



IB-426

P/N 85171

Model 60000  
Motorized Coaxial Switches  
1 5/8", 3 1/8", 4 1/16" and 6 1/8"

Instruction Manual

**Note:**

Review the contents of this manual  
prior to Removal from the crate and Installation.

Improper handling  
can **Void Product Warranty.**

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Note: All specifications are for reference use only. Consult factory for details.

# WARNING

**All Electrical and RF work must be done in accordance with  
Local and national codes and safety requirements.**

## 1.0 General Description

The Model 60000 Coaxial Switch provides reliable and fast switching of coaxial transmission line systems. It is a motor driven rotary type that can be controlled locally or remotely.

The switch is equipped with a manual override, mechanical position indicators and with read-out circuits.

Operable in any position and having a minimum of moving parts, the switch will routinely operate through 500,000 cycles without failure.

EIA male flanges are standard with adaptors available to mate with un-flanged or semi-flex transmission lines.

## 2.0 Specifications

|   | 1 5/8"  | 3 1/8"                                     | 4 1/16"                                 | 6 1/8"<br>50 Ohm                           | 6 1-8"<br>75 Ohm                           |
|---|---|--|---|--|--|
| Frequency Range   | DC-900 MHz  | DC-900 MHz                                 | DC-800 MHz                              | DC-800 MHz                                 | DC-800 MHz                                 |
| Characteristic Impedance  | 50 Ohm  | 50 Ohm                                     | 50 Ohm                                  | 50 Ohm                                     | 75 Ohm                                     |
| VSWR Max.   | 1.05:1  |  |   |  |  |
| Insertion Loss  | 0.1 dB max.   |  |   |  |  |
| Power Rating<br>Peak<br>Average at 30 MHz<br>Average at 300 MHz<br>Average at 900 MHz | 150 kw<br>25 kw<br>6 kw<br>4 kw   | 500 kw<br>90 kw<br>30 kw<br>15 kw          | 1000 kw<br>150 kw<br>50 kw<br>25 kw     | 2000 kw<br>300 kw<br>100 kw<br>45 kw       | 1500 kw<br>225 kw<br>75 kw<br>38 kw        |
| Switching Time (nominal)  | 3 seconds   | 3 seconds                                  | 3 seconds                               | 4 seconds                                  | 4 seconds                                  |
| Isolation   | 60 dB   |  |   |  |  |
| RF Connectors   | EIA Male  |  |   |  |  |
| Drive Motor Current<br>10 50/60 Hz at 115 V AC<br>at 230 V AC                         | Run Current Start<br>115 Nom. .6 AMP 115 Nom. 1.25 AMP<br>230 Nom. .5 AMP 230 Nom. .9 AMP |  |   |  |  |
| Auxiliary Switch Ratings  | 120 VAC 3A  |  |   |  |  |
|   | 28 VDC 3A   |  |   |  |  |
| Net Weight  | 36 lbs<br>16 kg   | 47 lbs<br>21.5 kg                          | 60 lbs<br>27 kg                         | 130 lbs<br>59 kg                           | 120 lbs<br>54 kg                           |
| Gross Packed Weight   | 48 lbs<br>21.7 kg   | 65 lbs<br>29.5 kg                          | 85 lbs<br>38 kg                         | 185 lbs<br>84 kg                           | 170 lbs<br>77 kg                           |
| Gross Packed Cube   | 3.58 ft <sup>3</sup><br>.10 m <sup>3</sup>  | 3.58 ft <sup>3</sup><br>.10 m <sup>3</sup> | 9 ft <sup>3</sup><br>.26 m <sup>3</sup> | 12.6 ft <sup>3</sup><br>.35 m <sup>3</sup> | 12.6 ft <sup>3</sup><br>.35 m <sup>3</sup> |

### 3.0 Theory of Operation

The Model 60000 Coaxial Switch is a rotary type switch having an aluminum RF cavity common to all ports. The rotor assembly contains two inner conductor blades and a common isolating ground plane which oscillates 90° to accomplish the switching function and provide isolation between the transmission line paths.

The rotor is driven by a gear motor. When the motor is activated by connection through the control, it will rotate 90°.

