SERIES 60C
Multi-Function Joystick



FEATURES
- Three-in-One Joystick, Optical Encoder and Pushbutton
- Compact Packaging
- Choices of Cable Length and Termination
- Customized Solutions Available

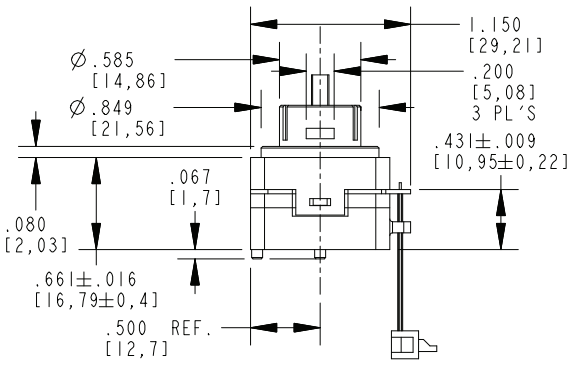
APPLICATIONS
- Avionics
- Medical Equipment
- Automotive Navigation, Information & Entertainment Equipment

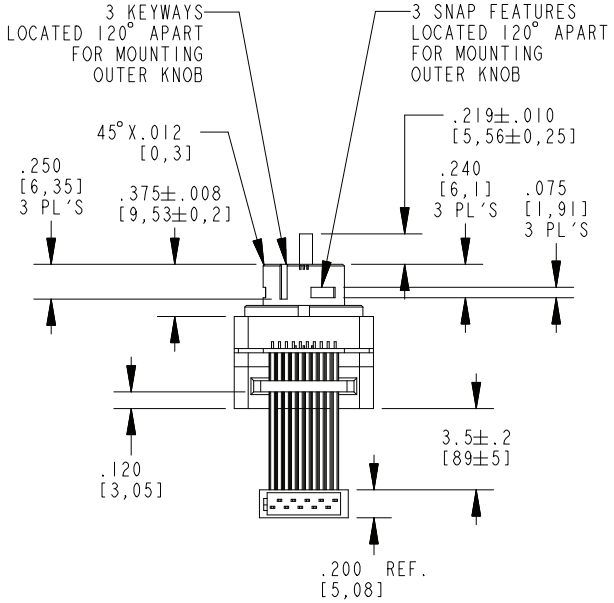
The 60C is a cost-effective replacement of a stationary mouse or trackball with improved control over cursor movement. An integral Schmitt Trigger is used to stabilize against noise and vibration.

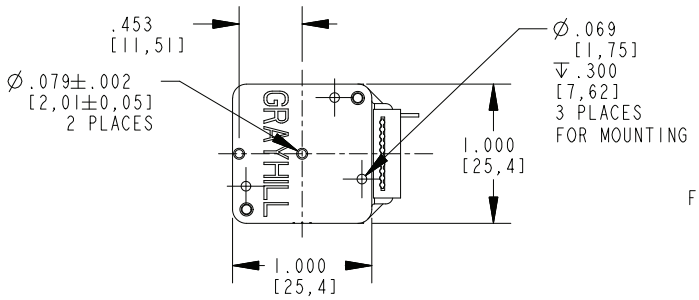
As a compact cursor control device, Grayhill's Series 60C is ideally suited for automotive and aviation dashboards, where use of separate joysticks, encoders and pushbuttons might be impractical. It provides all the functionality of a stationary mouse or trackball in a single unit with a 1"x1"x .661" deep housing. The joystick manipulates a cursor left, right, up and down; the rotary encoder facilitates sequential scrolling through menu options; and the pushbutton performs on-screen menu selects.

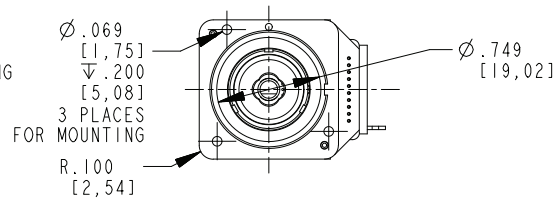
DIMENSIONS in inches (and millimeters)

