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# JOYSTICK & TRACKBALL CONTROLS



C H P R O D U C T S

CH PRODUCTS OEM CATALOG



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C H P R O D U C T S

The Joystick and Trackball controls in this catalog are designed for both the original equipment manufacturer (OEM) and the value added reseller (VAR). They are available in many sizes and configurations with optional features to suit most design requirements.

The precision analog Joysticks are the finger operated type, normally used to control rate and provide a linear infinite resolution voltage signal output. They are manufactured with four special blends of plastic to reduce the friction on the bearing surfaces allowing them to maintain their precision while providing many times the life cycles of the competition.

All of our trackballs are manufactured with custom designed non-contacting optical encoders for high reliability and long life. In order to help reduce your design time and effort, they include all of the interface electronics and industry standard output protocols.

CH Products is the leading U.S. manufacturer of precision positioning controls for both industrial and commercial applications. Our industrial controls are used in areas such as Medical Instrumentation, Video Post-Production, Robotics, Automated Machinery, Test and Measurement, Wheelchairs, Radar, Military and many other applications requiring precise X-Y-Z positioning control. Our commercial controls are widely used with computer games, computer graphics, CAD/CAM/CAE, desktop publishing and other applications requiring a pointing device with comfort, speed and accuracy.

All products are manufactured at our 80,000 square-foot manufacturing facility in Vista, California including the design, tool and die, plastic injection molding, and assembly. This enables CH Products to deliver the highest quality products at competitive prices.



P R O D U C T S

C H P R O D U C T S

C H P R O D U C T S

# COMPACT JOYSTICK

The Compact Joystick is only available in the CJ, MJ, and FJ Joystick Housings pictured on page 7. This Joystick has two unique features: (1) the slide switch spring disconnect and (2) the rotary trims. The spring disconnect feature provides for either independent X and Y axis centering or absolute positioning selection. The rotary trims provide a total of 50° of external trim and are four times more accurate than the conventional slide trims. It is available in a two-axis (Model 100), two-axis with pushbutton (Model 200) three-axis (Model 300), and three-axis with pushbutton (Model 400). Various potentiometer options are also available.

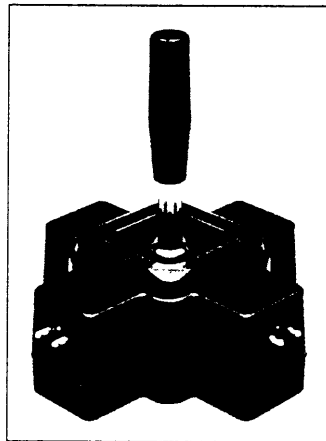
## Specifications

Joystick Travel.....	27° from design center in all directions
Mechanical Life Cycle .....	5 million (minimum)
Trim Movement (Optional) .....	±25° (total trim 50°) for each axis
Main Ball Pivot .....	precision ground stainless steel
Stick Shaft .....	3/16" brass plated
Potentiometers .....	set at center of resistance
Return to Center Repeatability...	±2%
Deflection Force .....	.2 lbs. @ 25° @ 1-1/2" up from pivot point

**NOTE:** For single axis applications, all of our Joysticks can be ordered with one axis locked (contact factory to special order).

# SWITCHSTICK (Part No. 100-175)

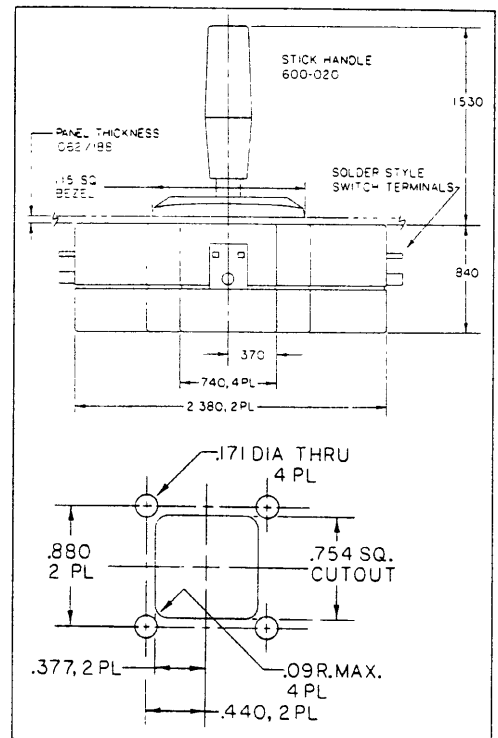
The SwitchStick is up to an 8-way joystick with 4 keyboard switches mounted at the end of the X and Y axis travel. It is self-centering, center off, with switch contact at 8° from center. It is ideal for keyboard and other application requiring simple 2, 4 or 8-way movement. It is supplied with a square mounting bezel for panel mounting.



## Specifications

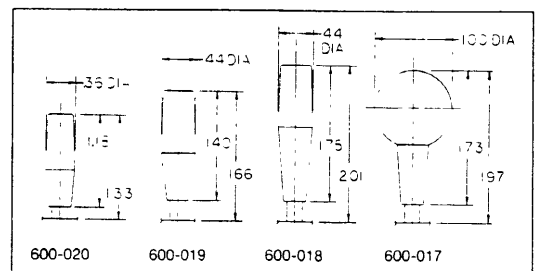
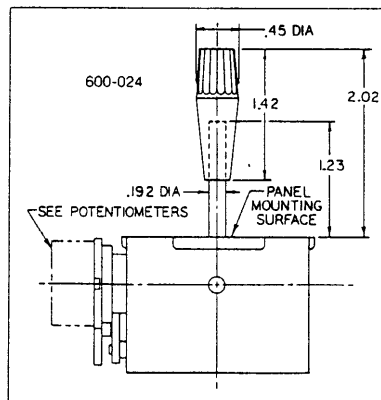
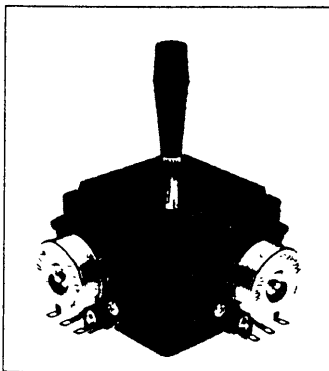
Joystick Travel:	
Total .....	30°
From Center.....	15°
Main Ball Pivot .....	precision ground stainless steel
Stick Shaft .....	3/16" brass plated
Switch Type .....	CTS (series 046)
Switch Rating .....	10 M at 12 VDC
Switch Life .....	5,000,000 cycles (minimum)
Panel Thickness (Mounting) ...	.050 to .1875
Deflection Force .....	.2 lbs @ 15° @ 1-1/2" up from pivot point

**NOTE:** Contact Factory to special order 2-way SwitchSticks



# MODEL 100 (Two-Axis Joystick Assemblies)

The Model 100 is a two-axis joystick with a choice of five black stick handles. The unit is provided with a selection of mounting bezels to accommodate either front- or rear-panel mounting. The rubber boot seal can also be used (optional).



### Notes:

- Overall stick height above is .200 less for miniature joysticks.
- Ball Tip handle (#600-017) available only with bezel options C, L or U.

**TO PLACE AN ORDER CALL:**

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# STANDARD JOYSTICK

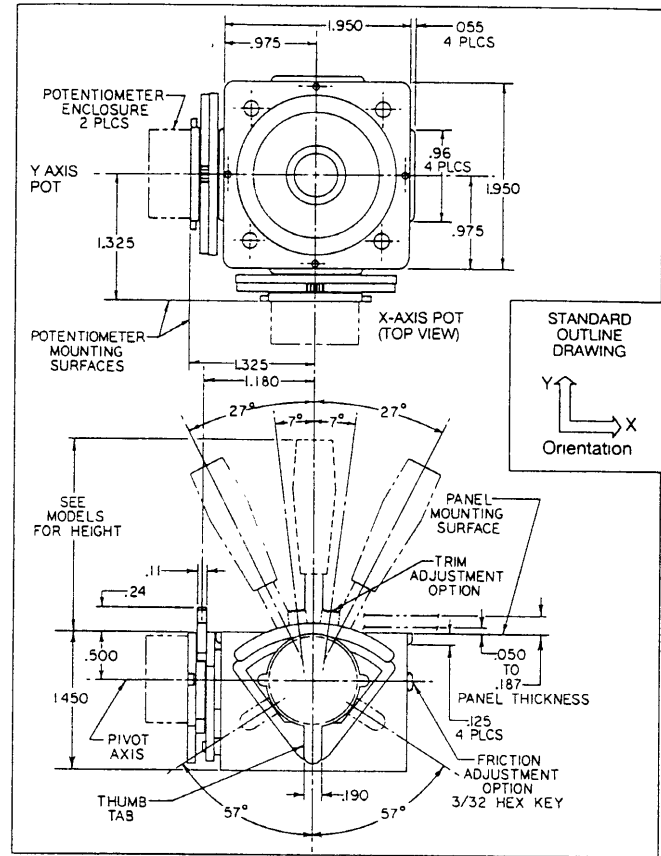
The Standard Joystick is our most popular and versatile unit. It is available in a two-axis (Model 100), two-axis with pushbutton (Model 200), three-axis (Model 300) and three-axis with pushbutton (Model 400) configuration. Optional features include: 6 different centering options, numerous mounting bezels for front or rear panel mounting, a rubber boot seal, various styles and sizes of stick handles, front panel accessible trim features as well as a wide range of potentiometer types and values. All of the above options enable you to design the optimal joystick configuration for your specific requirement.

## Specifications

Joystick Travel	27° from design center in all directions
Mechanical Life Cycle	5 million (minimum)
Trim Movement (Optional)	±7° (total trim 14°) for each axis
Main Ball Pivot	precision ground stainless steel
Stick Shaft	3/16" brass plated
Potentiometers	set at center of resistance
Potentiometer Calibration	thumb tab provides up to 114° of potentiometer calibration
Return to Center Repeatability	±1%
Mounting	front or rear panel (see bezels)
Panel Thickness (Mounting)	.050 to .1875
Deflection Force	.14 lbs. @ 27° @ 2-7/8" up from pivot point

### NOTES:

- All of the outline drawings and measurements in this catalog are made in inches.
- For vertical mounting applications, all of our Joysticks can be ordered with 50% stronger springs on the X and Y axis (contact factory to special order).



