VIBRATION ANALYSIS HARDWARE

Product Manual

MNX10015 / REV B

MODEL SB142, SB242

Dual Output Series Switch Boxes

Contents

Section I
Overview

Introduction

This document contains information on the operation, installation and maintenance of the SB142/SB242 Dual Output Switch Boxes. This manual is an overview of the system and references the specific component manuals. User manuals are provided with the system for all configurable internal components.

Description

Common cable termination point for bringing sensor cables into a switch box for routine data collection with portable data collectors.

Section II
Installation

Mounting Steps

Note: The term "Sensor" used in the notes below, refers to vibration sensors. An accelerometer is a type of vibration sensor and can therefore be used whenever sensor is referenced.

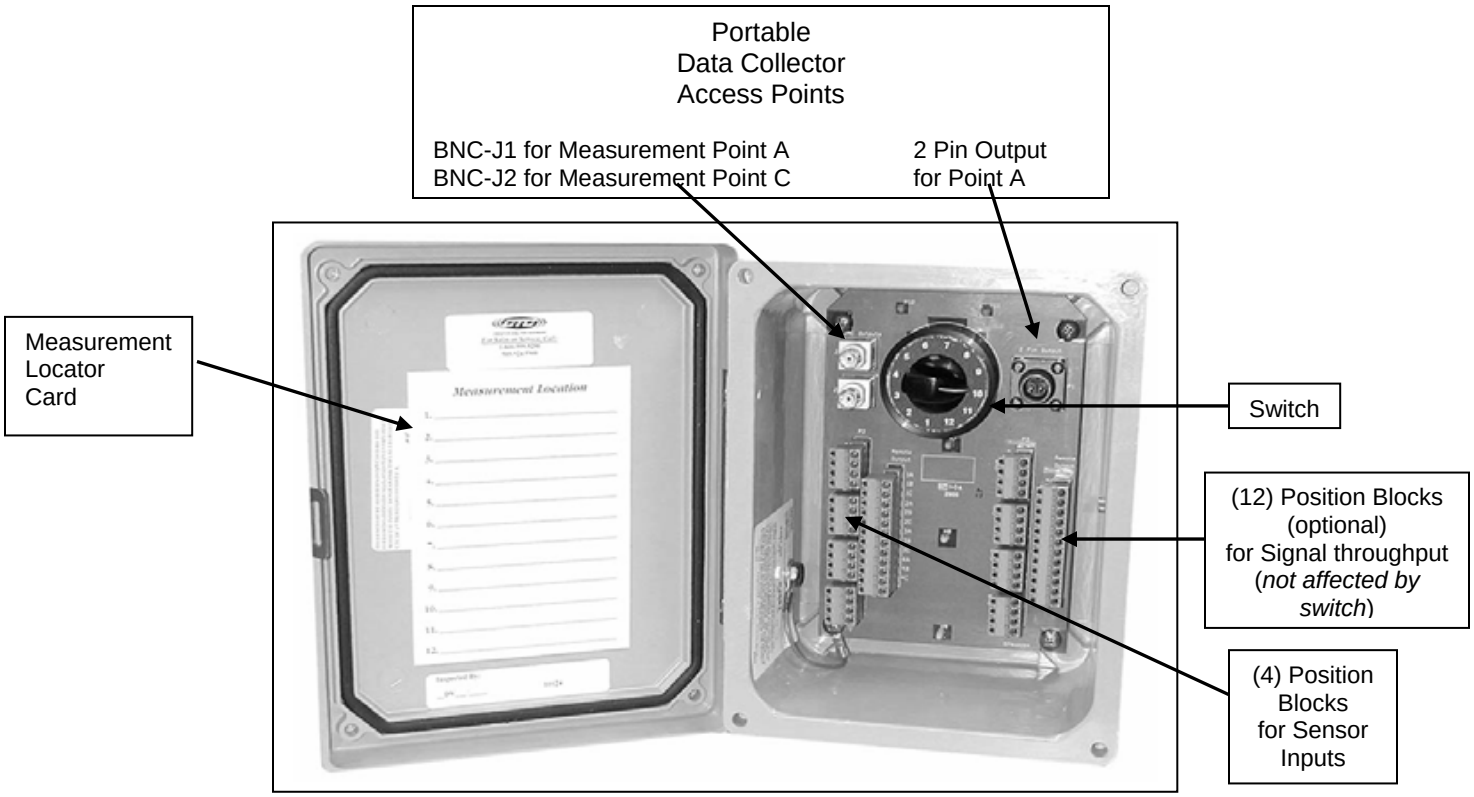


Figure 1. Dual Output Switch Box Layout

Examples of measurements:

- *Dual Outputs for Temperature and Vibration*
  BNC J1 & 2 pin output – Dynamic Vibration
  BNC J2 – Temperature (in Volts DC)
