

## SERIES 60AR

### Rugged and Sealed Joystick

#### FEATURES

- Three-in-One Joystick, Optical Encoder and Pushbutton
- Shaft and panel sealed to IP67 against liquids and particulates
- Choices of knobs, cable length and termination
- Customized solutions available

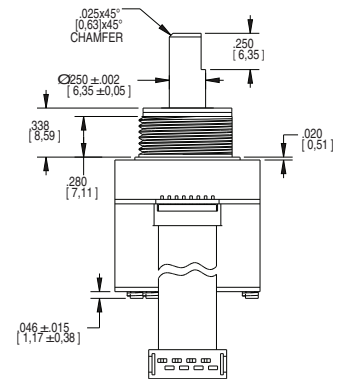
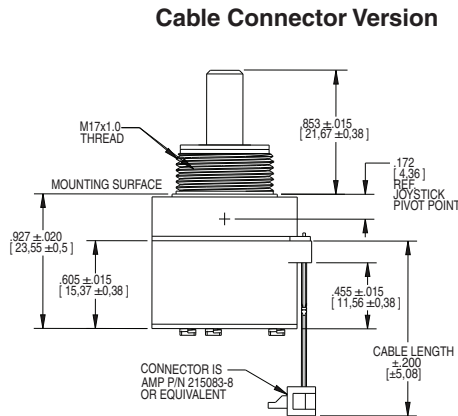
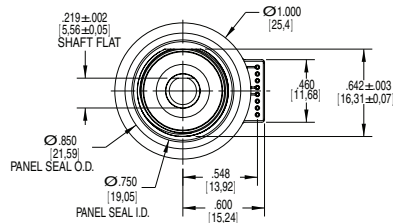
#### APPLICATIONS

- Aerospace
- Military vehicles and devices
- Mobile electronics for outdoor use



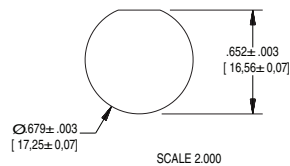
#### DIMENSIONS in inches (and millimeters)

Unless otherwise specified, standard tolerance are:  
 Linear ± .025  
 Diameter ± .010  
 Angle ± 2.0°

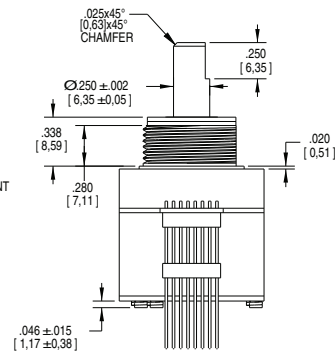
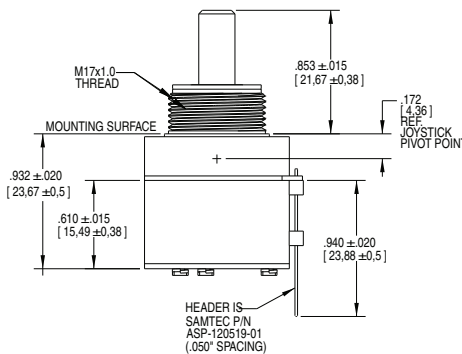