# MINIATURE JOYSTICK

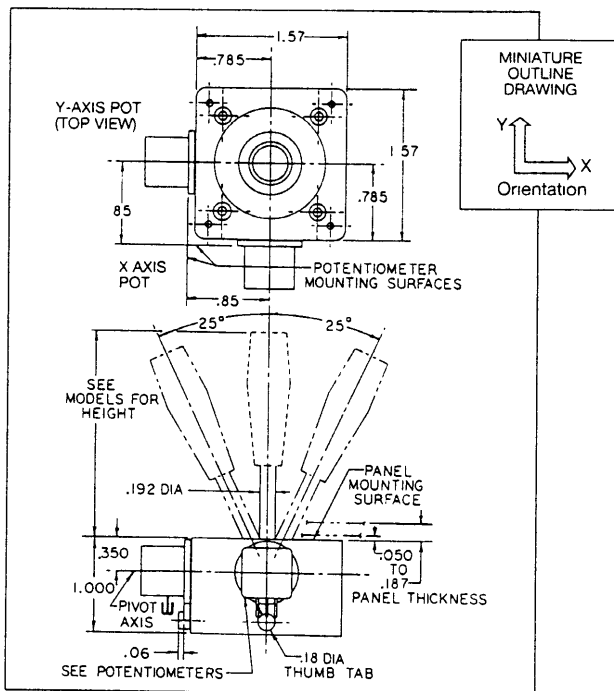
The Miniature Joystick is our smallest precision analog joystick. It has been designed for keyboard and other installations which have a limited amount of space available. This joystick incorporates the same stick handles as our standard unit and provides many of the same features. It is currently available in two-axis (Model 100), two-axis with pushbutton (Model 200), three-axis (Model 300) and three-axis with pushbutton (Model 400) configurations. Optional features include: spring centering or friction positive true positioning, four different mounting bezels including a rubber boot seal and 5K or 10K plastic conductive potentiometers.

## Specifications

Joystick Travel	25° from design center in all directions
Mechanical Life Cycle	5 million (minimum)
Main Ball Pivot	precision ground stainless steel
Stick Shaft	3/16" brass plated
Potentiometers	set at center of resistance
Potentiometer Calibration	thumb tab provides up to 180° of potentiometer calibration
Return to Center Repeatability	±1%
Mounting	front or rear panel (see bezels)
Panel Thickness (Mounting)	.050 to .1875
Deflection Force	.18 lbs @ 25° @ 1-1/2" up from pivot point

### NOTE: Temperature Ranges for all Joysticks

- Storage -40°C to +85°C
- Operating -20°C to +65°C



TO PLACE AN ORDER CALL:

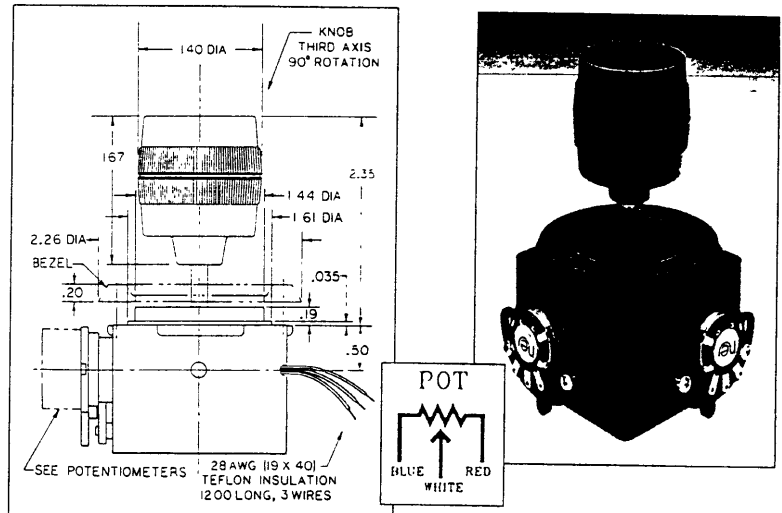
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## MODEL 300 (Continued)

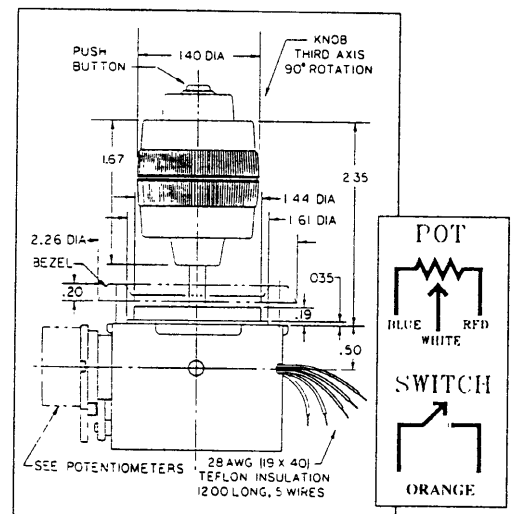
### (Three-Axis Joystick Assemblies)

The Model 300 Joystick with the Option 8 handle is a two-axis joystick with a black spring-return-to-center textured knob on the stick handle providing the third axis. A 5K ohm, 1 Watt potentiometer housed within the knob can be rotated a total of 90°, + 45°, from design center with .4 lbs. of in./lbs. of torque needed to initiate the rotation of the knob. Three wire leads are brought through the center of the stick shaft similar to the Model 200 assemblies. A two-piece mounting bezel is provided for ease of installation, but the rubber boot seal can also be used (optional). The Option 8 control knob is a double-scissor and extension-type spring action with positive stops.



## MODEL 400 (Three-Axis with Pushbutton Joystick Assemblies)

The Model 400 is similar to the Model 300 (Option 8 handle) with the addition of a pushbutton switch located on the end of the control knob (Option 9). The switch provides both tactile and audio feed-back. The switch is a normally open, single pole/single throw, momentary contact, 5,000,000 life cycle switch rated at 500 ma at 12VDC. Five wire leads are brought through the center of the stick shaft similar to the Model 200 and 300 assemblies. Provided with a two-piece mounting bezel, the rubber boot seal can also be used (optional). The standard handle and pushbutton color is black. A white pushbutton is available.



**PLEASE NOTE:** The following Construction, Bezel, Centering, Trim, Potentiometer and Housing options will vary depending on the Joystick type (Standard, Miniature or Compact Model 100, 200, 300 or 400). See Page 8 for details on availability of features, part number configuration and ordering information.

## CONSTRUCTION

All CH Joysticks are constructed with four different combinations of plastics, which is a necessity in order to reduce friction on bearing surfaces. However, 75% of the joystick itself is for structural and environmental reasons. This is why we offer you the choice of Nylon or Wellamid for these structural parts. The chart at the right will provide some of the key properties of both plastics:

Property	ASTM Test No.	(0)		(1)
		Nylon	Nylon	Wellamid
Tensile Strength <sup>1</sup>	D638	PSI	11,200	13,000
Flexural Modulus <sup>1</sup>	D790	PSI	175,000	850,000
Flexural Strength <sup>1</sup>	D790	PSI	175,000	24,000
Izod Impact Strength <sup>1</sup>	D256	ft.lb./in.	2.1	0.80
Hardness (Rockwell)	D785	—	R108	R120
Flammability	UL94 <sup>2</sup>	—	94V-2	94HB

**NOTES:** <sup>1</sup> Changes with Temperature and Relative Humidity, Data Based on 73°F and 50% RH <sup>2</sup> Underwriters Laboratory Test

**TO PLACE AN ORDER CALL:**

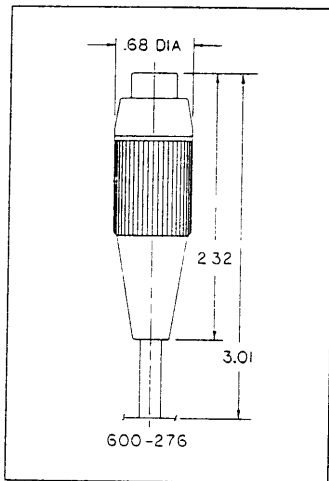
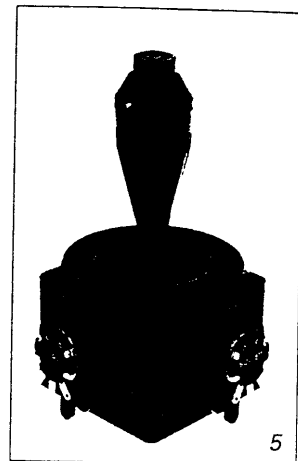
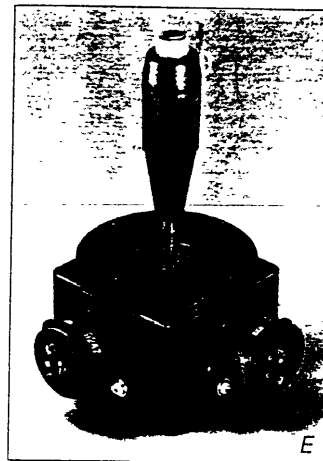
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## MODEL 200 (Two-Axis with Pushbutton Joystick Assemblies)

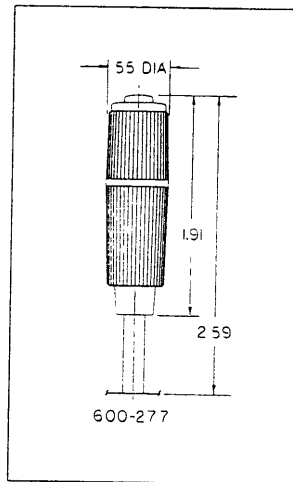
The Model 200 Joystick is a two-axis joystick with a pushbutton switch mounted in the stick handle. All switches in the Model 200 assemblies are normally open, single pole/single throw, momentary contact switches. The switch leads are brought through the center of the stick shaft and out the back of the housing below the mounting surface. These assemblies are provided with a two-piece textured front mounting bezel for ease of installation. The rubber boot seal can also be used (optional). The standard handle and pushbutton color is black. Other pushbutton colors are available (see handle descriptions this page).