Six normally open microswitches are provided for position confirmation. The rotor activates these microswitches; and they *must not be used* for transmitter interlocking. **One must ensure that RF power is off before a position command is activated. Dielectric cannot be responsible for failure or burnout of switches switched under power.**

### 3.1 Inside the Drive

The drive used on the 60000 switches is an AC power segregated AC/DC command actuator. The drive is operated by 115 VAC, or 230 VAC and controlled by 12-24 VDC or 115/230 VAC. The different voltages can be selected without removing the cover. See the schematic 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 open the switch unless local push button operation is required.

### 4.0 Installation

1. Locate position using the four mounting holes shown in figure 1. Orient the RF ports to meet the required transmission line layout.
2. The manual operate handle stub should be in an accessible location for manual switching in the event of a control power failure. Provide a minimum of eight (8) inches of clearance above the top of the motor drive cover to allow for removal.
3. After the switch is properly mounted in position, remove hardware and protective covers from the RF connectors.
4. Attach adapters or EIA female flanged lines to the switch ports and re-install hardware.
5. Ensure Cut-Back to mating piece is correct as well as Myat and/or Dielectric connectors are appropriate. Ensure excessive pressure is not applied to the switch inner assemblies.
6. Note: The RF contact of the switch flanges protrudes above the flange surface and when properly connected there will be a space between the flanges at the bolt circle. Tightening beyond rated torque levels will destroy the switch flange and the mating transmission line flange.

#### Caution

Tighten bolts evenly and do not exceed torque rating of eleven (11) foot pounds on the 1 5/8" switch or twenty (20) foot pounds on the 3 1/8", 4 1/16" and 6 1/8" switches.

#### Caution

Switch will return to last electrically commanded position if AC power is removed and re-applied. When switch position is manually changed ensure RF power is removed prior to the application of AC power to the switch or controller.

## 5.0 Operation

The 1 5/8", 3 1/8", 4 1/16" and 6 1/8" Model 60000 switches will change positions in approximately three (3) seconds upon command.

The interlock circuits should 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 is OFF before the switch is commanded for position change.

### **Warning! Users must remove all RF power before switching.**

The 60000 series switch can be operated in four ways.

1. Locally with the cover removed.
2. Locally with the Remote Pendant (p/n 400024205). This device does not include provisions for interlocks.
3. Remotely with connection through the Amp connector.
4. Manually with a 3/8" wrench.

*To operate locally with cover removed:*

- A. Remove AC power and remove the cover.
- B. Set the "Man Run" switch to "Man". Plug in the AC power.
- C. Press either the "CW or CCW" button to desired position and hold until the motor stops.
- D. Reset "Man Run" switch to "Run" and replace cover when done.

*To operate with the Remote Pendant (p/n 400024205):*

- A. Connect Amp connector and AC power.
- B. Press the Left Button for POS 1.
- C. Press the Right Button for POS 2.

*To operate through Amp connector:*

- A. Connect Amp connector and apply AC power.
- B. Connect control end cable and operate through control.

*To operate manually:*

- A. Assure AC power and Amp connectors are unplugged.
- B. Using wrench press down and turn until pointer on cover lines up with desired position.

## 6.0 Maintenance and Repairs

The Model 60000 Switch requires no periodic maintenance.