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

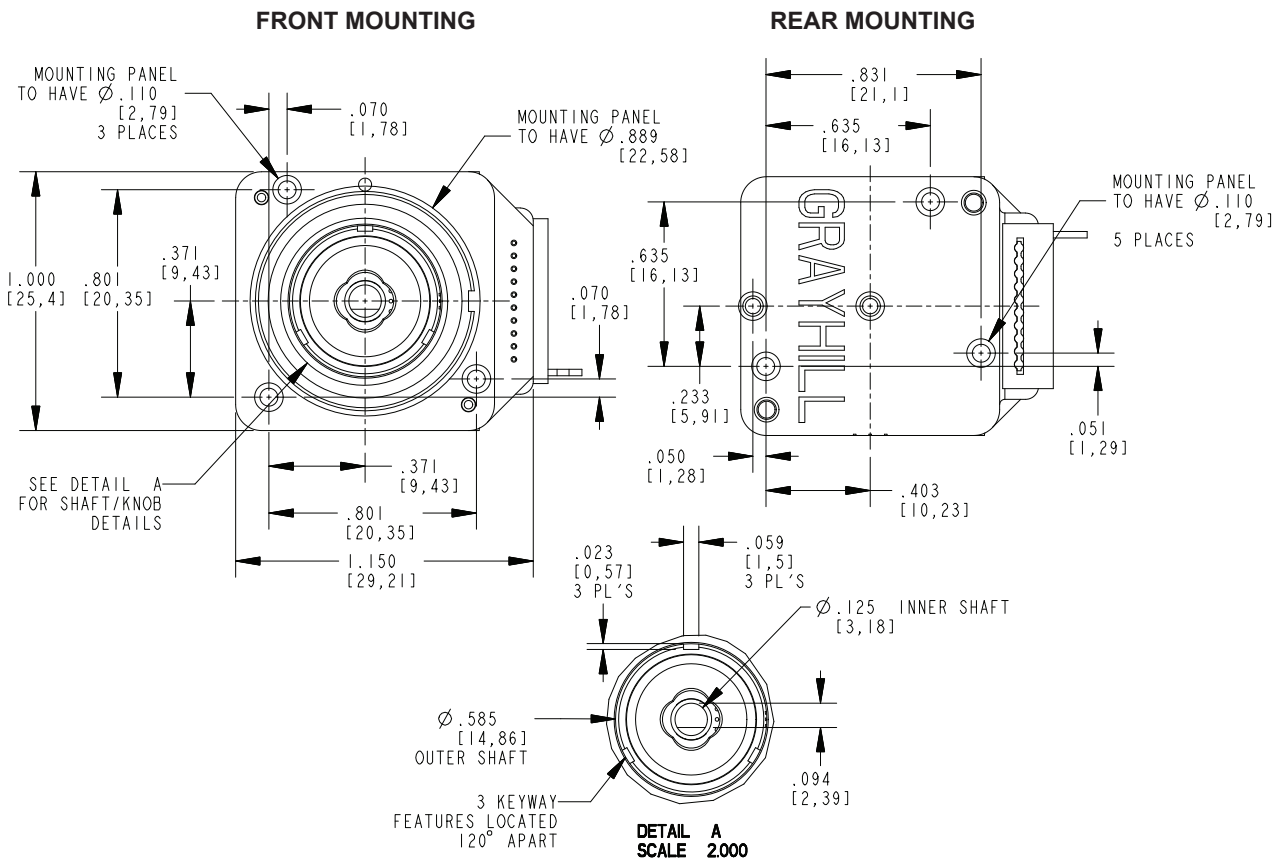








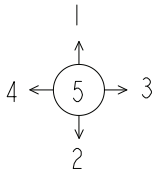
MOUNTING DETAILS in inches (and millimeters)

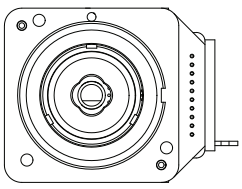


JOYSTICK OPERATION + ENCODER WAVEFORM AND TRUTH TABLE Standard Quadrature 2-Bit Code

JOYSTICK

POSITION	BIT 1	BIT 2	BIT 3	BIT 4
1	○	◯	◯	◯
2	◯	◯	○	◯
3	◯	○	◯	◯
4	◯	◯	◯	○
5	◯	◯	◯	◯

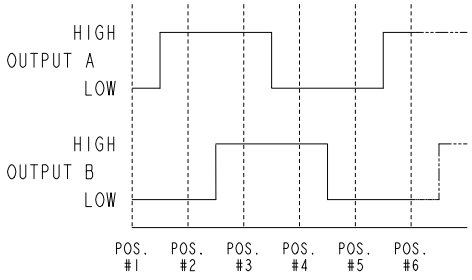




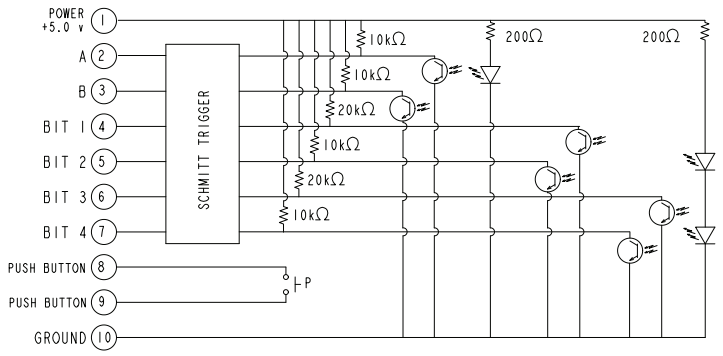
◯ INDICATES LOGIC HIGH
○ INDICATES LOGIC LOW

