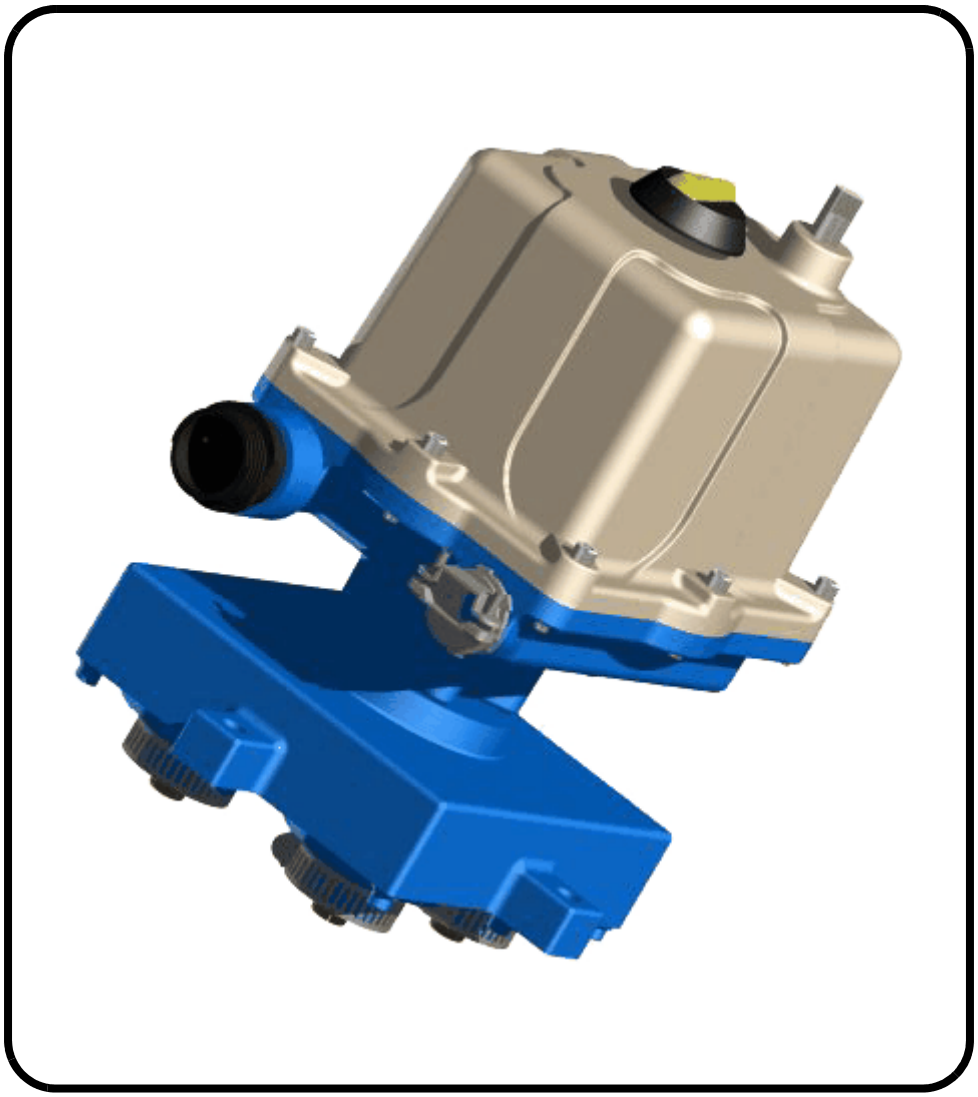
Shively Labs®

Motorized Coaxial Switch

Models 158NF-04MP & 158NF-04MP-2



Instruction Manual
Installation, Operation, & Maintenance

Congratulations!

Thank you for purchasing the finest FM broadcast equipment on the market today. The Shively Labs Models 158NF-04MP & 158NF-04MP-2 are widely recognized as top-of-the-line in their class for their superior performance and durability.

Your purchase is backed by the best technical support in the industry. Shively is a leading manufacturer in the broadcast industry, providing an extensive range of antennas, transmission line and components. Our technical staff has a wealth of experience in the broadcast industry and is standing by to serve you in any way.