- *Dual Outputs for Loop Power and Vibration (typically not used in this application)*
  BNC J1 & 2 pin output – Dynamic Vibration
  BNC J2 – 4-20mA output
- Requires optional JB905-1A Block to provide power from PLC/DCS system and to LP series sensor.

1. **For SB142 Series Switch Boxes (Fiberglass Enclosure):** Attach the enclosed mounting brackets to the Switch Box at the pre-determined locations (SB242 Series Switch Boxes {Stainless Steel} are supplied with mounting brackets attached)

Note: If you have purchased a switch box without cable entries provided, you should add your own entry prior to mounting the switch box.

Note: CTC does not recommend putting holes in the top of the switch boxes due to access and moisture concerns.

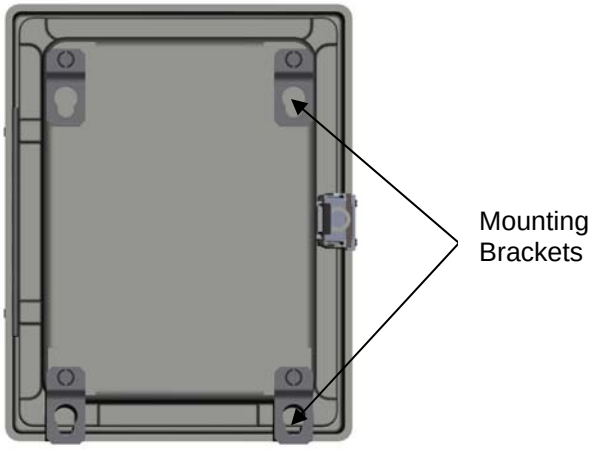


Figure 2. Mounting Bracket Placement

2. **Conduit Entry:** If you are running conduit to your switch box, ensure the conduit cable entry enters from the bottom of the enclosure when mounted. *(Figure 3)*

Note: To ensure moisture will not flow into the switch box, a hole should be drilled at the lowest point in the conduit to provide drainage for any moisture.