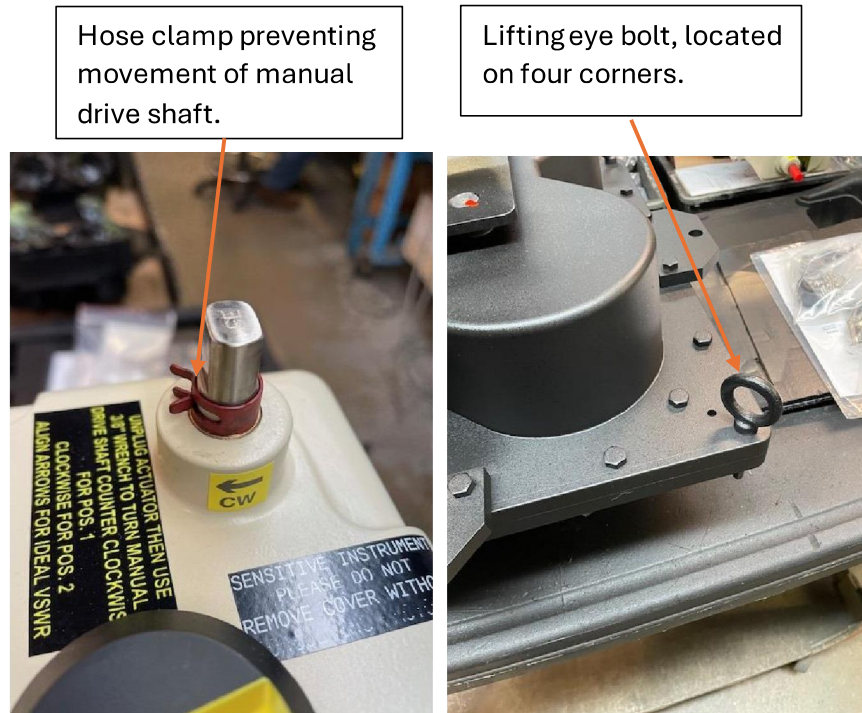
**Warning:** Removal of the cover may expose live electrical terminals (240V AC max.). Some sub-assemblies of the units are sealed at the factory after test; breaking these seals VOIDS any warranty and field repair of these assemblies is not recommended.

### Caution

Remove RF power prior to the application of AC power to the switch or controller. Switch may rotate to last electrically commanded position.

## 7.0 Troubleshooting and Helpful Hints

- When removing the switch from the transport crate, use the eyelets mounted on the top of the unit (6" switches only) to attach straps for lifting the switch whenever possible as this is an electronic device and can be damaged from rough handling.
- It is recommended that a "Two-Person" lift be utilized for the removal of all other switches from the crate.
- Avoid using the Actuator as a lifting point.



- The manual actuator shaft comes from the factory with a hose clamp to minimize the risk of inadvertent disengagement during handling (Pressed Down).
- If the switch does not engage after following proper installation steps provided in this document, the manual actuator shaft may be out of position. To rectify, using a pair of pliers, grab the top of the shaft and pull straight up – if the shaft was out of position it will move to its' highest position. Note: The entire distance the shaft can move from bottom (Fully Engaged) to top (Dis-engaged) is approximately 1/4".
- We recommend rotating the switch with:
  - Dielectric Dual Switch Controller – P/N 400013927 or
  - Remote Pendant Handheld Controller – P/N 400024205
- If you need to manually rotate the switch:
  - Power must be disconnected.
  - If there is resistance moving the shaft with a wrench, STOP.
  - Excessive force can break the shaft and cause damage to internal components.
  - Contact Dielectric for Technical Assistance.
- Issues not addressed in this document should be communicated to a Dielectric Customer Service Representative for support.

## 8.0 Ancillary Equipment

### Available Accessories

| Components  | Description                   | Part Number     |
|---|-------------------------------|-----------------|
| Adaptors  |                               |                 |
| 1 5/8" EIA-F  | to 1 5/8" no flange, 6" large | B-44920-502     |
|   | to 1 5/8" EIA-F, 6" large     | D-30997-001     |
| 3 1/8" EIA-F  | to 3 1/8" no flange, 6" large | B-44900-502     |
|   | to 3 1/8" EIA-F, 6" large     | C-7999-501      |
| 4 1/16" EIA-F   |                               |                 |
| Transitions   |                               |                 |
| 1 5/8" EIA-M  | to Type N-F                   | C-21109-503     |
| 3 1/8" EIA-F  | to 1 5/8" EIA-F, 6" large     | B-25623-501     |
| 3 1/8" EIA-M  | to Type N-F                   | C-14397-503     |
| 4 1/16" EIA-F   |                               |                 |
| Cable   |                               |                 |
| Dual Switch Controller to 60000 Switch Various Lengths        |                               | See Chart Below |
| To adapt 60000 switch CPC 24 pin to 16 pin AMP CPC ("Type C") |                               | 85156           |
| To adapt 60000 switches to 50000 Amphenol connector           |                               | 85144           |