This manual is intended to give you a good basic understanding of your coax switch: its proper and safe installation, startup, and operation, and trouble-shooting and maintenance information to keep it working satisfactorily for years to come. *Please have everyone involved with the coax switch read this manual carefully, and keep it handy for future reference.*

Meanwhile, please feel free to contact your sales representative at Shively Labs at any time if you need information or help. Call or write:

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IMPORTANT

Please read this manual in its entirety before beginning installation of your coax switch!

Failure to follow the installation and operation instructions in this manual could lead to failure of your equipment and might even void your warranty!

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1 Description & Specifications

General description

This coaxial switch provides reliable and fast switching of your coaxial transmission line system. It is a motor driven rotary type and can be controlled locally or remotely. The switch is equipped with a manual override, mechanical position indicators and auxiliary read-out circuits. The switch can be operated in any position. The switch can be configured with non-flanged or EIA male flanges and with either 115 VAC or 230 VAC motors.

The switch must be ordered with your desired motor from Shively Labs. You cannot modify the switch in the field to change the motor voltage.

Option	Motor Voltage
-1	115 VAC
-2	230 VAC
	Flange Interface
NF	Non-flange
F	EIA Male

Specifications

Frequency Range	87.5-108 MHz	
Characteristic Impedance	50 ohms	
VSWR Max	Less than 1.01 : 1 at 108 MHz	
Insertion Loss	0.01 dB	
Power Rating		
• Peak	150 kW [a]	
• Average @ 98 MHz	15 kW	
Switching Time	3 Seconds	
Isolation	55 dB	
RF Connectors	EIA or non-flange 1 5/8	
Drive Motor Current (A)	Run	Start
1 phase, 50/60 Hz @ 115 VAC	0.6	1.25
1 phase, 50/60 Hz @ 230 VAC	0.5	0.9

a. Power rating is comparable to 1-5/8" coax components. Please see technical bulletin on www.Shively.com for power ratings at other frequencies. Unit is non-pressurized and must be de-rated for altitude.

Theory of operation

The coaxial switch is a rotary type switch having an aluminum cavity common to all ports. The rotor assembly contains two inner conductor blades which oscillate 90° to accomplish the switching function. The rotor is driven by a specially designed, fast action, gear motor. When the motor is activated by connection through the control, it will rotate 90°. Six micro-switches (3 normally open, 3 normally closed) are provided for position confirmation. The rotor activates these micro-switches. Microswitches may be used for transmitter external interlock circuits as applicable, at voltages not exceeding 50 volts AC or DC. See the electrical schematic diagram, Figure 1.

The motor drive used is an AC power segregated AC/DC command actuator, operated by 115 VAC or 230 VAC and controlled by 12-24 VDC or 115/230 VAC through an internal circuit board. The various controlling voltages can be selected through the provided 24-pin Amp connector. See the electrical schematic below for pin-out for the configuration required. Do not apply AC and DC commands to the drive at the same time.

There is no need to take the cover off the switch unless local push button operation is required. See Operation, Chapter 3, for instructions.