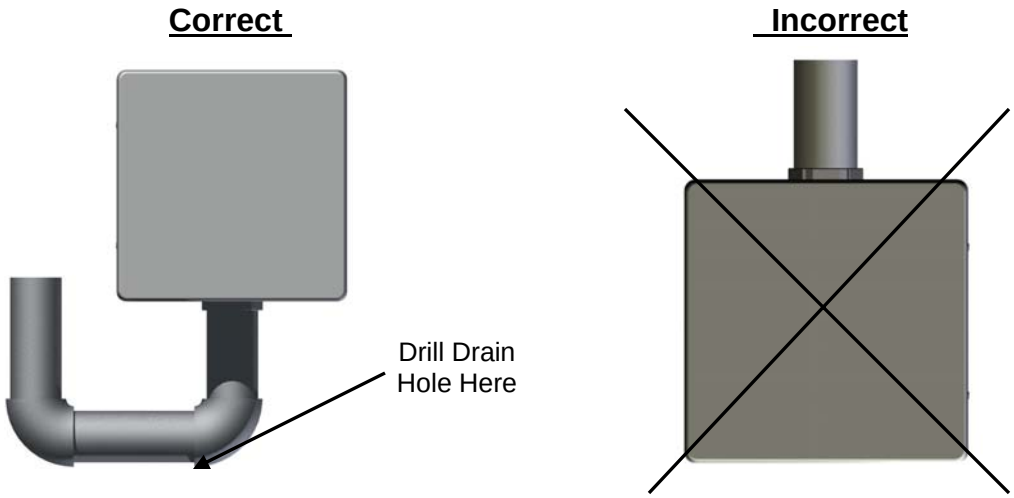


Figure 3. Conduit Entry for Switch Box

3. **Grounding of the Switch Box:** Ensure the shield ground wire on the SB142 Series Switch Boxes (Fiberglass Enclosures) is connected to earth ground.

> ***Note: The SB242 Series Switch Boxes (Stainless Steel Enclosures) are internally grounded to the enclosure.***
>
> ***Note: For SB142 Series Fiberglass Enclosure, customer is required to supply wire from ground to shield ground lug, located on the outside of the enclosure.***

Option 1. For SB142 Series Switch Boxes: When mounting the Switch Box to earth ground (such as an I-Beam); mount the shield ground wire behind one of the mounting brackets on the enclosure. (*Figure 4*)

Figure 4. Ground Wire Placement

Option 2. For SB142 Series Switch Boxes: When mounting the switch box to a non- grounded structure, ensure the shield ground wire or customer supplied ground wire is tied to a source of earth ground. (*Figure 5*)

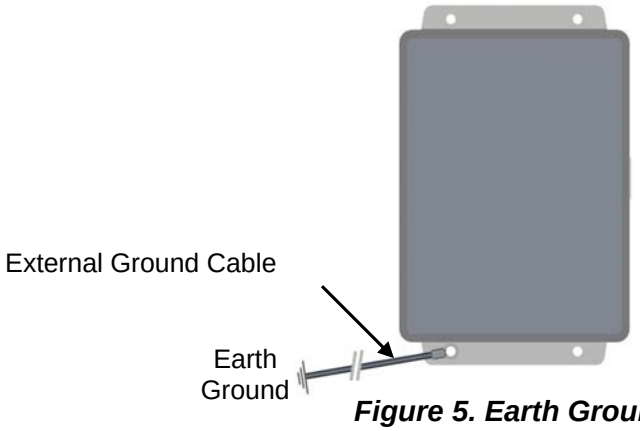


Figure 5. Earth Ground

4. **Installation of Sensor/Signal Input Cable:** Run sensor/signal input cable to the location of the switch box. Ensure the correct amount of cable is allocated. Splicing cable is not recommended.

Note: For conduit installations, conduit would be run to the switch box prior to completion of Step 4.

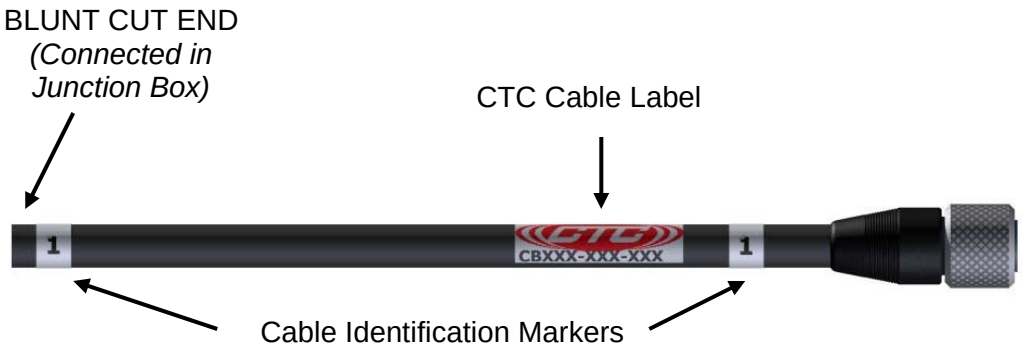


Figure 6. Identifying Cable Marks

- To help keep cable locations organized, it is recommended that cables are marked on BOTH ends and exact locations of the sensors are matched with their cable.
- Run each cable through the cable entry at the bottom of the switch box.
- For cord grip cable entry, take off the cord grip cover with bushing and run cable into enclosure, hand tighten cord grip cover to base to prevent damage of cord grip.
- For 16-32 channel switch boxes, wire tie bases are provided to help manage the cable into the box, secure cables for the top two boards, if applicable.