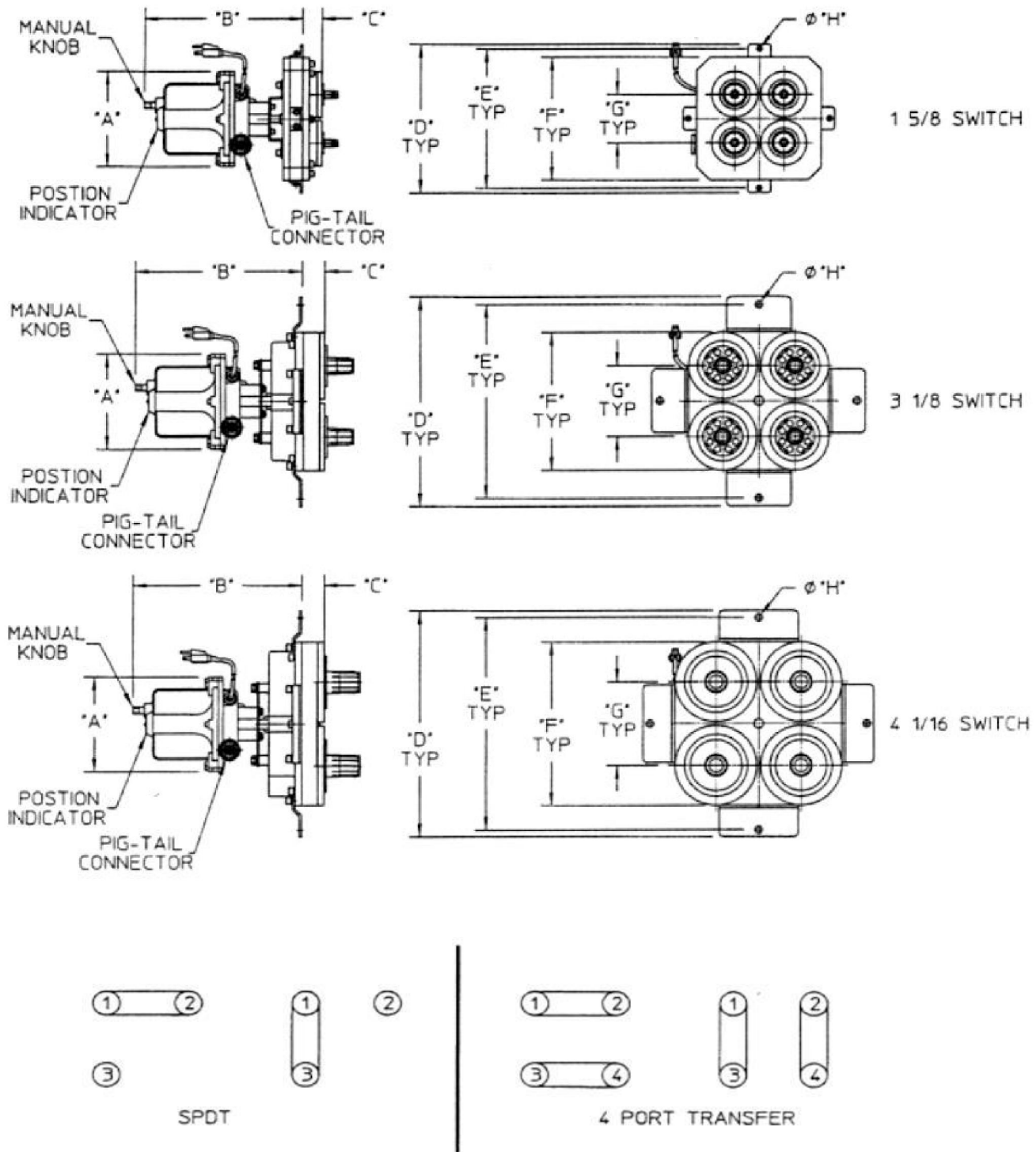
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### Dual Switch Controller to 60000 Switch

| PART NUMBER | LENGTH   |
|-------------|----------|
| 11000000372 | 6 FEET   |
| 11000000373 | 35 FEET  |
| 11000007099 | 100 FEET |
| R0101873025 | 25 FEET  |
| R0101873050 | 50 FEET  |
| R0101873075 | 75 FEET  |
| 400005554   | 150 FEET |

\* All components are copper; similar items having aluminum outer conductors are available. Contact Dielectric for a complete line of Coaxial and Waveguide transmission lines and components.

