL ASSY
6	1	3601-0717-08	SB600 LENS PLEXIGLASS .118 X 48 X 96
7	1	3601-0718-08	SB600 WIRE SUPPORT HOOK SS SHT 20 GA.
8	1	3601-0777-08	LONG CONTROL BOARD SLIDER
10	1	3601-0726-08	SB600 MOUNTING BRACKET 14 GA. SS SHT
11	1	3601-0736-0A	PHOTO SENSOR, SB600
12	1	3601-0740-0A	ACCESS PANEL GASKET ASSY
16	2	3601-0757-08	LENS RETAINER SS 20 GA. SHT
17	1	3601-0763-0A	SB600 FRONT BOX W/ GASKETS
19	1	3601-0765-0A	SB600 LED PANEL ASSY
21	1	3601-0768-PS	SER. TAG FOR SB250 & SB500
26	40	6013-0433	NUT #10-32 HEX ACORN LOCK S.S.
33	1	6560-0310	RUBBER PLUG 7/16 X 11/16 X 1" LG
34	2	6560-0311	RUBBER PLUG 1/4 X 7/16 X 1" LG
35	1	6610-1185	CONN GLAND .5-.625 GRIP
36	4	6610-2248	CONN GLAND .187-.312 GRIP
37	1	6650-1212	BREATHING VENT PLUG
41	1	6910-0171	NUT CONDUIT 1/2 LOCK
45	1	6980-1030	SB600 POWER CORD, 6.3'
	1	6980-0250	SB600EU POWER CORD H05VV-F3G 1mm, 10A / 250V, BLACK, EURO PLUG
	1	6980-1059	SB600UK POWER CORD, UK PLUG, 6.5 FT. 10A / 250V, BLACK



IMPORTANT! Item 26, #10-32 hex acorn nuts, should be torqued to 20 to 25 in-lb (2.3 to 2.8 Nm).

PART IDENTIFICATION, CONT.

Back Removed, Guards and Back Removed, Section C-C, Detail E Views



NOTE: Be sure that lens seals properly against box weldment with gaskets by ensuring gaskets are clean.

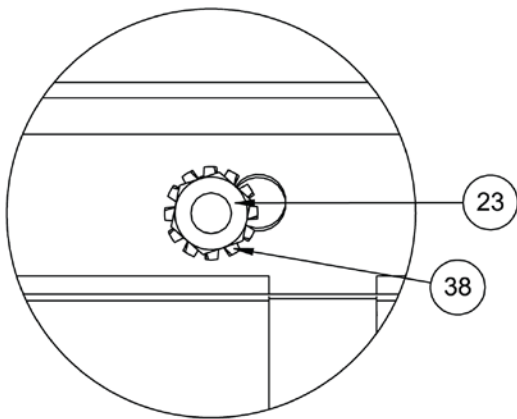
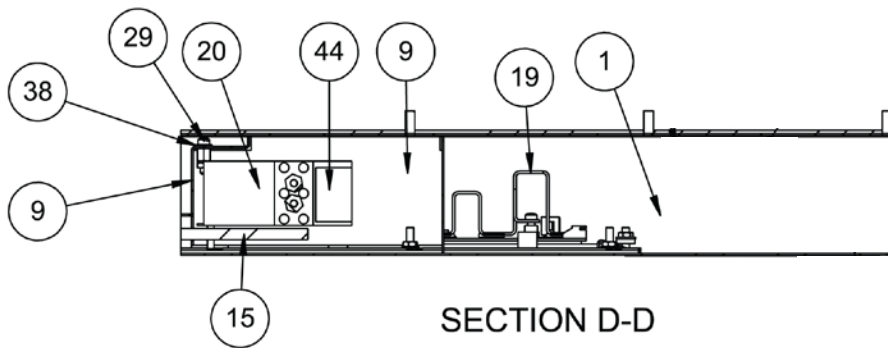
PART IDENTIFICATION, CONT.