Tip: Run rows of cable on same row as on the board, for example, channels 1-6 on Board 1 should be on the outer most left hand side to allow proper wiring.

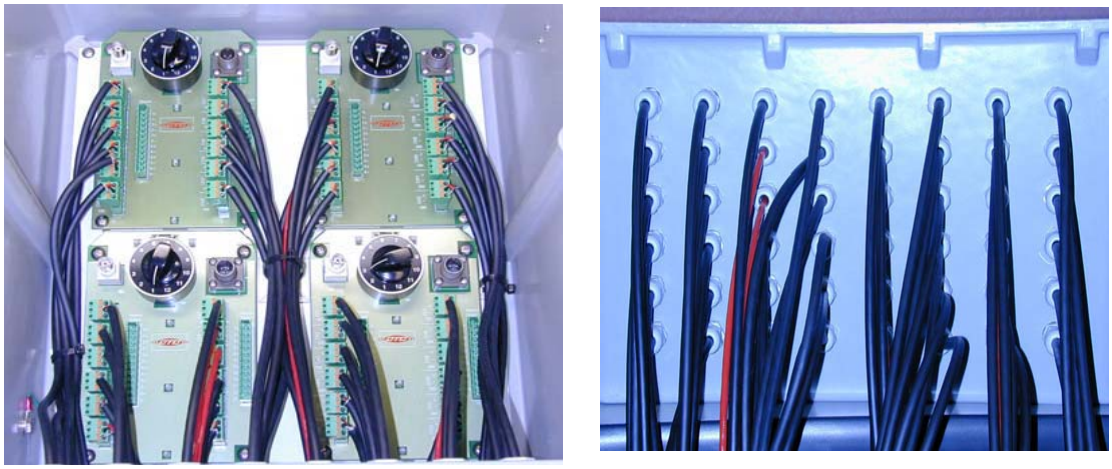


Figure 7. Cable Entry
(Representative Photo for Illustration Purposes only)

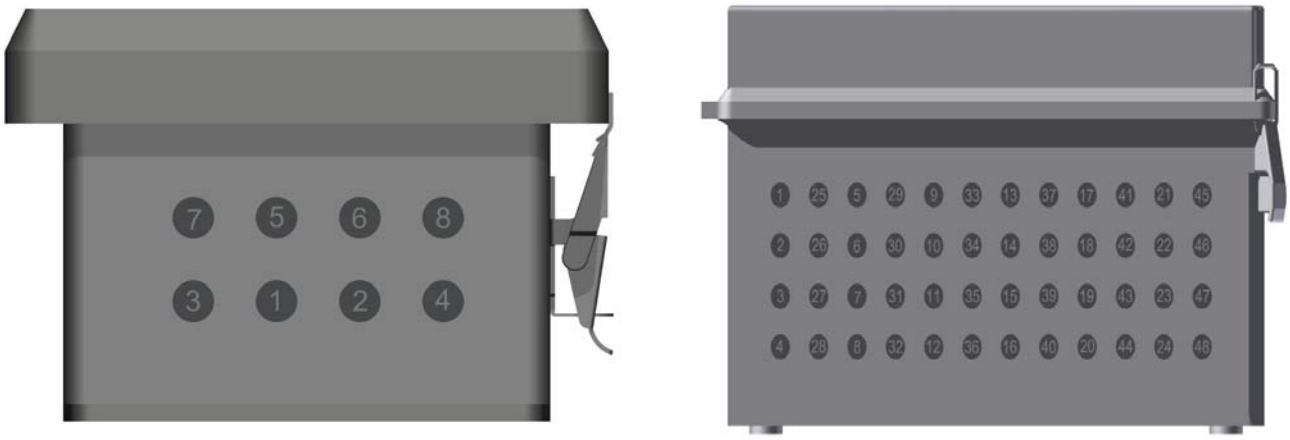


Figure 8. Bottom View for Cord Grip Installations

For SB142 and SB242 Series, attach sensor/signal input cables as follows:

a. Strip outer jacket of cable back 1 ¼"-1 1/2" and remove all of the shielding.
b. Strip red, black, and (white) insulation back ¼".
c. Remove each terminal plug from respective channel.

Orientation is as follows: (see Figure 9)

- Red (White in 4-20mA applications) insulated conductor wire is connected to socket (A).
- Black insulated conductor wire is connected to socket (B).
- White (Red in 4-20mA applications) insulated conductor wire is connected to socket (C).
- Shield/Drain wire is connected to ground socket (GND).
- Depress selected position button to open terminal for respective wire. (Small flat blade screwdriver is recommended).

Note: (4) position (and optional 12 position) plug can only be inserted one way to ensure proper wiring.

Installation considerations for Dual Output Switchbox:
There are several options for consideration of installation of a Dual Output Switchbox. *(Figure 9)*

Input signal options are:

- Temperature and Dynamic Acceleration
- Dual Vibration with 4-20mA Output and Dynamic output

Temperature and Dynamic Acceleration: (*Figure 9*)

a. Socket A – Positive (+ RED) connection for the dynamic acceleration and with output on the BNC “J1” and the (2) pin Output connectors.
b. Socket B – Negative (- BLACK) connection for the dynamic acceleration and volt output for temperature.
c. Socket C – Positive (+ WHITE) connection for the voltage output for temperature with output on the BNC “J2”, only.
d. Socket D – Shield/Drain wire connection that is directed to “Earth” ground.

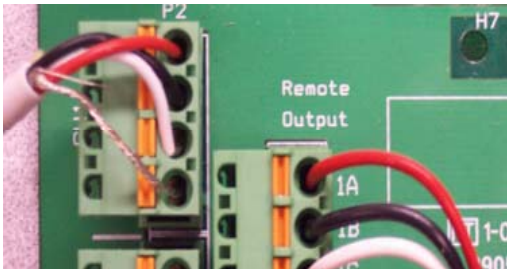
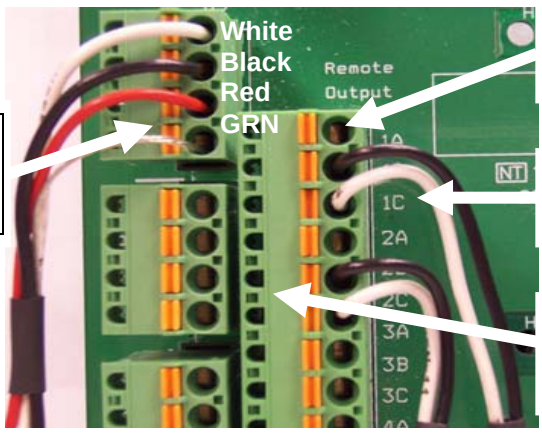


Figure 9. Connecting Cables to Switch Box For Vibration and Temperature

Dual Vibration with 4-20mA output and Dynamic outputs: (*Figure 9A*)

a. Socket A – Positive (+ WHITE) connection for the dynamic acceleration and would output on the BNC “J1” and the (2) pin MIL output connectors.
b. Socket B – Negative (- BLACK) connection for the dynamic acceleration and 4-20mA velocity output.
c. Socket C – Positive (+ RED) connection for the 4-20mA signal, and would output to the BNC “J2”, (not used in this application).This setup requires optional (12) position plug in block *(CTC #JB905-2A)* to wire LP series sensor to the PLC/DCS system. The PLC/DCS system then provides the power for the loop in this setup, using CTC’s LP series sensors. (*Figure 9A*)
d. Socket D – Shield/Drain wire connection that is directed to “Earth” ground.