**NOTE:** Option E handle adds additional cost to the joystick (see current price sheet).



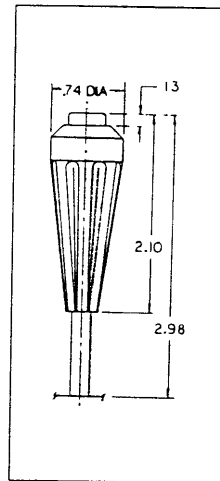
**OPTION E**

A tactile hermetically sealed switch that provides both ruggedness and a long life of 5,000,000 cycles. Contact rating of 1.0VA. Black or red button.



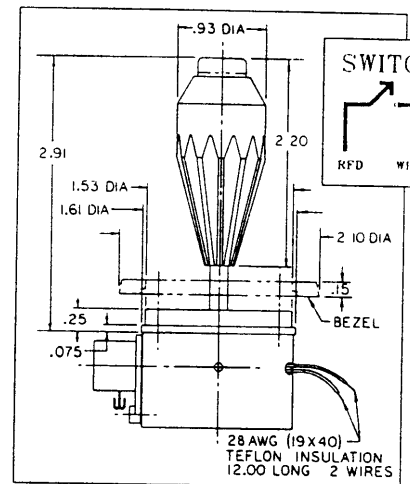
**OPTION G**

Snap-action contact mechanism assures short key stroke with positive feedback. Designed for consumer type applications. Contact rating of 50ma at 24VDC and a life of 1,000,000 cycles. Black or red button.



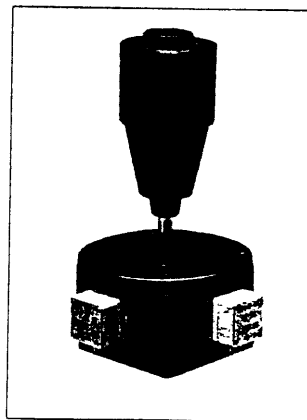
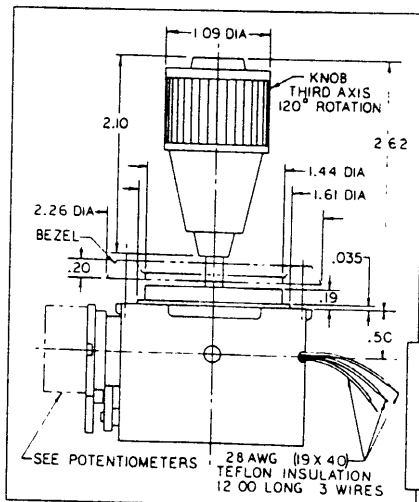
**OPTION 4**

A momentary switch rated at 1/4 amp at 115VAC. Operating force of 550 grams and a life of 250,000 cycles. Black or red button.



**OPTION 5**

A keyboard style switch rated at 10ma at 12VDC. Operating force of 275 grams with a life of 5,000,000 cycles. Black or gray button.



## MODEL 300 (Three-Axis Joystick Assemblies)

The Model 300 Joystick with the Option 7 handle is a two-axis joystick with a black spring-return-to-center textured knob on the stick handle providing the third axis. A 5K ohm, 1/2 Watt potentiometer housed within the knob can be rotated a total of 120°, +60°, from design center with .4 lbs. of torque needed to initiate the rotation of the knob. Three wire leads are brought through the center of the stick shaft similar to the Model 200 assemblies. It is also provided with a two-piece mounting bezel for ease of installation, but the rubber boot seal can also be used (optional). The Option 7 control knob is a single-torsion spring action with positive stops.

# CENTERING OPTIONS

## O - Spring Centering

With spring centering the joystick returns to design center or neutral when the stick handle is released.

**NOTE:** There are several options for absolute positioning for the Standard and Miniature Joystick (see below). The Compact Joystick (used in CJ, MJ and FJ housings) comes with X and Y axis spring release tabs which allow for either independent spring centering or absolute positioning modes of operation.

## 1 - Friction Clutch

The friction clutch absolute positioning allows the operator to position the stick anywhere in the motion pattern. Rotating a socket set screw adjusts the friction along the desired axis (available on Standard Joystick only).

## 3,4,5 - Center Detent

This feature is available for either axis or both. When the stick handle is moved across its absolute center position, a tactile feedback occurs. Additional force applied will remove the joystick from its center detent position (available on Standard Joystick only).

## 6 - Torque Set

This feature is similar to the friction clutch except that the friction is applied to the main ball pivot. The same friction is applied throughout the motion pattern (available on either Standard or Miniature Joystick).

**NOTE:** Both the Center Detent and Torque Set centering options add additional cost to the joystick (see current price sheet).

# TRIM OPTIONS

## O - With Trim

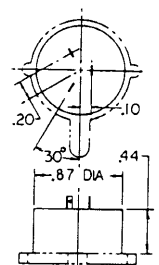
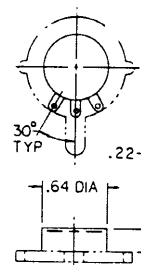
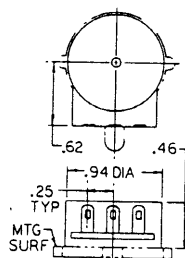
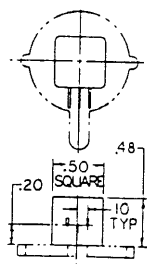
This option enables a shift of mechanical center  $\pm 7^\circ$  and is front panel accessible.

## 1 - Without Trim

No front panel accessible trims.

# POTENTIOMETER OPTIONS & SPECIFICATIONS

Potentiometer	Clarostat 388	CTS HP Series	COPAL CRV-16	NEI MK III
Electrical:				
Element	Conductive Plastic	Conductive Carbon	Conductive Plastic	Conductive Plastic
Resistance (ohms)	5K & 10K	100K & 130K	5K	5K & 10K
Tolerance	$\pm 10\%$	$\pm 9\%, \pm 5\%$	$\pm 20\%$	$\pm 20\%$
Power Rating	.5W	.25W	1W	.25W
Linearity	$\pm 5\%$	$\pm 5\%$	$\pm 1\%$	$\pm 1\%$
Temperature Range ( $^\circ\text{C}$ )	-55 to +120	0 to +85	-10 to +65	-65 to +125
CRV	1.5%	1%	2%	1%
Electrical Travel	265 $^\circ$	50 $^\circ$	260 $^\circ$	270 $^\circ$
Mechanical:				
Rotation	295 $^\circ$	300 $^\circ$	300 $^\circ$	300 $^\circ$
Terminals	J Hooks	Solder Lug	Solder Lug	Solder Lug
Rotational Life (Cycles)	50,000	2,000,000	1,000,000	5,000,000



### NOTES:

- The amount utilized of a potentiometer's electrical travel is dependent upon the joystick's mechanical travel. The travel for both the Standard and Compact Joystick is 54 $^\circ$ . The travel for the Miniature Joystick is 50 $^\circ$ .
- The following equation can be used to calculate the available resistance range of a potentiometer/joystick combination:

$$\frac{\text{Total Potentiometer Resistance (ohms)}}{\text{Potentiometer Electrical Travel (degrees)}} \times \text{Joystick Mechanical Travel (degrees)} = \text{Available Resistance Range (ohms)}$$

### TO PLACE AN ORDER CALL:

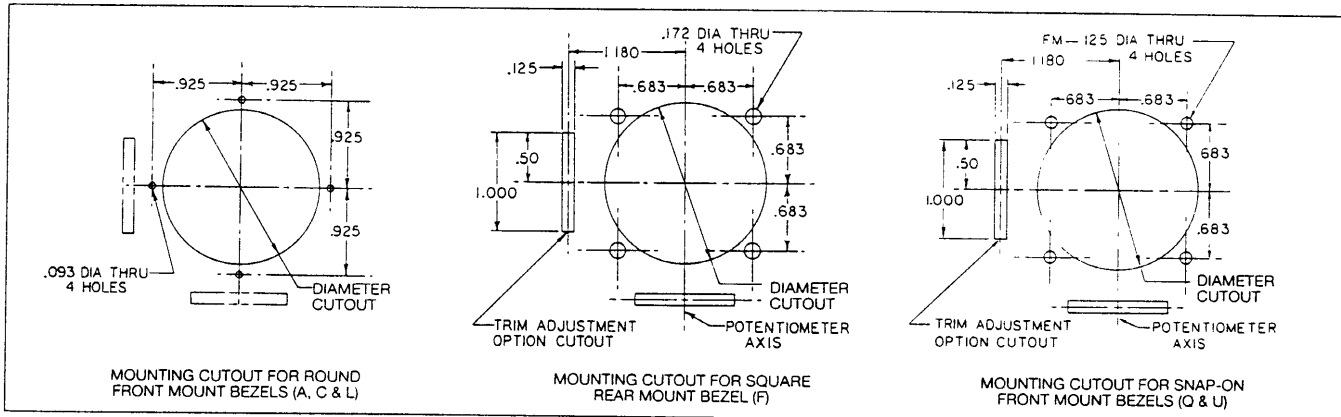
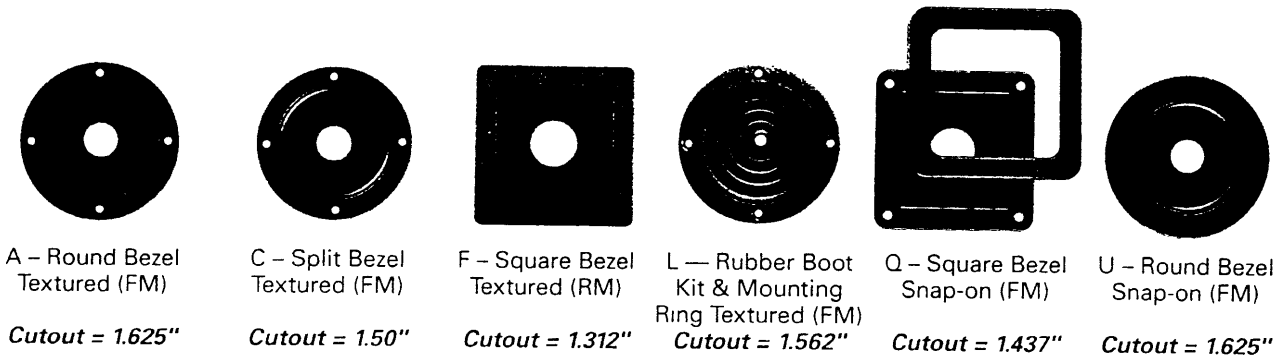
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## MOUNTING BEZELS