ENCODER

POSITION	OUTPUT A	OUTPUT B
#1	○	○
#2	◯	○
#3	◯	◯
#4	○	◯



SWITCH SCHEMATIC



SPECIFICATIONS

Rotary

Electrical and Mechanical Ratings

Operating Voltage: 5.00 ± 0.25 Vdc
Supply Current: 35mA TYP at 5 Vdc
Power Consumption: 175mW TYP at 5Vdc
Output: Direct output from inverting Schmitt trigger
Output Code: 2-Bit quadrature, channel A leads channel B by 90° in cw rotation
Logic Output Characteristics:
High: No less than 3.5 Vdc
Low: No greater than 1.0 Vdc
Mechanical Life: 500K rotational cycles (through all positions and a full return)
Rotational Torque: medium torque option 3.00±2.00 in-oz, torque shall be within 50% of initial value throughout life
Mounting Torque: 15 in-lbs. maximum
Shaft Push/Pull Out Force: 25 lbs minimum
Terminal Strength: 15 lbs terminal minimum

Joystick

Electrical and Mechanical Ratings

Operating Voltage: 5.00 ± 0.25 Vdc
Supply Current: 35mA at TYP at 5 Vdc
Power Consumption: 175mW TYP at 5Vdc
Output: Direct output from inverting Schmitt trigger
Logic Output Characteristics:
High: No less than 3.5 Vdc
Low: No greater than 1.0 Vdc
Mechanical Life: 500K cycles (through all positions and a full return)
Angle of Throw: 8° max. in all directions

Pushbutton

Electrical and Mechanical Ratings

Rating: 10 mA at 5 Vdc resistive
Contact Resistance: less than 10 ohms
Contact Bounce: < 4ms make, 10 ms break
Mechanical Life: 500K actuations minimum
Actuation Force: option 7 = 485 ± 115grams
Pushbutton Travel: 0.033 ± 0.015 inches to contact; 0.075 inches maximum

Environmental Ratings

Operating Temperature Range: -40°C to 85°C
Storage Temperature Range: -55°C to 100°C
Relative Humidity: 96 hours at 90-95% humidity at 40°C
Vibration: Harmonic motion with amplitude of 15g, within a varied 10 to 2000 Hz
Mechanical Shock:
Test 1: 100g for 6ms half-sine wave with a velocity change of 12.3 ft/s
Test 2: 100g for 6ms sawtooth wave with a velocity change of 9.7 ft/s
Thermocycle: 4 hours cycling between -40°C to 85°C

Materials and Finishes

Bushing: Thermoplastic
Shaft Outer: Thermoplastic
Upper Housing: Thermoplastic
Pushbutton Rocker: Thermoplastic
Pushbutton Actuator: Thermoplastic
Inner Shaft Slide: Thermoplastic
Slider Plate: Thermoplastic
Backplate: Thermplastic
Lightpipe, Joystick: Thermoplastic
Lightpipe, 16 pos: Thermoplastic
Centering Profile: Thermoplastic
Shaft Inner: Aluminum
Pins: Stainless steel
Barbed Rivet: Stainless steel
Detent Balls: Carbon steel 100 with nickel finish
Centering Balls: Carbon steel 100 with nickel finish
Detent Springs: Tinned music wire
Centering Springs: Tinned music wire
Cable ASM: .050 round conductor flat cable, PVC coated. Conductors are stranded, top-coated wire
Solder: 95.5% SN, 4% AG, 0.5% CU
Dome: Stainless steel
PCB 16 Pos: NEMA grade FR-4. Plating is gold or palladium over nickel
Infrared Emitter: Gallium aluminum arsenide
Phototransistor: Planar silicon
Resistor: Carbon film
Schmitt Trigger: RoHS Compliant TSSOP, 14 pin
Lubricating Grease: Nyogel 774L
Label: TT406 Thermal transfer cast film

OPTIONS

Contact Grayhill for custom terminations, rotational torque, number of positions, shaft configurations, and resolutions. Control knobs are also available.

ORDERING INFORMATION

60C22-M7-4-060S

Series
Angle of Throw: 22= 22.5° or 16 positions
Rotation Torque: M= Medium torque
Pushbutton: 7= 485 grams
Joystick: 4= Four directions

Termination: 0.050" center ribbon cable with; C= Connector; S= 0.1" stripped end
Cable Length: 025 thru 250 in 1/2 inch increments, 060= 6.0 inch cable

Available from your local Grayhill Distributor. For prices and discounts, contact a local sales office, an authorized distributor, or Grayhill.