Illustrations

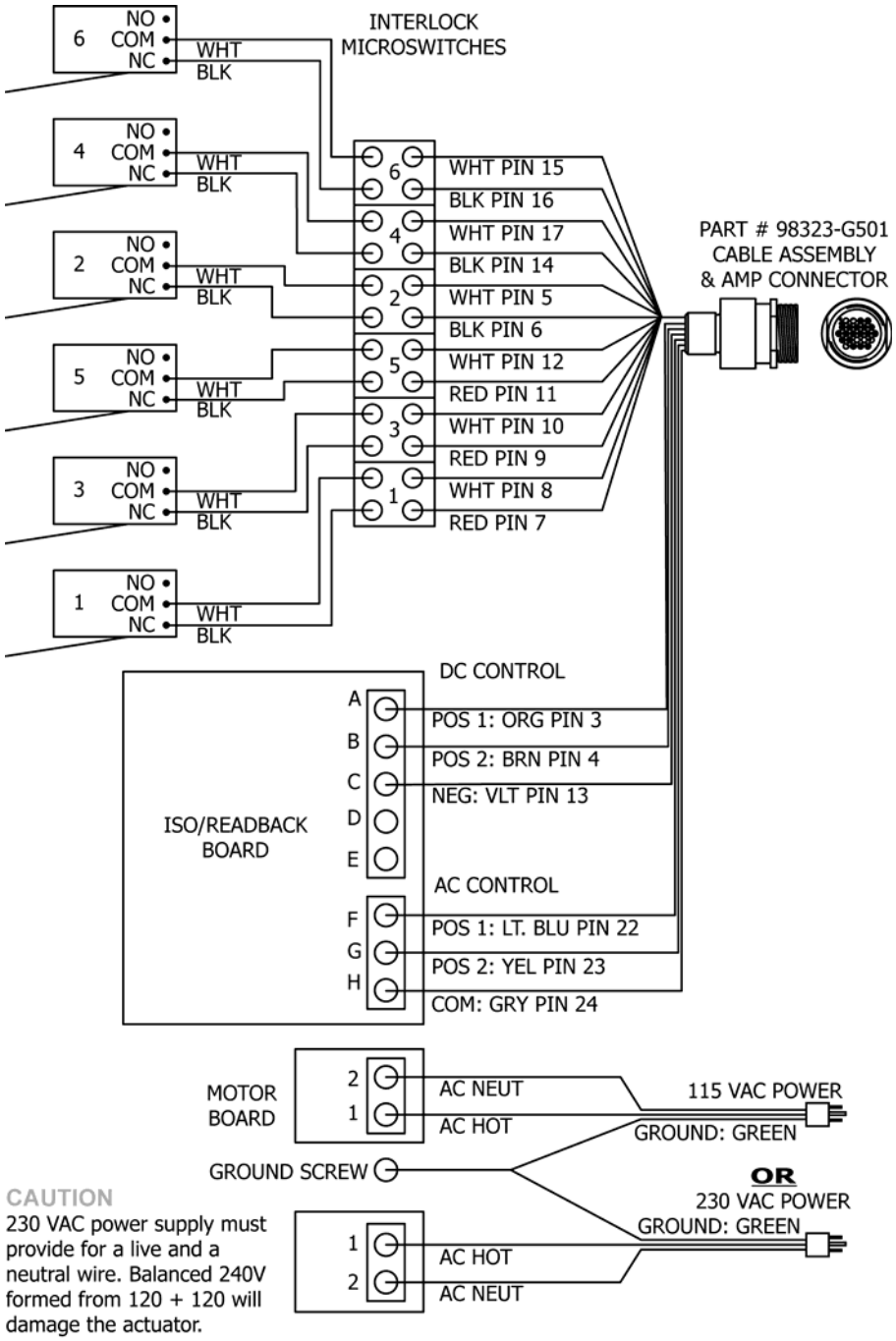

Figure 1. Electrical schematic diagram

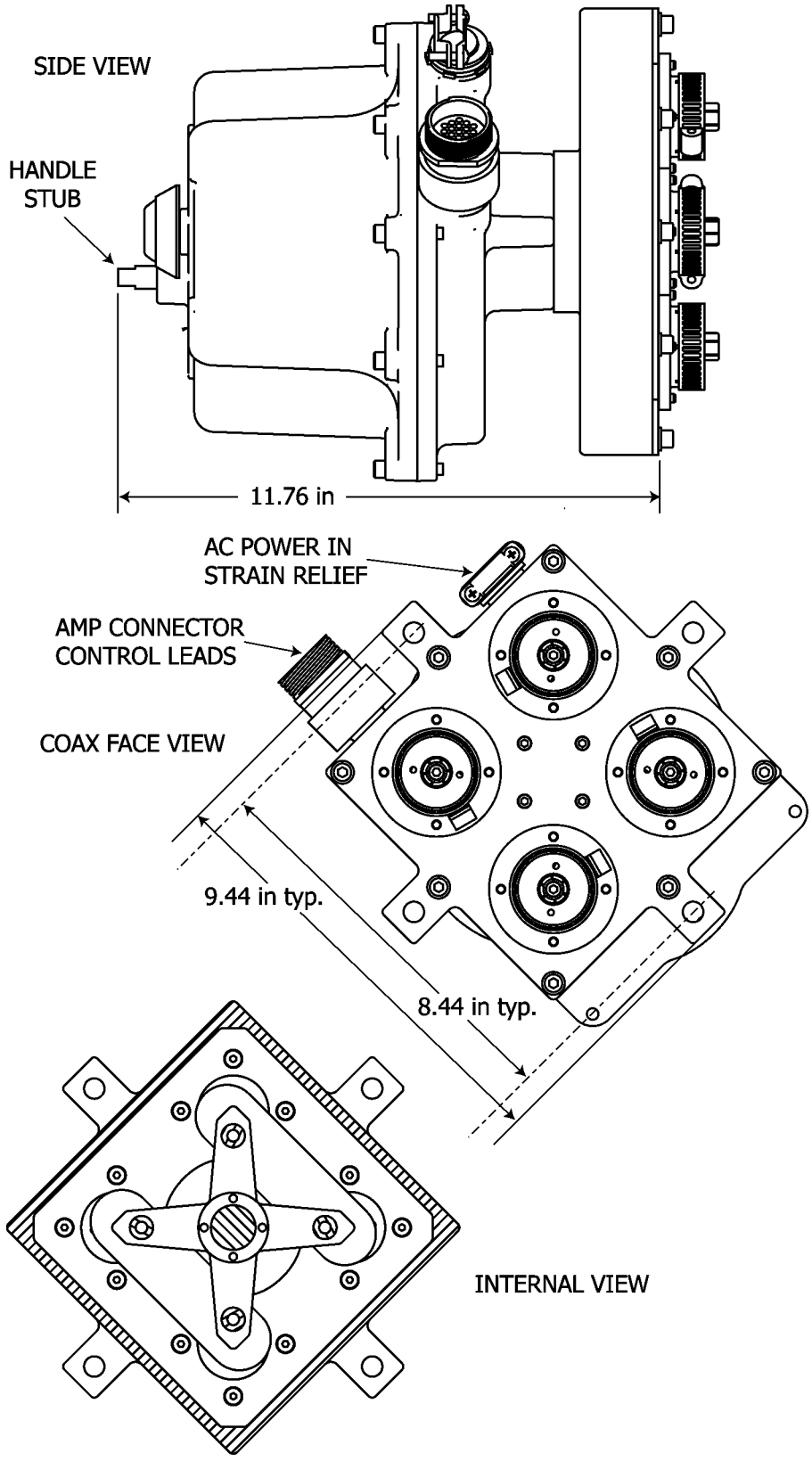

Figure 2. Coax switch views

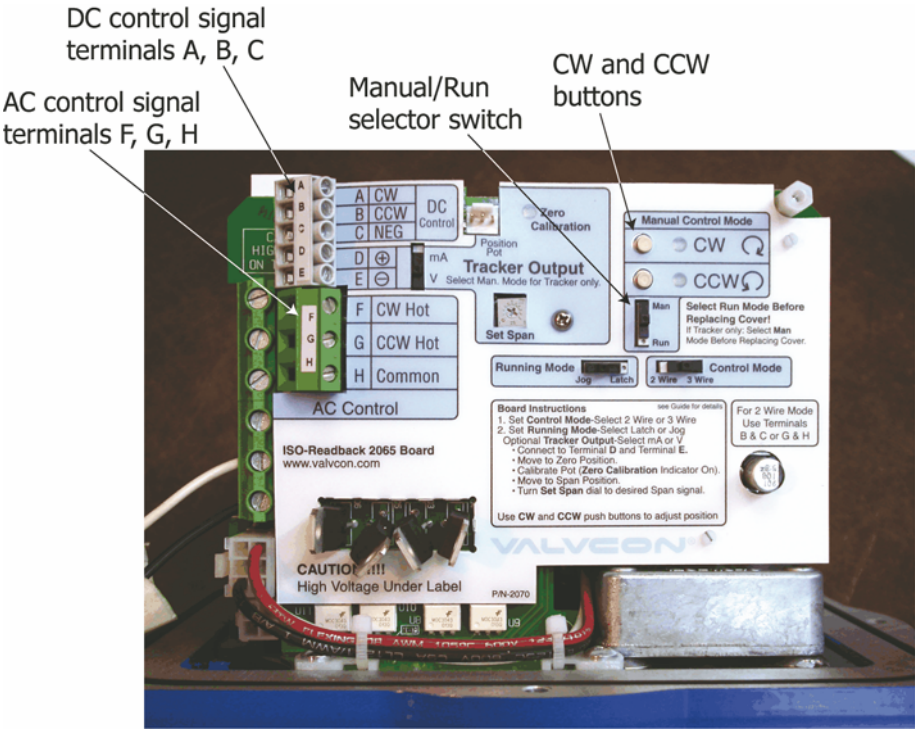

Figure 3. Connections and controls

2 Installation

Precautions

CAUTION

Interlock circuits must be provided to prevent RF power being applied unless a legitimate RF transmission line path has been completed through the switch to an antenna or dummy load. Failure to do this may result in catastrophic switch damage.

CAUTION

On EIA flanged models, the RF contact on the switch flanges protrudes above the flange surface. When properly connected there will be a space between the flanges at the bolt circle of approximately 0.020 to 0.040 inch (0.5 to 1 mm). Torque EIA flange bolts to 11 - 12 ft-lb (16 N-m). Tightening beyond rated torque will damage both the switch flange and the mating transmission line flange.

Installation procedure

a. Mount the switch in any convenient position as follows:

   (1) Mount using the four mounting holes shown on the mechanical outline drawing, Figure 2 on page 3.

   (2) Orient the RF ports to meet the required transmission line layout.

   (3) Locate the manual operate handle stub in an accessible location for manual switching in the event of control power failure.

   (4) Provide a minimum of eight inches of clearance above the top of the motor drive cover to allow for removal.