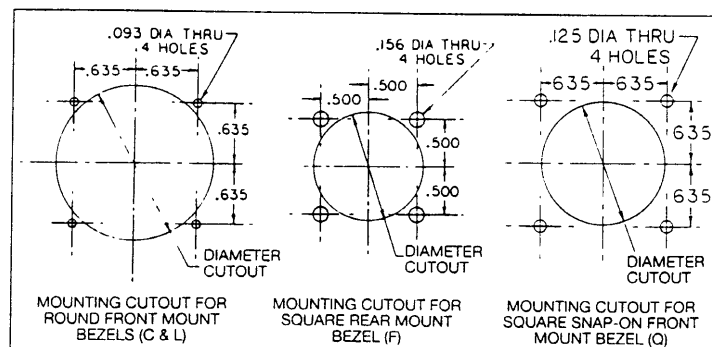
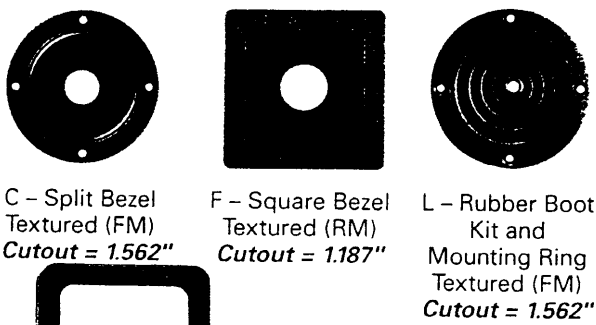
There are a variety of front mount (FM) or rear mount (RM) panel mounting bezels available with a textured finish. A square snap-on bezel (Option Q) and round snap-on bezel (Option U) are also available which mount from the front and hide the screw heads with a snap on cover. Mounting screws are included with each unit.

**NOTE:** The Model 100 assemblies can use any of the bezels shown (does not apply to Ball Tip handle #600-017). Model 200, 300 and 400 assemblies can be provided with split bezel (Option C), rubber boot kit (Option L) or round snap-on bezel (Option U-available on Standard Joystick only).

### Standard Joystick Mounting Bezels and Mounting Cutout Dimensions

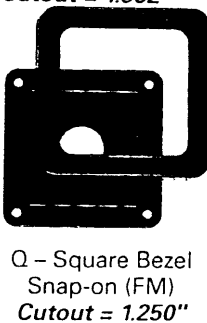


### Miniature Joystick Bezels and Mounting Cutout Dimensions



**NOTES:**

- All front mount bezels are sent with 2 sets (4 screws per set) of mounting screws (1/2" and 5/16" with 2/56 threading, black anodized, Phillips flathead). 3/8" screws are available as an option (contact factory to special order).
- All rear mount bezels are sent with two sets of mounting screws (1/2" and 1/4" with 2/56 threading, Phillips flathead). 5/16" screws are available as an option (contact factory to special order).
- Mounting screws for snap-on and rear mount bezels are not anodized.
- Joysticks ordered with housings are available only with the computer bezel (Option O see page 8 under mounting bezels) which is similar to the square bezel (Option F).
- Both the rubber boot kit (Option L) and the snap-on bezels (Options Q and U) add additional cost to the joystick (see current price sheet).



TO PLACE AN ORDER CALL:

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# PART NUMBER CONFIGURATION & FEATURE AVAILABILITY GUIDE

PART NUMBER	DESCRIPTION	KEY DESIGNATION	FEATURE	FEATURE AVAILABILITY																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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	JOYSTICK TYPE	S	Standard	S	S	S	S													M	Miniature							M	M	M	M							C	Compact											C	C	C	C		MODEL NUMBER	1	100-2 Axis	100						100				100						2	200-2 Axis with Pushbutton		200						200				200					3	300-3 Axis			300						300				300				4	400-3 Axis with Pushbutton				400						400				400		CONSTRUCTION	0	Nylon Plastic	X	X	X	X							X	X	X	X			1	Wellamid	X	X	X	X	X	X	X	X	X							MOUNTING BEZEL	A	Round Cup - Textured (FM)	X																C	Split Bezel - Textured (FM)	X	X	X	X	X	X	X	X	X								F	Square Bezel - Textured (RM)	X					X											0	Computer Bezel	X	X	X	X													1	Rubber Boot Kit (FM)	X	X	X	X		X	X	X	X		X	X	X	X			0	Square Bezel Snap-On (FM)	X					X											U	Round Bezel Snap-On (FM)	X	X	X	X	X												X	Without Bezel	X	X	X	X	X	X	X	X	X							CENTERING	0	Spring Centering	X	X	X	X	X	X	X	X	X	X	X	X	X	X			1	Friction Clutch	X	X	X	X													3*	Center Detent - X Axis	X	X	X	X													4*	Center Detent - Y Axis	X	X	X	X													5*	Center Detent - Both Axes	X	X	X	X													6*	Torque Set (Friction)	X	X	X	X	X	X	X	X	X							STICK HANDLE	3	Concave Tip - Long (600-024)	X					X					X						4	Pushbutton - Option 4		X					X					X					5	Pushbutton - Option 5		X					X					X					6	Straight Tip - Short (600-020)	X					X					X						7	3 RD Axis - A Model				X					X				X				8	3 RD Axis - B Model				X					X				X				9	3 RD Axis with Pushbutton					X					X				X			A	Straight Tip - Mid (600-019)	X					X					X						B	Straight Tip - Long (600-018)	X					X					X						C*	Ball Tip (600-017)	X					X					X						E*	Pushbutton - Option E		X					X					X					G	Pushbutton - Option G		X					X					X					X	Without Handle	X					X					X					TRIM	0	With Trim	X	X	X	X							X	X	X	X			1	Without Trim	X	X	X	X	X	X	X	X	X	X	X	X	X	X			9	Unassembled	X	X	X	X	X	X	X	X	X							POTENTIOMETER	B	ClaroStat 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			C	ClaroStat 10K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			J	CTS (HP100) 100K	X	X	X	X							X	X	X	X			L	CTS (HP 130) 130K	X	X	X	X							X	X	X	X			P	COPAL (CRV -16) 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			T	NEI MKIII 5K	X	X	X	X							X	X	X	X			U	NEI MKIII 10K	X	X	X	X							X	X	X	X			W	Without Pot	X	X	X	X	X	X	X	X	X								Z	Special Pot	X	X	X	X										
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	MODEL NUMBER	1	100-2 Axis	100						100				100						2	200-2 Axis with Pushbutton		200						200				200					3	300-3 Axis			300						300				300				4	400-3 Axis with Pushbutton				400						400				400		CONSTRUCTION	0	Nylon Plastic	X	X	X	X							X	X	X	X			1	Wellamid	X	X	X	X	X	X	X	X	X							MOUNTING BEZEL	A	Round Cup - Textured (FM)	X																C	Split Bezel - Textured (FM)	X	X	X	X	X	X	X	X	X								F	Square Bezel - Textured (RM)	X					X											0	Computer Bezel	X	X	X	X													1	Rubber Boot Kit (FM)	X	X	X	X		X	X	X	X		X	X	X	X			0	Square Bezel Snap-On (FM)	X					X											U	Round Bezel Snap-On (FM)	X	X	X	X	X												X	Without Bezel	X	X	X	X	X	X	X	X	X							CENTERING	0	Spring Centering	X	X	X	X	X	X	X	X	X	X	X	X	X	X			1	Friction Clutch	X	X	X	X													3*	Center Detent - X Axis	X	X	X	X													4*	Center Detent - Y Axis	X	X	X	X													5*	Center Detent - Both Axes	X	X	X	X													6*	Torque Set (Friction)	X	X	X	X	X	X	X	X	X							STICK HANDLE	3	Concave Tip - Long (600-024)	X					X					X						4	Pushbutton - Option 4		X					X					X					5	Pushbutton - Option 5		X					X					X					6	Straight Tip - Short (600-020)	X					X					X						7	3 RD Axis - A Model				X					X				X				8	3 RD Axis - B Model				X					X				X				9	3 RD Axis with Pushbutton					X					X				X			A	Straight Tip - Mid (600-019)	X					X					X						B	Straight Tip - Long (600-018)	X					X					X						C*	Ball Tip (600-017)	X					X					X						E*	Pushbutton - Option E		X					X					X					G	Pushbutton - Option G		X					X					X					X	Without Handle	X					X					X					TRIM	0	With Trim	X	X	X	X							X	X	X	X			1	Without Trim	X	X	X	X	X	X	X	X	X	X	X	X	X	X			9	Unassembled	X	X	X	X	X	X	X	X	X							POTENTIOMETER	B	ClaroStat 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			C	ClaroStat 10K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			J	CTS (HP100) 100K	X	X	X	X							X	X	X	X			L	CTS (HP 130) 130K	X	X	X	X							X	X	X	X			P	COPAL (CRV -16) 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			T	NEI MKIII 5K	X	X	X	X							X	X	X	X			U	NEI MKIII 10K	X	X	X	X							X	X	X	X			W	Without Pot	X	X	X	X	X	X	X	X	X								Z	Special Pot	X	X	X	X																																																																
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		3	300-3 Axis			300						300				300				4	400-3 Axis with Pushbutton				400						400				400		CONSTRUCTION	0	Nylon Plastic	X	X	X	X							X	X	X	X			1	Wellamid	X	X	X	X	X	X	X	X	X							MOUNTING BEZEL	A	Round Cup - Textured (FM)	X																C	Split Bezel - Textured (FM)	X	X	X	X	X	X	X	X	X								F	Square Bezel - Textured (RM)	X					X											0	Computer Bezel	X	X	X	X													1	Rubber Boot Kit (FM)	X	X	X	X		X	X	X	X		X	X	X	X			0	Square Bezel Snap-On (FM)	X					X											U	Round Bezel Snap-On (FM)	X	X	X	X	X												X	Without Bezel	X	X	X	X	X	X	X	X	X							CENTERING	0	Spring Centering	X	X	X	X	X	X	X	X	X	X	X	X	X	X			1	Friction Clutch	X	X	X	X													3*	Center Detent - X Axis	X	X	X	X													4*	Center Detent - Y Axis	X	X	X	X													5*	Center Detent - Both Axes	X	X	X	X													6*	Torque Set (Friction)	X	X	X	X	X	X	X	X	X							STICK HANDLE	3	Concave Tip - Long (600-024)	X					X					X						4	Pushbutton - Option 4		X					X					X					5	Pushbutton - Option 5		X					X					X					6	Straight Tip - Short (600-020)	X					X					X						7	3 RD Axis - A Model				X					X				X				8	3 RD Axis - B Model				X					X				X				9	3 RD Axis with Pushbutton					X					X				X			A	Straight Tip - Mid (600-019)	X					X					X						B	Straight Tip - Long (600-018)	X					X					X						C*	Ball Tip (600-017)	X					X					X						E*	Pushbutton - Option E		X					X					X					G	Pushbutton - Option G		X					X					X					X	Without Handle	X					X					X					TRIM	0	With Trim	X	X	X	X							X	X	X	X			1	Without Trim	X	X	X	X	X	X	X	X	X	X	X	X	X	X			9	Unassembled	X	X	X	X	X	X	X	X	X							POTENTIOMETER	B	ClaroStat 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			C	ClaroStat 10K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			J	CTS (HP100) 100K	X	X	X	X							X	X	X	X			L	CTS (HP 130) 130K	X	X	X	X							X	X	X	X			P	COPAL (CRV -16) 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			T	NEI MKIII 5K	X	X	X	X							X	X	X	X			U	NEI MKIII 10K	X	X	X	X							X	X	X	X			W	Without Pot	X	X	X	X	X	X	X	X	X								Z	Special Pot	X	X	X	X																																																																																																				
		4	400-3 Axis with Pushbutton				400						400				400		CONSTRUCTION	0	Nylon Plastic	X	X	X	X							X	X	X	X			1	Wellamid	X	X	X	X	X	X	X	X	X							MOUNTING BEZEL	A	Round Cup - Textured (FM)	X																C	Split Bezel - Textured (FM)	X	X	X	X	X	X	X	X	X								F	Square Bezel - Textured (RM)	X					X											0	Computer Bezel	X	X	X	X													1	Rubber Boot Kit (FM)	X	X	X	X		X	X	X	X		X	X	X	X			0	Square Bezel Snap-On (FM)	X					X											U	Round Bezel Snap-On (FM)	X	X	X	X	X												X	Without Bezel	X	X	X	X	X	X	X	X	X							CENTERING	0	Spring Centering	X	X	X	X	X	X	X	X	X	X	X	X	X	X			1	Friction Clutch	X	X	X	X													3*	Center Detent - X Axis	X	X	X	X													4*	Center Detent - Y Axis	X	X	X	X													5*	Center Detent - Both Axes	X	X	X	X													6*	Torque Set (Friction)	X	X	X	X	X	X	X	X	X							STICK HANDLE	3	Concave Tip - Long (600-024)	X					X					X						4	Pushbutton - Option 4		X					X					X					5	Pushbutton - Option 5		X					X					X					6	Straight Tip - Short (600-020)	X					X					X						7	3 RD Axis - A Model				X					X				X				8	3 RD Axis - B Model				X					X				X				9	3 RD Axis with Pushbutton					X					X				X			A	Straight Tip - Mid (600-019)	X					X					X						B	Straight Tip - Long (600-018)	X					X					X						C*	Ball Tip (600-017)	X					X					X						E*	Pushbutton - Option E		X					X					X					G	Pushbutton - Option G		X					X					X					X	Without Handle	X					X					X					TRIM	0	With Trim	X	X	X	X							X	X	X	X			1	Without Trim	X	X	X	X	X	X	X	X	X	X	X	X	X	X			9	Unassembled	X	X	X	X	X	X	X	X	X							POTENTIOMETER	B	ClaroStat 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			C	ClaroStat 10K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			J	CTS (HP100) 100K	X	X	X	X							X	X	X	X			L	CTS (HP 130) 130K	X	X	X	X							X	X	X	X			P	COPAL (CRV -16) 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			T	NEI MKIII 5K	X	X	X	X							X	X	X	X			U	NEI MKIII 10K	X	X	X	X							X	X	X	X			W	Without Pot	X	X	X	X	X	X	X	X	X								Z	Special Pot	X	X	X	X																																																																																																																						
	CONSTRUCTION	0	Nylon Plastic	X	X	X	X							X	X	X	X			1	Wellamid	X	X	X	X	X	X	X	X	X							MOUNTING BEZEL	A	Round Cup - Textured (FM)	X																C	Split Bezel - Textured (FM)	X	X	X	X	X	X	X	X	X								F	Square Bezel - Textured (RM)	X					X											0	Computer Bezel	X	X	X	X													1	Rubber Boot Kit (FM)	X	X	X	X		X	X	X	X		X	X	X	X			0	Square Bezel Snap-On (FM)	X					X											U	Round Bezel Snap-On (FM)	X	X	X	X	X												X	Without Bezel	X	X	X	X	X	X	X	X	X							CENTERING	0	Spring Centering	X	X	X	X	X	X	X	X	X	X	X	X	X	X			1	Friction Clutch	X	X	X	X													3*	Center Detent - X Axis	X	X	X	X													4*	Center Detent - Y Axis	X	X	X	X													5*	Center Detent - Both Axes	X	X	X	X													6*	Torque Set (Friction)	X	X	X	X	X	X	X	X	X							STICK HANDLE	3	Concave Tip - Long (600-024)	X					X					X						4	Pushbutton - Option 4		X					X					X					5	Pushbutton - Option 5		X					X					X					6	Straight Tip - Short (600-020)	X					X					X						7	3 RD Axis - A Model				X					X				X				8	3 RD Axis - B Model				X					X				X				9	3 RD Axis with Pushbutton					X					X				X			A	Straight Tip - Mid (600-019)	X					X					X						B	Straight Tip - Long (600-018)	X					X					X						C*	Ball Tip (600-017)	X					X					X						E*	Pushbutton - Option E		X					X					X					G	Pushbutton - Option G		X					X					X					X	Without Handle	X					X					X					TRIM	0	With Trim	X	X	X	X							X	X	X	X			1	Without Trim	X	X	X	X	X	X	X	X	X	X	X	X	X	X			9	Unassembled	X	X	X	X	X	X	X	X	X							POTENTIOMETER	B	ClaroStat 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			C	ClaroStat 10K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			J	CTS (HP100) 100K	X	X	X	X							X	X	X	X			L	CTS (HP 130) 130K	X	X	X	X							X	X	X	X			P	COPAL (CRV -16) 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			T	NEI MKIII 5K	X	X	X	X							X	X	X	X			U	NEI MKIII 10K	X	X	X	X							X	X	X	X			W	Without Pot	X	X	X	X	X	X	X	X	X								Z	Special Pot	X	X	X	X																																																																																																																																								
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		C	Split Bezel - Textured (FM)	X	X	X	X	X	X	X	X	X								F	Square Bezel - Textured (RM)	X					X											0	Computer Bezel	X	X	X	X													1	Rubber Boot Kit (FM)	X	X	X	X		X	X	X	X		X	X	X	X			0	Square Bezel Snap-On (FM)	X					X											U	Round Bezel Snap-On (FM)	X	X	X	X	X												X	Without Bezel	X	X	X	X	X	X	X	X	X							CENTERING	0	Spring Centering	X	X	X	X	X	X	X	X	X	X	X	X	X	X			1	Friction Clutch	X	X	X	X													3*	Center Detent - X Axis	X	X	X	X													4*	Center Detent - Y Axis	X	X	X	X													5*	Center Detent - Both Axes	X	X	X	X													6*	Torque Set (Friction)	X	X	X	X	X	X	X	X	X							STICK HANDLE	3	Concave Tip - Long (600-024)	X					X					X						4	Pushbutton - Option 4		X					X					X					5	Pushbutton - Option 5		X					X					X					6	Straight Tip - Short (600-020)	X					X					X						7	3 RD Axis - A Model				X					X				X				8	3 RD Axis - B Model				X					X				X				9	3 RD Axis with Pushbutton					X					X				X			A	Straight Tip - Mid (600-019)	X					X					X						B	Straight Tip - Long (600-018)	X					X					X						C*	Ball Tip (600-017)	X					X					X						E*	Pushbutton - Option E		X					X					X					G	Pushbutton - Option G		X					X					X					X	Without Handle	X					X					X					TRIM	0	With Trim	X	X	X	X							X	X	X	X			1	Without Trim	X	X	X	X	X	X	X	X	X	X	X	X	X	X			9	Unassembled	X	X	X	X	X	X	X	X	X							POTENTIOMETER	B	ClaroStat 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			C	ClaroStat 10K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			J	CTS (HP100) 100K	X	X	X	X							X	X	X	X			L	CTS (HP 130) 130K	X	X	X	X							X	X	X	X			P	COPAL (CRV -16) 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			T	NEI MKIII 5K	X	X	X	X							X	X	X	X			U	NEI MKIII 10K	X	X	X	X							X	X	X	X			W	Without Pot	X	X	X	X	X	X	X	X	X								Z	Special Pot	X	X	X	X																																																																																																																																																																																														
		F	Square Bezel - Textured (RM)	X					X											0	Computer Bezel	X	X	X	X													1	Rubber Boot Kit (FM)	X	X	X	X		X	X	X	X		X	X	X	X			0	Square Bezel Snap-On (FM)	X					X											U	Round Bezel Snap-On (FM)	X	X	X	X	X												X	Without Bezel	X	X	X	X	X	X	X	X	X							CENTERING	0	Spring Centering	X	X	X	X	X	X	X	X	X	X	X	X	X	X			1	Friction Clutch	X	X	X	X													3*	Center Detent - X Axis	X	X	X	X													4*	Center Detent - Y Axis	X	X	X	X													5*	Center Detent - Both Axes	X	X	X	X													6*	Torque Set (Friction)	X	X	X	X	X	X	X	X	X							STICK HANDLE	3	Concave Tip - Long (600-024)	X					X					X						4	Pushbutton - Option 4		X					X					X					5	Pushbutton - Option 5		X					X					X					6	Straight Tip - Short (600-020)	X					X					X						7	3 RD Axis - A Model				X					X				X				8	3 RD Axis - B Model				X					X				X				9	3 RD Axis with Pushbutton					X					X				X			A	Straight Tip - Mid (600-019)	X					X					X						B	Straight Tip - Long (600-018)	X					X					X						C*	Ball Tip (600-017)	X					X					X						E*	Pushbutton - Option E		X					X					X					G	Pushbutton - Option G		X					X					X					X	Without Handle	X					X					X					TRIM	0	With Trim	X	X	X	X							X	X	X	X			1	Without Trim	X	X	X	X	X	X	X	X	X	X	X	X	X	X			9	Unassembled	X	X	X	X	X	X	X	X	X							POTENTIOMETER	B	ClaroStat 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			C	ClaroStat 10K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			J	CTS (HP100) 100K	X	X	X	X							X	X	X	X			L	CTS (HP 130) 130K	X	X	X	X							X	X	X	X			P	COPAL (CRV -16) 5K	X	X	X	X	X	X	X	X	X	X	X	X	X	X			T	NEI MKIII 5K	X	X	X	X							X	X	X	X			U	NEI MKIII 10K	X	X	X	X							X	X	X	X			W	Without Pot	X	X	X	X	X	X	X	X	X								Z	Special Pot	X	X	X	X																																																																																																																																																																																																																
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**NOTES:**