### Switch Head Configurations/Measurements (Except 6")



| SWITCH | 'A'  | 'B'   | 'C'  | 'D'   | 'E'   | 'F'   | 'G'  | 'H' |
|--------|------|-------|------|-------|-------|-------|------|-----|
| 1-5/8  | 7.38 | 12.13 | 1.50 | 11.50 | 10.75 | 9.50  | 3.75 | .41 |
| 3-1/8  | 7.38 | 12.75 | 1.74 | 16.25 | 15.00 | 10.69 | 5.50 | .56 |
| 4-1/16 | 7.38 | 12.88 | 1.72 | 17.56 | 16.50 | 12.69 | 6.50 | .56 |

Figure 1



## Wiring Diagram for Actuator

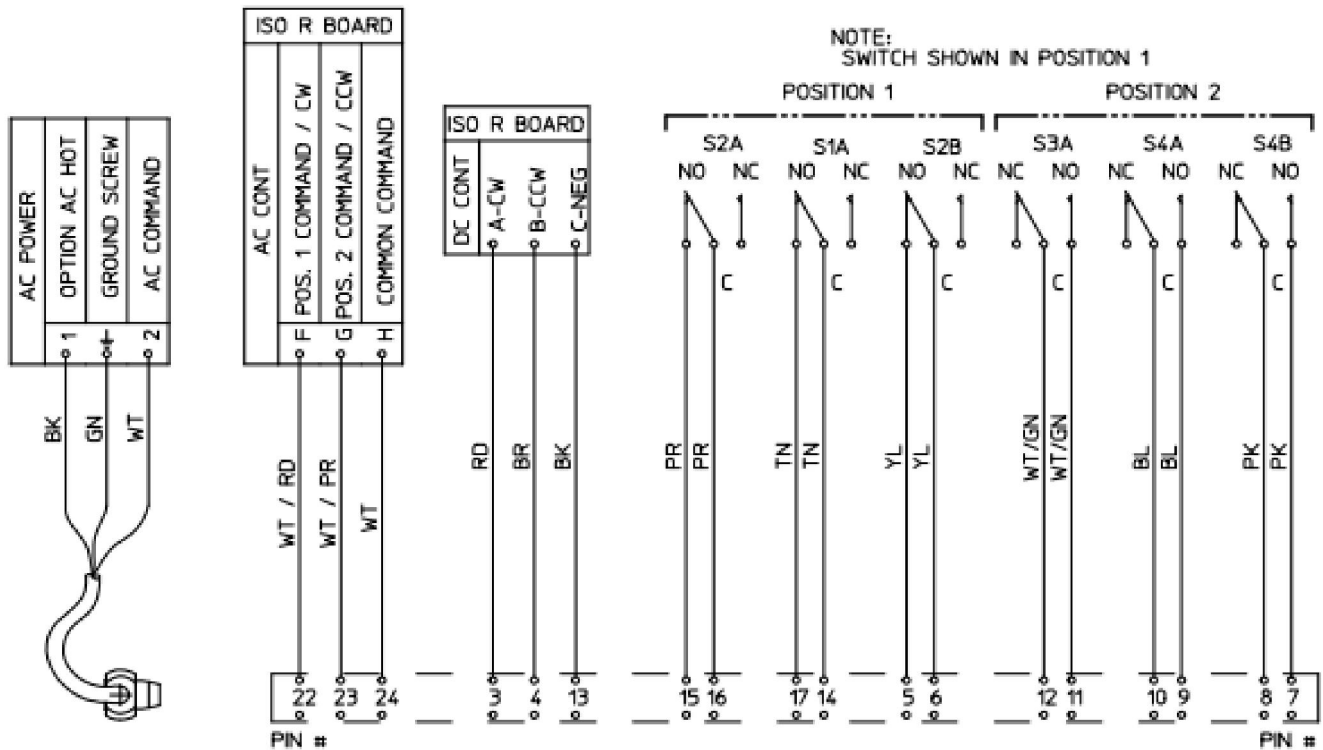


Figure 2

**Note:**

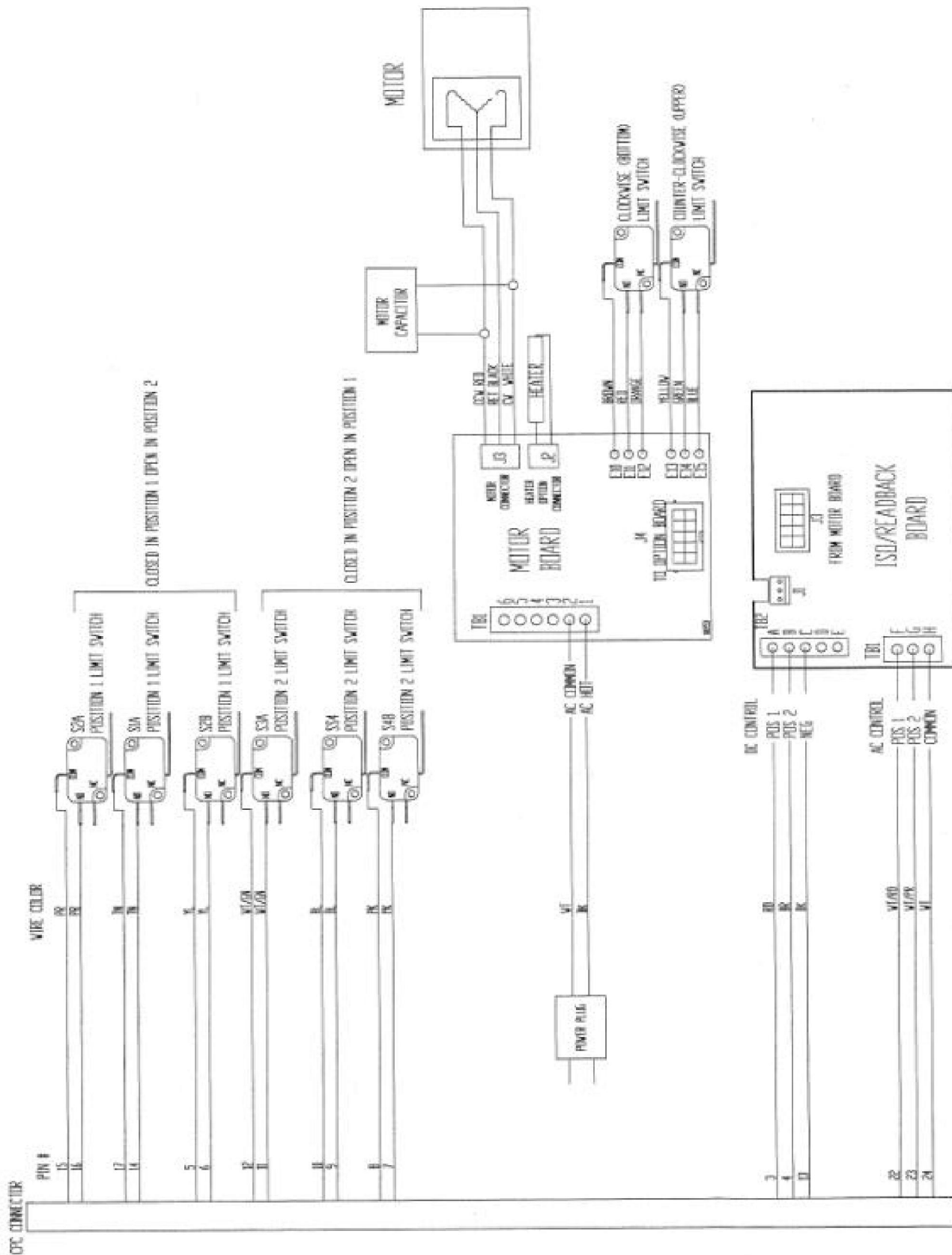
1. The actuator only requires a 1/2 second command pulse to latch the control in. A maintained command will not harm the unit.
2. Do not apply AC and DC commands at the same time.
3. For AC command between 110 VAC and 230 VAC, hook the common AC conductor to pin 24 and position 1 and 2 commands to pins 22 and 23.
4. For DC command between 12 and 24 VDC, hook the negative conductor to pin 13 and the position 1 and position 2 to pins 3 and 4.

The actuator has been tested to operate at 10% less than the rated input voltage and is dual rated for 50/60 Hz operation.