b. After the switch is properly mounted in position, remove hardware and protective covers from the RF connectors.

c. Attach transmission lines to the switch ports and re-install hardware. Torque flange bolts (if applicable) to 11 - 12 ft-lb.

d. Connect the switch controller in preferred manner.

Additional limit switches

The following limit switches are available for additional components:

Table 1. Additional limit switches

Pin #	Position 1	Position 2	Pin #	Position 1	Position 2
15	Closed	Open	12	Open	Closed
16	Closed	Open	11	Open	Closed
17	Closed	Open	10	Open	Closed
14	Closed	Open	9	Open	Closed
5	Closed	Open	8	Open	Closed
6	Closed	Open	7	Open	Closed

Available equipment

Please contact Shively Labs or visit www.shively.com for additional equipment. Available are:

- Switch controllers
- Interconnecting cables
- Adapters
- Coax elbows
- Transmission line

3 Operation

Precautions

CAUTION

Interlock circuits must be employed to prevent RF power being applied unless a legitimate RF transmission line path has been completed through the switch to an antenna or dummy load. Ensure that RF power is off before the switch is commanded for position change. Failure to do this will result in catastrophic switch damage.

Modes of operation

The switch will change positions in approximately three seconds upon command.

The switch can be operated in three ways, as described below.

- Locally with the cover removed.
- Remotely (with a switch controller) with connection through the Amp connector.