(1) X Denotes availability of features.

(2) Customers desiring options not listed in guide should contact factory.

(3) Example:

Joystick Part Number = S10C031P = Standard Joystick, 2-Axis, Nylon Plastic, Split Bezel, Spring Centering, Stick Tip 600-024, Without Trim, 5K COPAL-CRV16 Pot.

\* Additional Charge (see pricing information).

**TO PLACE AN ORDER CALL:**

CH Products • 970 Park Center Drive, Vista, California 92083 • 619/598-2518 • Fax 619/598-2524

CROSS REFERENCE TO PART NUMBER 11110

## JOYSTICK HOUSINGS

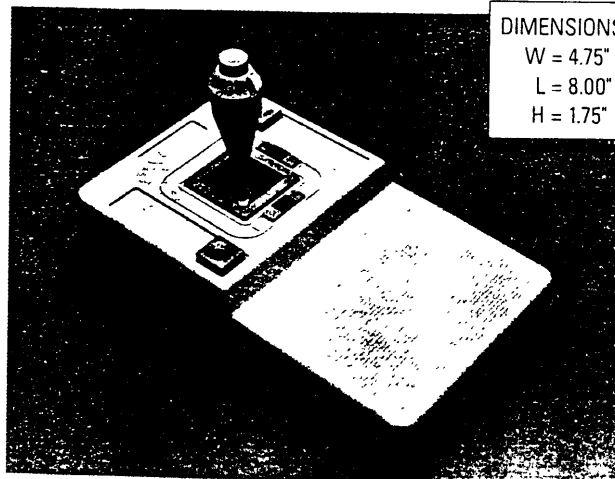
The following Joystick Housings can incorporate all joystick model numbers and most of the optional features detailed on page 8. These two-piece housings are constructed with high impact ABS plastic. In addition, up to four pushbutton switches can be mounted for added functions and features. We also have various strain relief cable assemblies available (contact factory for pricing and availability of cable assemblies).

### JOYSTICK HOUSING NOTES:

- The standard color for housings is IBM gray (black is optional - contact factory to special order.)
- The standard color for buttons, bezel, rotary trims and spring release tabs is gray (black is optional - contact factory to special order).
- The standard color for handles is IBM gray for options 600-020, 600-019, and 600-018 (MODEL 100), Option 5 (MODEL 200), Option 8 (MODEL 300) and Option 9 (MODEL 400) when mounted in a stand-alone housing. (Black is optional - contact factory to special order.) All other handle options are available in black only (see handle descriptions for handle mounted button color options).
- The CJ, MJ, and FJ housings all come standard with dual X and Y axis spring release tabs which allow the operator to easily switch between either a spring activated self-centering or a free floating absolute positioning mode.
- All joystick housings use the computer bezel (Option O) which is similar to the square bezel (Option F).
- The housing hole diameter for cable assemblies (side panel) is .307 inches.
- All housing switches are normally open, single pole/single throw, momentary contact switches.

## MJ HOUSING

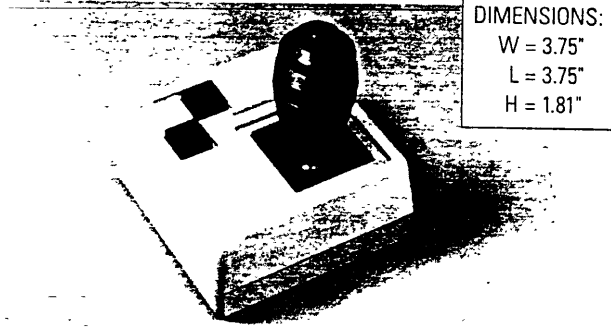
The MJ Housing uses the Compact Joystick described on page 2. The housing is ergonomically designed with a tapered wrist rest that provides ample space (4" x 4") for a circuit board for custom electronics. The two pushbutton switches located on the housing are standard, however, a MJ Housing without pushbutton switches is available. A four button MJ Housing is also available (contact factory to special order-not available with external trim option).



DIMENSIONS:  
W = 4.75"  
L = 8.00"  
H = 1.75"

## SJ HOUSING

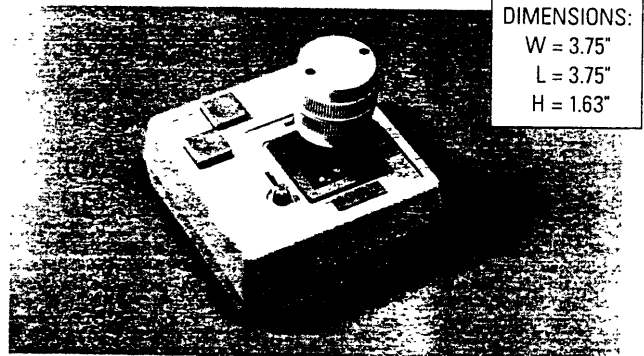
The SJ Housing incorporates our Standard Joystick with all the features and options available for it. In addition, it is provided with two pushbutton switches (not available with external trim option).



DIMENSIONS:  
W = 3.75"  
L = 3.75"  
H = 1.81"

## CJ HOUSING

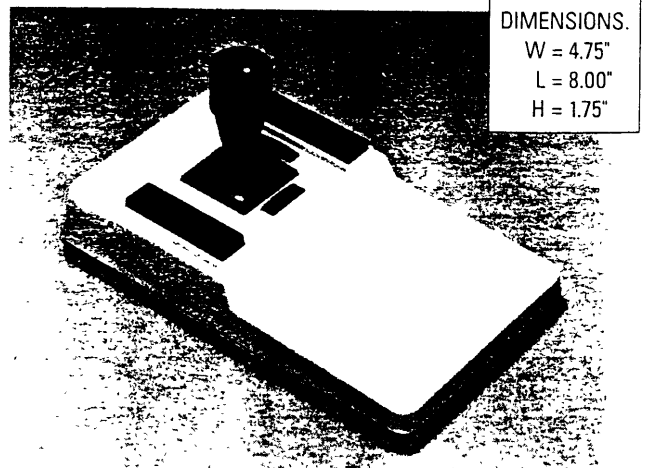
The CJ Housing is available with our Compact Joystick design that is not available as a panel mount unit (available only with external trim option).