Parts List for Back Removed, Guards and Back Removed, Section C-C, Detail E Views

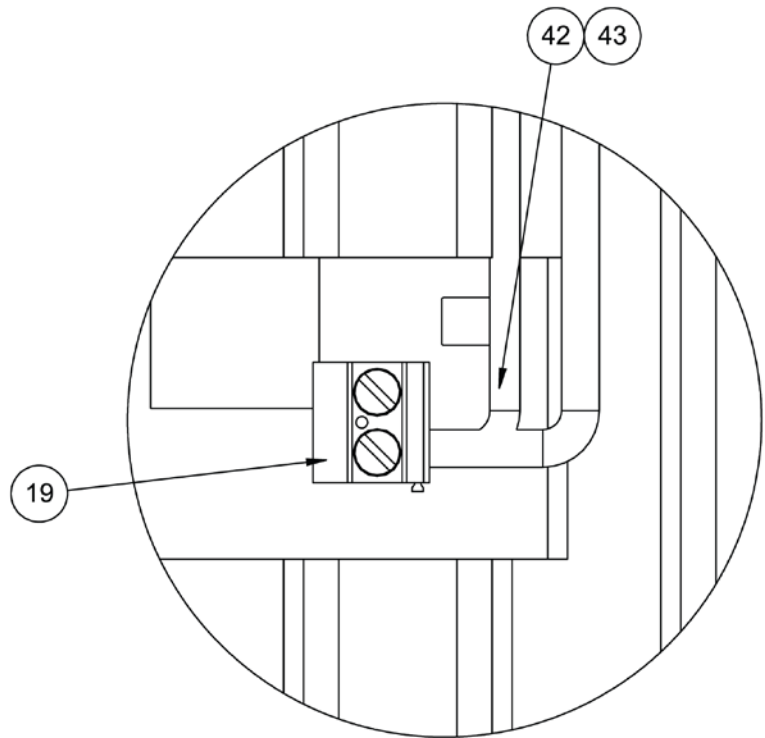
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	3601-0684-0A	PCB ASSY SB600 CONTROLLER
	1	3601-0684-1A	PCB ASSY SB600RI CONTROLLER w/TRAFFIC LIGHT CONTROL
3	1	3601-0707-08	SB600 POWER SUPPLY GUARD CR 20 GA. SHT
5	1	3601-0710-08	SB600 WIRE TRACK CR 20 GA. SHT
6	1	3601-0717-08	SB600 LENS PLEXIGLASS .118 X 48 X 96
9	1	3601-0721-08	SB600 TERMINAL BLOCK COVER 20 GA. CR SHT
15	1	3601-0742-0A	CABLE 03 COND 18 GA. SJ CORDAGE
16	2	3601-0757-08	LENS RETAINER SS 20 GA. SHT
17	1	3601-0763-0A	SB600 FRONT BOX W/ GASKETS
19	1	3601-0765-0A	SB600 LED PANEL ASSY
23	25	6013-0039	NUT #6-32 Z/P
25	4	6013-0315	NUT #6-32 HEX SMALL PATTERN Z/P
32	4	6024-1078	WASHER FLAT #6 NEOPRENE BACKING SS
37	1	6650-1212	BREATHING VENT PLUG
38	18	6680-0040	WASHER LOCK EXT TOOTH #6 ZP
39	4	6680-0203	SPACER #6-32 x .5 HEX NYLON
40	1	6800-1084	SB600 POWER SUPPLY, 90-130VAC / 4.2VDC @ 50A, CONVECTION COOLED
	1	6800-1085	SB600EU / SB600UK POWER SUPPLY, 180-264VAC / 4.2VDC @ 60A, CONVECTION COOLED
42	1	3601-0741-1A	POWER SUPPLY TO PANEL NEG WIRE ASSY
43	1	3601-0741-0A	POWER SUPPLY TO PANEL POS WIRE ASSY
45	1	6980-1030	SB600 POWER CORD, 6.3'
	1	6980-0250	SB600EU POWER CORD H05VV-F3G 1mm, 10A / 250V, BLACK, EURO PLUG
	1	6980-1059	SB600UK POWER CORD, UK PLUG, 6.5 FT. 10A / 250V, BLACK

PART IDENTIFICATION, CONT.