Internal Wiring Table for Switches

| Internal Wiring Table for Switches |                         |                        |                     |                         |                            |                            |             |             |             |
|------------------------------------|-------------------------|------------------------|---------------------|-------------------------|----------------------------|----------------------------|-------------|-------------|-------------|
| 50000 SWITCH                       | 50000 SWITCH            | DUAL SWITCH CONTROLLER | WAVEGUIDE SW        | UNIVERSAL CONTROL PANEL | 60000 SWITCH               | 60000 SWITCH               | 50000 PIN # | 60000 PIN # | 60000 COLOR |
|                                    | COMMENT                 | 66982                  | DC Com AC Mnt PIN # | 48 112-501              | COMMENT                    | COMMENT                    |             | 60000 PIN # | 60000 COLOR |
| R                                  | POS # 1 CONTACT S2A NO  | 15                     | J                   | 15                      | POS # 1 CONTACT S2A NO     | POS # 1 CONTACT S2A NO     |             | 16          | PR          |
| S                                  | POS # 1 CONTACT S2A COM | 16                     | S                   | 16                      | POS # 1 CONTACT S2A COM    | POS # 1 CONTACT S2A COM    |             | 15          | PR          |
| T                                  | POS # 1 CONTACT S1A NO  | 17                     | F                   | 17                      | POS # 1 CONTACT S1A NO     | POS # 1 CONTACT S1A NO     |             | 17          | TN          |
| P                                  | POS # 1 CONTACT S1A COM | 14                     | G                   | 14                      | POS # 1 CONTACT S1A COM    | POS # 1 CONTACT S1A COM    |             | 14          | TN          |
| E                                  | POS # 1 CONTACT S2B NO  | 5                      | Q                   | 5                       | POS # 1 CONTACT S2B NO     | POS # 1 CONTACT S2B NO     |             | 5           | YL          |
| F                                  | POS # 1 CONTACT S2B COM | 6                      | P                   | 6                       | POS # 1 CONTACT S2B COM    | POS # 1 CONTACT S2B COM    |             | 6           | YL          |
| C                                  | COMMAND FOR POS # 1     | 3                      | U                   | 3                       | DC COMMAND FOR POS #1 (+)  | DC COMMAND FOR POS #1 (+)  |             | 3           | RD          |
| A                                  | AC POWER                | 1                      | N/A                 | Used on 50, not on 60   | N/A                        | N/A                        |             | N/A         | N/A         |
| B                                  | AC POWER                | 2                      | N/A                 | Used on 50, not on 60   | N/A                        | N/A                        |             | N/A         | N/A         |
| N                                  | COMMAND COMMON          | 13                     | R                   | 13                      | DC COMMAND COMMON (-)      | DC COMMAND COMMON (-)      |             | 13          | BK          |
| D                                  | COMMAND FOR POS # 2     | 4                      | V                   | 4                       | DC COMMAND FOR POS # 2 (+) | DC COMMAND FOR POS # 2 (+) |             | 4           | BR          |
| M                                  | POS # 2 CONTACT S3A COM | 12                     | B                   | 12                      | POS # 2 CONTACT S3A COM    | POS # 2 CONTACT S3A COM    |             | 12          | WTGN        |
| L                                  | POS # 2 CONTACT S3A NO  | 11                     | A                   | 11                      | POS # 2 CONTACT S3A NO     | POS # 2 CONTACT S3A NO     |             | 11          | WTGN        |
| K                                  | POS # 2 CONTACT S4A COM | 10                     | L                   | 10                      | POS # 2 CONTACT S4A COM    | POS # 2 CONTACT S4A COM    |             | 10          | BL          |
| J                                  | POS # 2 CONTACT S4A NO  | 9                      | M                   | 9                       | POS # 2 CONTACT S4A NO     | POS # 2 CONTACT S4A NO     |             | 9           | BL          |
| H                                  | POS # 2 CONTACT S4B COM | 8                      | D                   | 8                       | POS # 2 CONTACT S4B COM    | POS # 2 CONTACT S4B COM    |             | 7           | PK          |
| G                                  | POS # 2 CONTACT S4B NO  | 7                      | E                   | 7                       | POS # 2 CONTACT S4B NO     | POS # 2 CONTACT S4B NO     |             | 8           | PK          |
|                                    |                         |                        |                     |                         |                            |                            |             |             |             |
|                                    |                         |                        |                     |                         | RESERVED FOR HEATER        | RESERVED FOR HEATER        |             | 1           |             |
|                                    |                         |                        |                     |                         | RESERVED FOR HEATER        | RESERVED FOR HEATER        |             | 2           |             |
|                                    |                         |                        |                     |                         | N/A                        | N/A                        |             | 18          | N/A         |
|                                    |                         |                        |                     |                         | N/A                        | N/A                        |             | 19          | N/A         |
|                                    |                         |                        |                     |                         | N/A                        | N/A                        |             | 20          | N/A         |
|                                    |                         |                        |                     |                         | N/A                        | N/A                        |             | 21          | N/A         |
|                                    |                         |                        |                     |                         | AC COMMAND POS # 1         | AC COMMAND POS # 1         |             | 22          | WTRD        |
|                                    |                         |                        |                     |                         | AC COMMAND POS # 2         | AC COMMAND POS # 2         |             | 23          | WTPR        |
|                                    |                         |                        |                     |                         | AC COMMAND COMMON          | AC COMMAND COMMON          |             | 24          | WT          |