DIMENSIONS:  
W = 3.75"  
L = 3.75"  
H = 1.63"

## FJ HOUSING

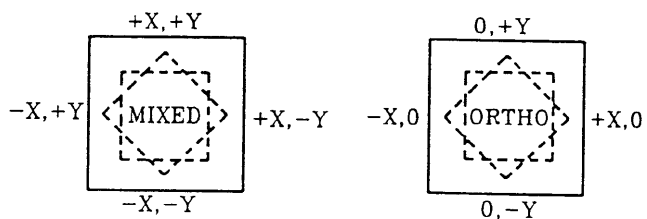
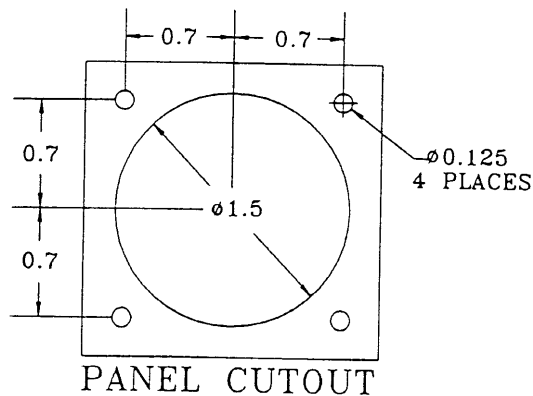
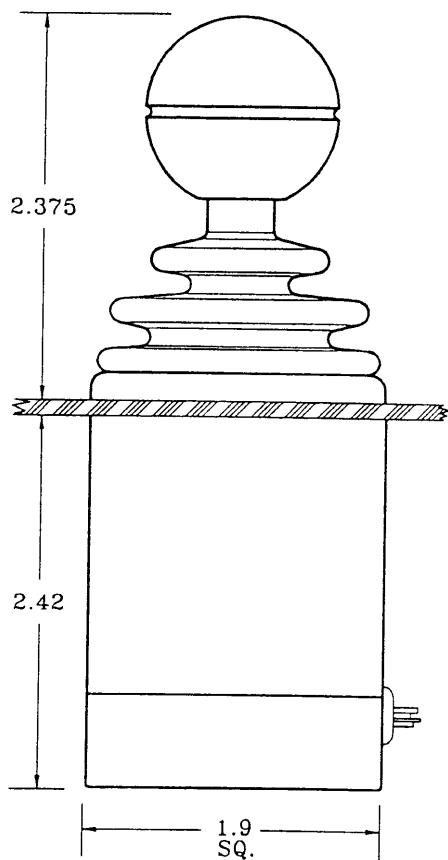
The FJ Housing also uses the Compact Joystick, and, like the MJ Housing, can accommodate a (4"X4") circuit board for custom electronics. The two switches are longer than those on the MJ Housing and are hinged at one end (available with or without the external rotary trims).



DIMENSIONS:  
W = 4.75"  
L = 8.00"  
H = 1.75"

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**NOTES:**

- Dashed lines above indicate outline of diamond and square limiter plates available.
- Output voltage polarity options are shown on X and Y axis.
- Bezel attaches with four 4-40 socket head cap screws (provided).
- Contact factory for availability of custom limiter plate designs.

## PART NUMBER DESIGNATION

Part Number	Description	Key Designation	Feature
IJ	INDUCTIVE JOYSTICK	IJ	Contactless Joystick
_____	MODEL NUMBER	0 1 2 *3 *4	Single-Axis Dual-Axis Dual-Axis with Pushbutton Three-Axis Three-Axis with Pushbutton
_____	LIMITER PLATE	D S R Z.	Diamond Square Round Special Limiter Plate
_____	OUTPUT MIXING	M O	Mixed Orthogonal

\* Contact the factory for availability.

**NOTE:** The dual-axis Inductive Joystick with pushbutton handle incorporates the Model 200 Joystick Option G handle (see page 3).

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## INDUCTIVE JOYSTICK

(Part No. 100-180)

The Inductive Joystick provides for infinite resolution control of the X and Y axis without sacrificing quality or performance. The compact potentiometer-free design makes it the ideal choice for rugged applications where reliability is critical. The output signal is free from noise for the life of the joystick. A centering design, utilizing a single spring, produces a uniform omnidirectional feel. The enclosure houses all of the interface electronics with your choice of output configurations. The Inductive Joysticks incorporates non-contacting balanced coils, and has only one moving part (the spring) for millions of cycles without wear. They are constructed with a stainless steel shaft, glass filled nylon housing, comfortable phenolic ball handle and rubber boot to protect from contamination.

### Specifications

Operating Voltage	5 to 18 VDC
Current	20 ma at 12 Volts
Center Reference	V/2 ±1%
*Output Option 1	
(Null Voltage = Vcc/2)	±10% of Vcc
*Output Option 2	
(Null Voltage = Gnd)	±10% of Vcc
Output Impedance	2 K ohms
Life	10 million cycles
Limiter Plate	diamond or square
Panel Thickness (Mounting)	.050 to .1875
Deflection Force	1.7 Lbs @ 24° @ 2-1/4" up from pivot point
Resolution	infinite
Ripple	less than 0.3%
Frequency	22.8 KHz
Response	5 mSec
Centering	single spring, omnidirectional
Weight	0.386 Lbs (175 g)
MATERIALS	
Housing	high impact glass-filled nylon
Stick Handle	thermoset phenolic 1.25 inch black
TEMPERATURE	
Storage	-25°C to +75°C
Operating	-10°C to +55°C
WIRING	
Red	positive power supply
Green	reference output, V/2 ± 1%
Black	negative power supply
Blue	"X" Axis
Yellow	"Y" Axis

\*Null voltage refers to the output voltage of the joystick when in the center position.  
\*Contact factory for output percentages other than ±10%



### Typical Applications

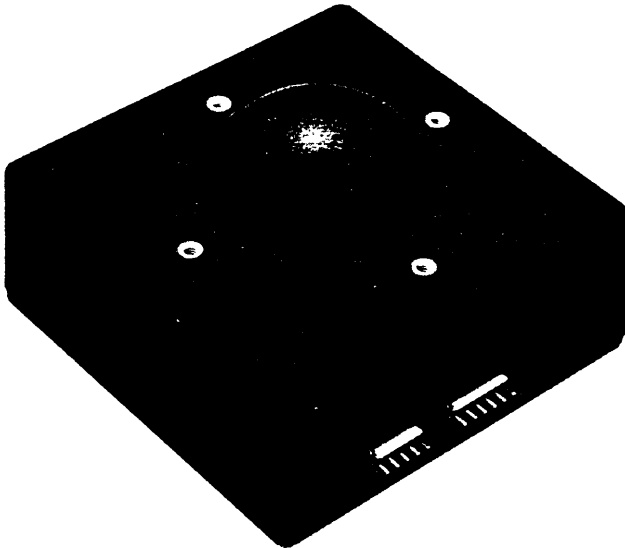
- Wheelchair Steering
- Factory-Floor Controls
- Video Games

### Standard Features

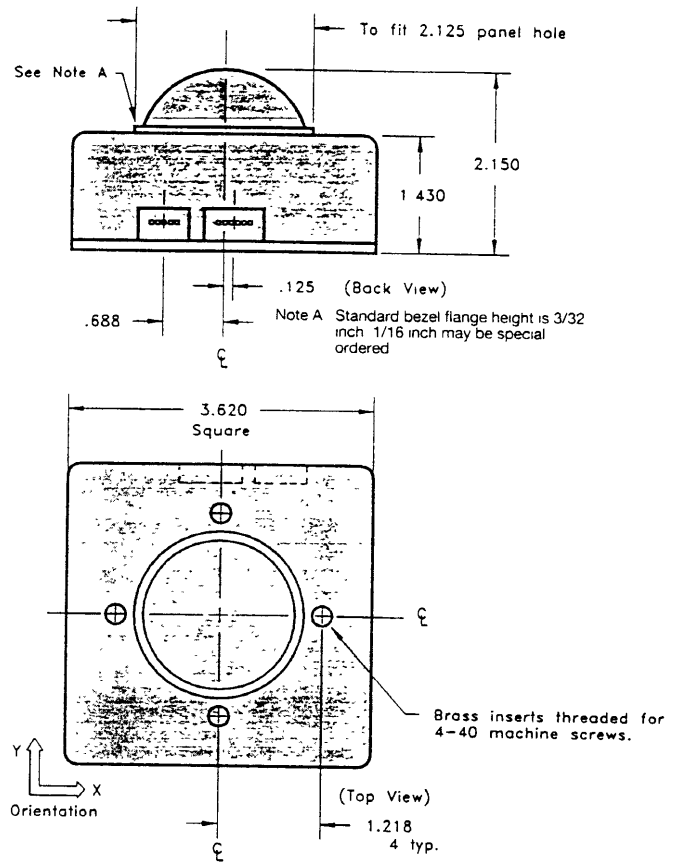
- Reliable Inductive Sensor System
- Interference Free Output
- Wide Power Supply Range
- Free From Potentiometer Noise
- Infinite Resolution
- Compact Design
- Low Current Drain
- Fast 5 mSec. Response

# P200 PANEL MOUNT TRACKBALL

The P200 is our most popular Panel Mount Trackball requiring only 1.43 inches below panel depth for mounting. It has a precision 2.0 inch diameter ball and resolution options of 160, 320, or 640 PPR (pulses per revolution). See page 14 for complete features and specifications.



## Outline Drawing



**PLEASE NOTE:** The following Protocol Format, Mounting Position, Resolution, Baud Rate and Interface options will vary depending on the Trackball type (Panel Mount Models P150 and P200 or Desktop Model DT225). See page 15 for details on availability of features, part number configuration and ordering information.

## Interface Description for P150 & P200 Series Panel Mount Trackballs

### NOTES:

- The correct way to determine the pinout number sequence is to face the trackball header pins with the ball on top. The numbers read from left to right. Header pins are standard AMP components, P/N's 640443-5 and 640443-6.
- The green AMP mating connectors that are provided with each unit have the pinouts numbered backwards.