PLEASE NOTE: In this application, the portable data acquisition system needs to have sensor power turned off before collecting data.



*NOTE:
WHITE “A” terminals not used

Sensor Wire Inputs

Signal Wire Outputs

Optional Plug-in Block
CTC part # JB905-2A

Figure 9A. Optional Plug-in Block #JB905-2A for Vibration and 4-20mA

5. Identification of inputs:
Mark the Measurement Location Card with a description of each SENSOR location.

Repeat these steps until all cables have been wired into their respective Channel Location on the terminal strips.

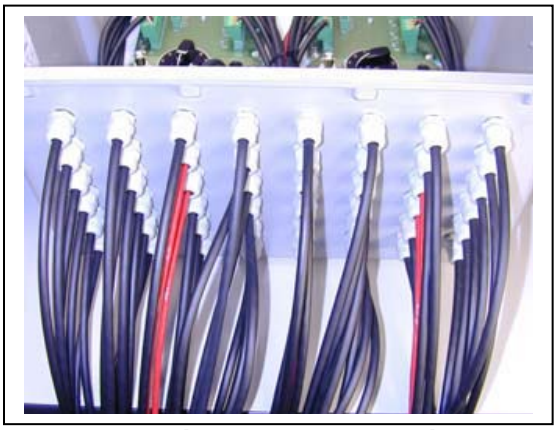


Figure 10. Connecting Cables to Enclosure

Figure 11. Connecting Cables to Enclosure

If Cord Grips are used, ensure cord grip covers are securely fastened to base. A wrench may be needed to ensure the bushing in the cord grip has created a tight seal around the cable entering the enclosure.

Note: If using the remote output option (with optional plug in connector #JB905-2A) only (+) and (-) terminals are used. Populate appropriate number of channels for the plug(s) and slide into place. The enclosure will have to be modified to account for the exiting cables.

Post-Installation Procedures:

1. Utilizing TM1018 Accelerometer Verification Meter (*Figure 12*), cable conductivity, sensor location and proper wiring connections can be verified. The Verification Meter will indicate if the sensor, cable and/or junction box is in working condition. It will also confirm bias voltage of the accelerometer, which will inform you of the operation of the internal accelerometer amplifier.

FIGURE 12. TM1018 Accelerometer Verification Meter

2. One method of confirming the correct Measurement Location and proper cable hook up utilizes two personnel, an Accelerometer Verification Meter, and a means of communication (i.e. hand-held walkie-talkies if the sensors are not located within site of the junction box). Person A will be located @ the Switch Box, while Person B goes to each Measurement Location.
    a. Once positioned, Person A will connect the TM1018 to the Data Collector Output to the switch box and turn the Channel Selector to the channel that corresponds to the referenced measurement location. A “NORMAL” LED reading should be observed.
    b. Then Person B disconnects the cable from the accelerometer, and the TM1018 should respond with an “OPEN” LED.
    c. Then Person B reconnects the cable to the accelerometer, and the TM1018 should respond with a “NORMAL” LED.
    d. Repeat for each measurement location to verify that accelerometer location properly identified at the switch box.

The following LED Readout indicates the circuit integrity:

- ***Normal.*** Indicates proper connection and an output bias will be given, indicating the health of the sensor (4 – 16 V indicates a healthy accelerometer).

- ***Open Circuit*****.** Indicates one of the following:
    a. Cable connector is not connected to accelerometer
    b. Cable is open circuit (broken or not connected @ one end)
    c. Accelerometer is not functioning correctly.

- ***Short Circuit.*** Indicates one of the following:
    a. Water or contamination in the connector
    b. Reverse Wiring ((+) and (-) leads are reversed)
    a. Wires in switch box or cable connector (+) & (-) are touching

Section IV
Maintenance

General

There are no customer replaceable parts. The switch box has been designed for trouble-free service under normal operating conditions.

Warranty

If any CTC vibration analysis hardware product should ever fail, we will repair or replace it at no charge.

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