# Wiring Schematic



Control Cable Wiring Table

| CONTROL CABLE WIRING TABLE |                        |  |           |              |              |              |              |             |
|----------------------------|------------------------|--|-----------|--------------|--------------|--------------|--------------|-------------|
| COMMENT                    | DUAL SWITCH CONTROLLER |  | WG SWITCH |              | 50000 SWITCH |              | 60000 SWITCH |             |
|                            | PIN #                  |  | PIN #     | WIRE COLOR   | PIN #        | WIRE COLOR   | PIN #        | WIRE COLOR  |
| POS # 1 CONTACT S2A NO     | 15                     |  | 9         | White/Red    | R            | White/Red    | 16           | White/Black |
| POS # 1 CONTACT S2A COM    | 16                     |  | 17        | White/Green  | S            | White/Green  | 15           | Red/Black   |
| POS # 1 CONTACT S1A NO     | 17                     |  | 6         | White/Yellow | T            | White/Yellow | 17           | White/Red   |
| POS # 1 CONTACT S1A COM    | 14                     |  | 7         | White/Black  | P            | White/Black  | 14           | Red/Yellow  |
| POS # 1 CONTACT S2B NO     | 5                      |  | 15        | Brown        | E            | Brown        | 5            | Orange      |
| POS # 1 CONTACT S2B COM    | 6                      |  | 14        | Yellow       | F            | Yellow       | 6            | Blue        |
| COMMAND FOR POS # 1        | 3                      |  | 19        | Orange       | C            | Orange       | 3            | White       |
| AC POWER*                  | 1                      |  | N/A       | N/A          | A            | Black        | N/A          | N/A         |
| AC POWER*                  | 2                      |  | N/A       | N/A          | B            | Red          | N/A          | N/A         |
| COMMAND COMMON             | 13                     |  | 16        | Red/Black    | N            | Red/Black    | 13           | Red/Green   |
| COMMAND FOR POS # 2        | 4                      |  | 20        | Blue         | D            | Blue         | 4            | Green       |
| POS # 2 CONTACT S3A COM    | 12                     |  | 2         | Red/Yellow   | M            | Red/Yellow   | 12           | Tan         |
| POS # 2 CONTACT S3A NO     | 11                     |  | 1         | Red/Green    | L            | Red/Green    | 11           | Pink        |
| POS # 2 CONTACT S4A COM    | 10                     |  | 11        | Tan          | K            | Tan          | 10           | Gray        |
| POS # 2 CONTACT S4A NO     | 9                      |  | 12        | Pink         | J            | Pink         | 9            | Violet      |
| POS # 2 CONTACT S4B COM    | 8                      |  | 4         | Gray         | H            | Gray         | 7            | Brown       |
| POS # 2 CONTACT S4B NO     | 7                      |  | 5         | Violet       | G            | Violet       | 8            | Yellow      |

\* AC Power is not available via pins 1 and 2 on DSC P/N 11000005508. Please see Dual Switch Controller IB-467, section 3 for more detail.