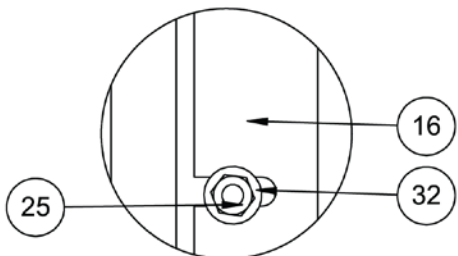
Section D-D, Detail F, Detail K, Detail M Views



DETAIL F
TYP. 20 PL.



DETAIL K



DETAIL M
TYP 4 PL.

PART IDENTIFICATION, CONT.

Parts List for Section D-D, Detail F, Detail K, Detail M Views

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	3601-0684-0A	PCB ASSY SB600 CONTROLLER
	1	3601-0684-1A	PCB ASSY SB600RI CONTROLLER w/TRAFFIC LIGHT CONTROL
9	1	3601-0721-08	SB600 TERMINAL BLOCK COVER 20 GA. CR SHT
16	2	3601-0757-08	LENS RETAINER SS 20 GA. SHT
19	1	3601-0765-0A	SB600 LED PANEL ASSY
20	1	3601-0766-0A	TERMINAL BLOCK SWING ARM W/HW
23	25	6013-0039	NUT #6-32 Z/P
25	4	6013-0315	NUT #6-32 HEX SMALL PATTERN Z/P
32	4	6024-1078	WASHER FLAT #6 NEOPRENE BACKING SS
38	18	6680-0040	WASHER LOCK EXT TOOTH #6 ZP
42	1	6980-1024	CABLE RIBBON ASSY 24-PIN-DIP 6-INCH,
44	1	8200-B104-08	LABEL: 205/210 TERM. BLOCK
45	1	6980-1030	SB600 POWER CORD, 6.3'
	1	6980-0250	SB600EU POWER CORD H05VV-F3G 1mm, 10A / 250V, BLACK, EURO PLUG
	1	6980-1059	SB600UK POWER CORD, UK PLUG, 6.5 FT. 10A / 250V, BLACK

STATEMENT OF LIMITED WARRANTY

WARRANTY TERMS

Cardinal Scale Manufacturing Company warrants the equipment we manufacture against defects in material and workmanship. The length and terms and conditions of these warranties vary with the type of product and are summarized below:

PRODUCT TYPE	TERM	MATERIAL AND WORKMANSHIP	LIGHTNING DAMAGE See note 9	WATER DAMAGE See note 7	CORROSION See note 4	ON-SITE LABOR	LIMITATIONS AND REQUIREMENTS
WEIGHT INDICATORS	90 DAY REPLACEMENT ----- 1 YEAR PARTS	YES	YES	YES	YES	NO	1, 2, 3, 5, 6 A, B, C, D
LOAD CELLS (Excluding Hydraulic)	1 YEAR	YES	YES	YES	YES	NO	1, 2, 3, 5, 6 A, B, C, D
HYDRAULIC LOAD CELLS (When purchased with Guardian Vehicle Scale)	LIFETIME	YES	YES	YES	YES	90 DAYS	1, 5, 6, 8 A, B, C, D
HYDRAULIC LOAD CELLS (When purchased separately)	10 YEARS	YES	YES	YES	YES	NO	1, 5, 6, 8, 9 A, B, C, D
VEHICLE SCALE (Deck and Below Excl. PSC Series)	5 YEARS	YES	YES	YES	YES	90 DAYS	1, 2, 3, 5, 6 A, B, C, D, E
LSC SCALE (Deck and Below)	3 YEARS	YES	YES	YES	YES	90 DAYS	1, 2, 3, 5, 6, 11 A, B, C, D
GUARDIAN FLOOR SCALES	10 YEARS	YES	YES	YES	YES	NO	1, 2, 3, 5, 6, 9, 10 A, B, C, D
ALL OTHER CARDINAL PRODUCTS	1 YEAR	YES	YES	YES	YES	NO	1, 2, 5, 6 A, B, C, D, E
REPLACEMENT PARTS	90 DAYS	YES	YES	YES	YES	NO	1, 2, 4, 5, 6 A, B, C, D
SWIM AND 760 SERIES VEHICLE SCALES	1 YEAR	YES	YES	YES	YES	90 DAYS	1, 2, 5, 6 A, B, C, D
SOFTWARE	90 DAYS	YES	N/A	N/A	N/A	NO	1, 6 B, C, D
CONVEYOR BELT SCALES (including Belt-Way)	1 YEAR	YES	YES	YES	YES	NO	1, 2, 3, 5, 6 A, B, C, D, E, F