PANEL SEAL GASKET NOT SHOWN TO ILLUSTRATE MOUNTING SURFACE

#### Recommended Panel Cut Out

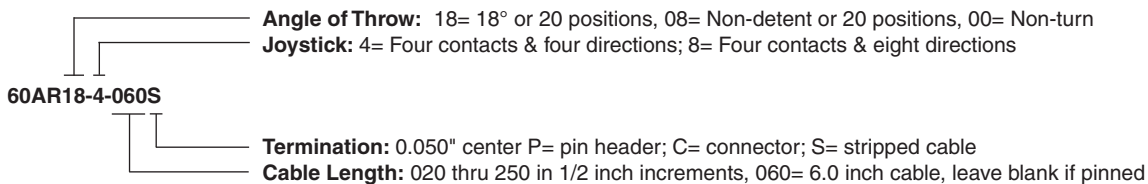


#### Pin Version



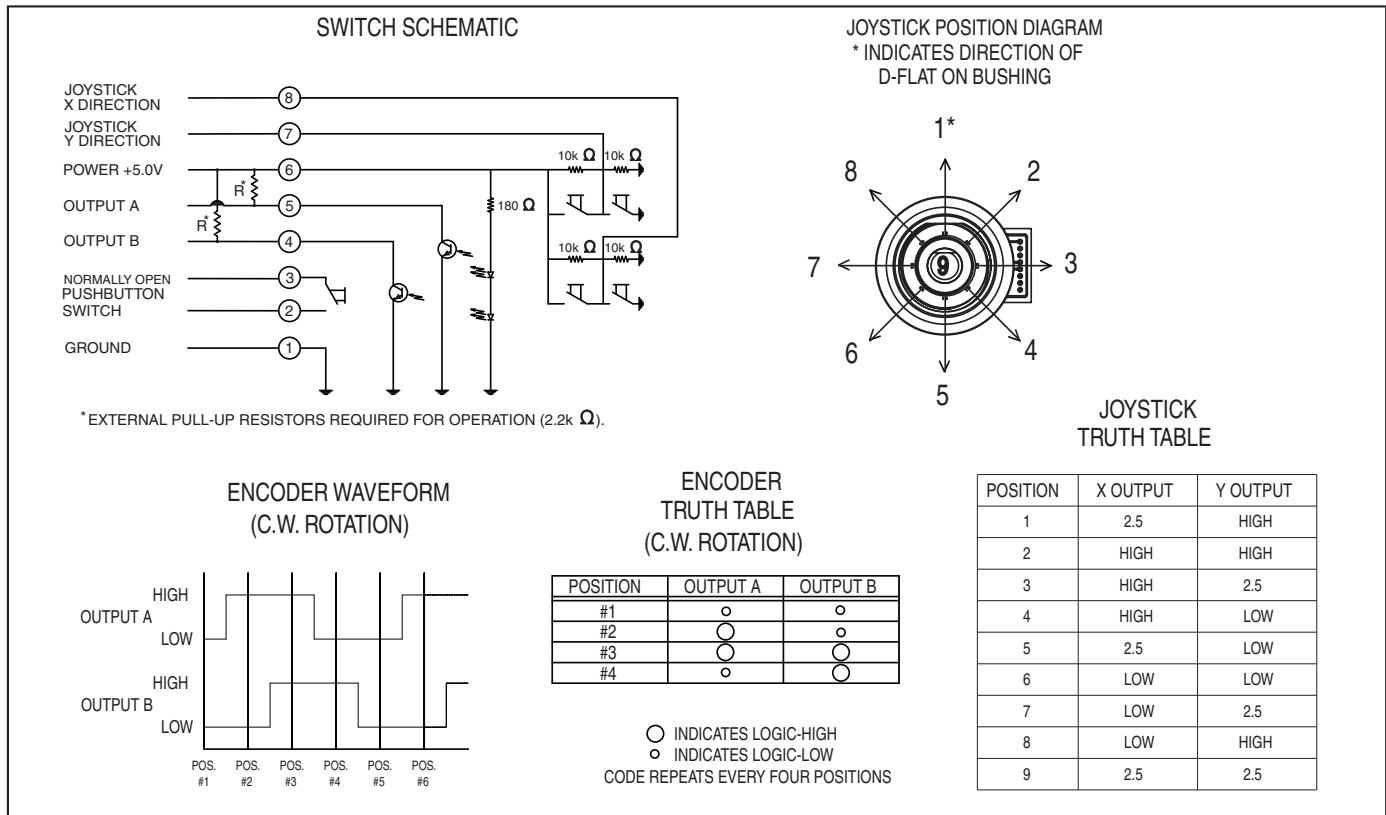
PANEL SEAL GASKET NOT SHOWN IN LOWER VIEWS TO ILLUSTRATE MOUNTING SURFACE

#### ORDERING INFORMATION



For prices and custom configurations, contact a local sales office, an authorized distributor, or Grayhill's sales department.

Optical and Mechanical Encoders

**JOYSTICK OPERATION + ENCODER WAVEFORM AND TRUTH TABLE** Standard Quadrature 2-Bit Code


## SPECIFICATIONS

### Environmental Specifications

**Operating Temperature Range:** -40°C to 85°C

**Storage Temperature Range:** -40°C to 100°C

**Humidity:** 96 hours at 90-95% humidity at 40°C

**Mechanical Vibration:** Harmonic motion with amplitude of 15g, within a varied 10 to 2000 Hz frequency for 12 hours

### Mechanical shock:

Test 1: 100g for 6Ms half sine wave with velocity change of 12.3 ft/s.

Test 2: 100g for 6 Ms sawtooth wave with velocity change of 9.7 ft/s.

**Shaft and panel Seal:** IP67, 1 meter submersion for 30 minutes

### Joystick Electrical & Mechanical Specifications

**Supply Current:** 5 Ma, maximum

**Output Code:** 2-bit

**Logic Output Characteristics:** Neutral Position: 2.5±0.5 Vdc, High-state Position: >4.5 Vdc, Low-state Position: <0.5 Vdc

**Mechanical Life (Joystick):** 500k actuations, minimum in each direction

**Actuation Force (Joystick):** 1500±300g (X&Y directions only)

**Angle of Throw:** 3.5°±2/1° (X&Y directions only, at electrical contact)

### Pushbutton Electrical & Mechanical Specifications

**Rating:** 10 Ma at 5 Vdc, resistive

**Contact Resistance:** Less than 10  $\Omega$

**Contact Bounce:** <4 Ms make, <10 Ms break

**Mechanical Life (Pushbutton):** 1 million actuations, minimum

**Actuation Force (Pushbutton):** 1600±400g

**Pushbutton Travel:** .015±.005 in

### Rotary Electrical & Mechanical Specifications

**Operating Voltage:** 5.00±25 Vdc

**Supply Current:** 20 Ma, maximum at 5 Vdc

**Minimum Sink Current:** 2.0 Ma for 5 Vdc

**Output:** Open collector phototransistor, external pull-up resistors are required

**Output Code:** 2-bit quadrature, channel "A" leads channel "B" by 90° electrically during clockwise rotation of the shaft

**Logic Output Characteristics:** Logic-high shall be no less than 3.5 Vdc, Logic-low shall be no greater than 1.0 Vdc

**Optical Rise Time:** 30  $\mu$ s, maximum

**Optical Fall Time:** 30  $\mu$ s, maximum

**Mechanical Life (Rotational):** 1 million cycles, minimum (1 cycle is a rotation through all positions and a full return)

**Average Rotational Torque:** 8.0±30% in-oz, initial

**Shaft Push-out Force:** 60 lbs, minimum before failure

**Shaft Side-load Force:** 25 lbs, minimum before failure

**Terminal Strength:** 15 lbs pull-out force, minimum for cable or header termination

**Solderability:** 95% free of pin holes or voids

**Maximum Rotational Speed:** 100 Rpm

**Mounting Torque:** 15 in-lbs maximum

*Specifications are subject to change*