- Manually with a 3/8" wrench or hand wheel.

Local operation

To operate the switch locally (see Figure 3 on page 4):

a. Remove AC power and remove the switch cover.

b. Set the "Man/Run" switch to "Man." Apply AC power.

c. Press either the "CW or CCW" button to turn the switch to the desired position. Hold the button until the motor stops.

d. Reset the "Man/Run" switch to "Run" and replace the cover when done.

Remote operation

To operate remotely through the Amp connector:

a. Connect the Amp connector and apply AC power.

b. Connect control end cable and operate through control.

Manual operation

To operate manually:

a. Ensure AC power and Amp connectors are unplugged.

b. Using a wrench or hand wheel, press down on the handle stub (see Figure 2 on page 3) and turn until the pointer on the switch cover lines up with the desired position.

4 Maintenance

Initial check

After installation is complete, remove the actuator cover and inspect the switch for loose electrical connections and/or auxiliary switch hardware that may have become loose during shipping. Correct as necessary.

Periodic maintenance

These switches require no periodic maintenance.

Amp connector part numbers

If Amp connector parts are damaged, order from an electrical supply house as follows:

- Socket Assembly, Loose piece, Type III: 1-66101-9
- Free-Hanging Plug, 24 Contacts, Shell Size 23: 206837-1
- Cable Clamp, Shell Size 23: 206138-8