CARDINAL

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Webb City, MO 64870

04/24
Printed in USA
315-WARRANTY-CAR-M

APPLICABLE LIMITATIONS AND REQUIREMENTS

1. This warranty applies only to the original purchaser. The warranty does not apply to equipment that has been tampered with, defaced, damaged, or had repairs or modifications not authorized by Cardinal or has had the serial number altered, defaced or removed.
2. This warranty is not applicable to equipment that has not been grounded in accordance with Cardinal's recommendations.
3. This equipment must be installed and continuously maintained by an authorized Cardinal / Belt-Way dealer.
4. Applies only to components constructed from stainless steel.
5. This warranty does not apply to equipment damaged in transit. Claims for such damage must be made with the responsible freight carrier in accordance with freight carrier regulations.
6. Warranty term begins with date of shipment from Cardinal.
7. Only if device is rated NEMA 4 or better or IP equivalent.
8. Lifetime warranty applies to damages resulting from water, lightning, and voltage transients and applies only to the hydraulic load cell structure itself (does not include pressure transducers, rubber seals, o-rings, and associated wiring).
9. 10-Year prorated warranty on hydraulic load cells.
10. 1-Year warranty for scale structure.
11. PSC models' warranty coverage applies only to agricultural installations on farms up to 3,000 acres (LSC models not limited in this manner).
12. Load cell kits MUST be installed in accordance with Cardinal Scale instructions. Failure to follow these instructions will void the warranty.

EXCLUSIONS

- A.) This warranty does not include replacement of consumable or expendable parts. The warranty does not apply to any item that has been damaged due to unusual wear, abuse, improper line voltage, overloading, theft, fire, water, prolonged storage or exposure while in purchaser's possession or acts of God unless otherwise stated herein.
- B.) This warranty does not apply to peripheral equipment not manufactured by Cardinal. This equipment will normally be covered by the equipment manufacturer's warranty.
- C.) This warranty sets forth the extent of our liability for breach of any warranty or deficiency in connection with the sale or use of our product. Cardinal will not be liable for consequential damages of any nature, including but not limited to loss of profit, delays or expenses, whether based on tort or contract. Cardinal reserves the right to incorporate improvements in material and design without notice and is not obligated to incorporate said improvements in equipment previously manufactured.
- D.) This warranty is in lieu of all other warranties expressed or implied including any warranty that extends beyond the description of the product including any warranty of merchantability or fitness for a particular purpose. This warranty covers only those Cardinal products installed in the forty-eight contiguous United States and Canada.
- E.) This warranty does not cover paint coatings due to the variety of environmental conditions.
- F.) Do not cut load cell cables on load cells returned for credit or warranty replacement. Cutting the cable will void the warranty.
- G.) Software is warranted only for performance of the functions listed in the software manual and/or the Cardinal proposal.
- H.) The software warranty does not cover hardware. Warranties on hardware are provided from the hardware vendor only.
- I.) The software warranty does not cover interfacing issues to non-Cardinal supplied hardware.
- J.) The software warranty does not include automatic software upgrades unless purchased separately.



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