### 5-PIN HEADER

Pin No.	1	2	3	4	5
Serial 2 Btn	#	##	BTN1	BTN2	GND
Serial 3 Btn	BTN3	BTN3	BTN1	BTN2	GND
Serial 4 Btn	BTN3	BTN4	BTN1	BTN2	GND
PS/2	#	##	BTN1	BTN2	GND
ADB	PROG	PROG	#	BTN1	GND
Sun 3 Btn	BTN3	BTN3	BTN1	BTN2	GND
Sun 4 Btn	BTN3	BTN4	BTN1	BTN2	GND

### 6-PIN HEADER

Pin No.	1	2	3	4	5	6
Serial (RS-232)		GND	*DTR	TD	RD	*RTS
Serial (+5V)	+5V	GND				
IBM PS/2	+5V	GND	CLK	DTA		
Apple (ADB)	+5V	GND	DTA			
Sun	+5V	GND			DTA	
Quadrature	+5V	GND	XA	XB	YA	YB

### PC SERIAL PORT CONNECTIONS

6-Pin Header	1	2	3	4	5	6
RS-232, DB9		5	4	3	2	7
RS-232, DB25		7	20	2	3	4

# Button 1, Click-Lock  
 ## Button 2, Click-Lock  
 Prog Programmable to execute one of eight keyboard commands

\*Voltage for DTR and RTS ranges from +7V to +15V and must be provided on both pins

**NOTE:** The quadrature model is provided with a single 6-pin header.

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## PANEL MOUNT TRACKBALLS

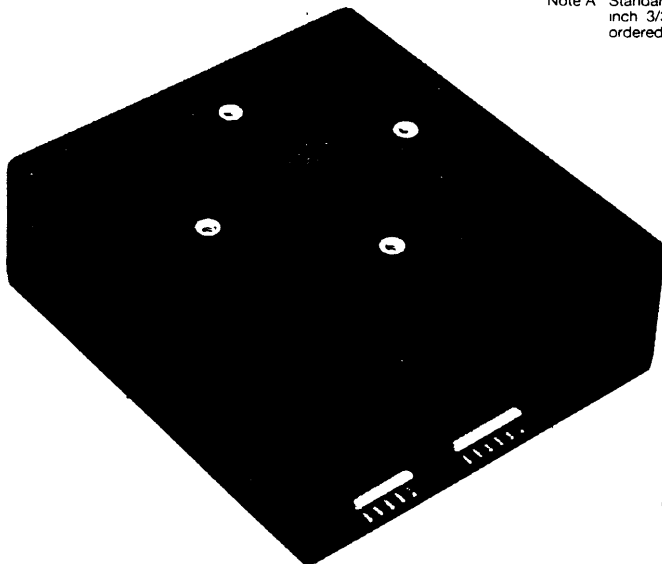
The P150 and P200 Panel Mount Trackballs are a cost effective solution for accurate X and Y axis positioning controls that don't sacrifice quality or performance. Their compact low profile design makes them ideal for keyboard or panel mount applications where space is at a premium.

The enclosure houses all of the interface electronics with industry standard output protocols that will reduce your design time. Most configurations offer a choice of resolutions, baud rates and up to four external switch inputs. Our designs incorporate non-contacting optical encoders for high reliability and long life. Standard AMP pin headers exit the rear of the housing for easy connection.

They are constructed with a black high impact plastic housing, black precision thermoset phenolic ball, five point ball bearing support system and precision ground stainless steel shafts for an effortless fluid movement. A retaining ring that increases the tracking force to 60 grams (mounting position Option N) is available for those applications where severe vibration could cause inadvertent ball movement or when 90° mounting is desired. We also have various strain relief cable assemblies available (contact factory for pricing and availability of cable assemblies).

### P150 PANEL MOUNT TRACKBALL

The P150 is our smallest Panel Mount Trackball requiring only 1.24 inches below panel depth for mounting. It has a precision 1.5 inch diameter ball and resolution options of 120, 240, or 480 PPR (pulses per revolution). See page 14 for complete features and specifications.



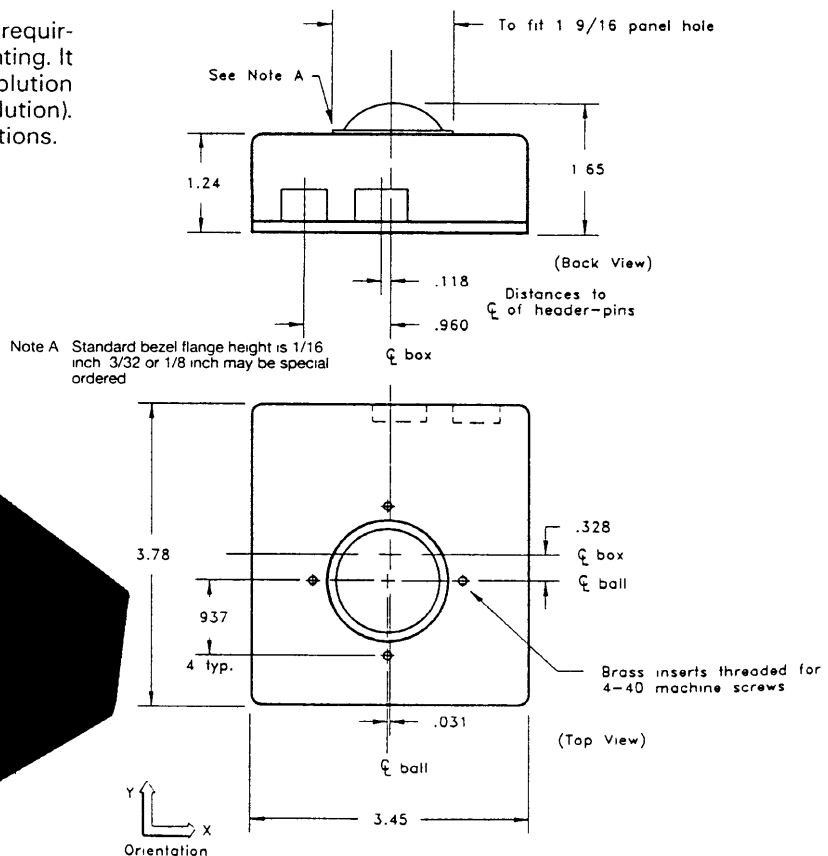
### Typical Applications

- Robot Positioning Controls
- Medical Diagnostic Equipment
- Automated Machine Controls
- Video Editing Equipment
- Navigation Controls
- Custom Control Panels

#### NOTES:

- Due to the custom nature of each application, button switches are not provided for either the P150 or the P200. However, the integration of button switches is relatively easy. To connect button switches to the panel mount trackball (all models except quadrature), simply install a switch between the appropriate button pin and the Ground pin on the 5-pin header. For quadrature models, either the +5V pin or the Ground pin on the 6-pin header may be used to connect one of the two leads on a button switch.
- Both the P150 and P200 are provided with four 1/2 inch, Alens flathead, black anodized, 4-40 machine screws for mounting. An optional round bezel (not required for mounting) is also provided with each unit.
- The X-axis and Y-axis orientation may be exchanged which causes the pinouts to rotate one quarter turn to the right (not available on PS/2 or quadrature models - contact factory to special order).

### Outline Drawing



# PANEL MOUNT AND DESKTOP TRACKBALLS

## FEATURES & SPECIFICATIONS

### Standard Features

- Reliable non-contacting optical encoders
- Four distinct button inputs (most models)
- Variable resolutions
  - 120, 240 and 480 PPR (P150 Series)
  - 160, 320 and 640 PPR (P200 Series)
  - 180, 360 and 720 PPR (DT225 Series)
- Compact low profile design
- Click and Click-Lock inputs
- Zero drift
- Easy installation
- Standard AMP connectors
- Variable BAUD rates of 1200, 2400, 4800 and 9600 BPS
- Protocols:
  - Microsoft Mouse Systems
  - IBM PS/2
  - Apple DeskTop Bus
  - Raw Quadrature Waveforms
  - Sun Workstation
  - ACCESS.bus (DT225 only)

**NOTE:** DT225 also available for AMIGA, NeXT and IBM RISC 6000 computers.  
(Contact factory for availability on other systems.)

### Electrical Specifications

<i>Format</i>	<i>Input</i>	<i>Output</i>
Microsoft and Mouse Systems .....	*DTR @ 15mA Max and .....	RS-232, Serial
	*RTS @ 15mA Max	
PS/2 .....	+5V @ 30mA Max .....	CMOS/TTL, Serial
Bus .....	via ISA Bus .....	CMOS, Quadrature
Quadrature .....	+5V @ 30mA Max .....	Quadrature Square Waves
Apple (ADB) .....	+5V @ 30mA Max .....	CMOS/TTL, Serial
Sun Workstation .....	+5V @ 30mA Max .....	CMOS/TTL, Serial
ACCESS.bus .....	+5V @ 30mA Max .....	CMOS/TTL, Serial

**\*Voltage for DTR and RTS ranges between +7V and +15V and must be provided on both pins.**

Temperature:	
Storage: .....	-25°C to +75°C
Operating: .....	0°C to +55°C

Electrical MTBF (Mean Time Between Failures) ..... 100,000 operational (power on) hours

### Physical Specifications

	<i>P150 Series</i>	<i>P200 Series</i>	<i>DT225 Series</i>
Ball .....	Thermoset Phenolic 1.5" .....	Thermoset Phenolic 2.0" .....	Thermoset Phenolic 2.25"
Housing .....	High Impact Plastic .....	High Impact Plastic .....	High Impact Plastic
Rotation .....	360 degrees .....	360 degrees .....	360 degrees
Tracking Force .....	10 grams .....	10 grams .....	11 grams
FCC Approved .....	Not Applicable .....	Not Applicable .....	Class B, subpart J of part 15
Weight .....	199 grams .....	281 grams .....	460 grams
Dimensions .....	3.45"W x 3.78"D x 1.24"H .....	3.62"W x 3.62"D x 1.43"H .....	5.0"W x 5.5"D x 2.7"H

Mechanical MTBF (Mean Time Between Failures) ... 5,000,000 180° rotations with 6 ounces of vertical force

MTTR (Mean Time To Repair) ..... 10 minutes

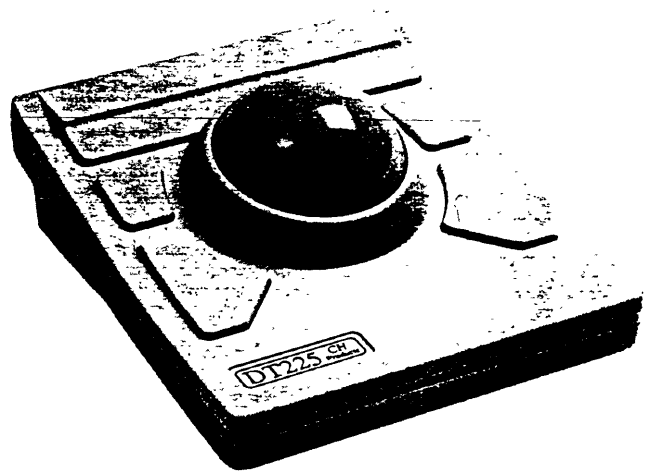
**NOTE:** DT225 also available in black housing with black ball (see front cover for picture).

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## DT225 DESKTOP TRACKBALL

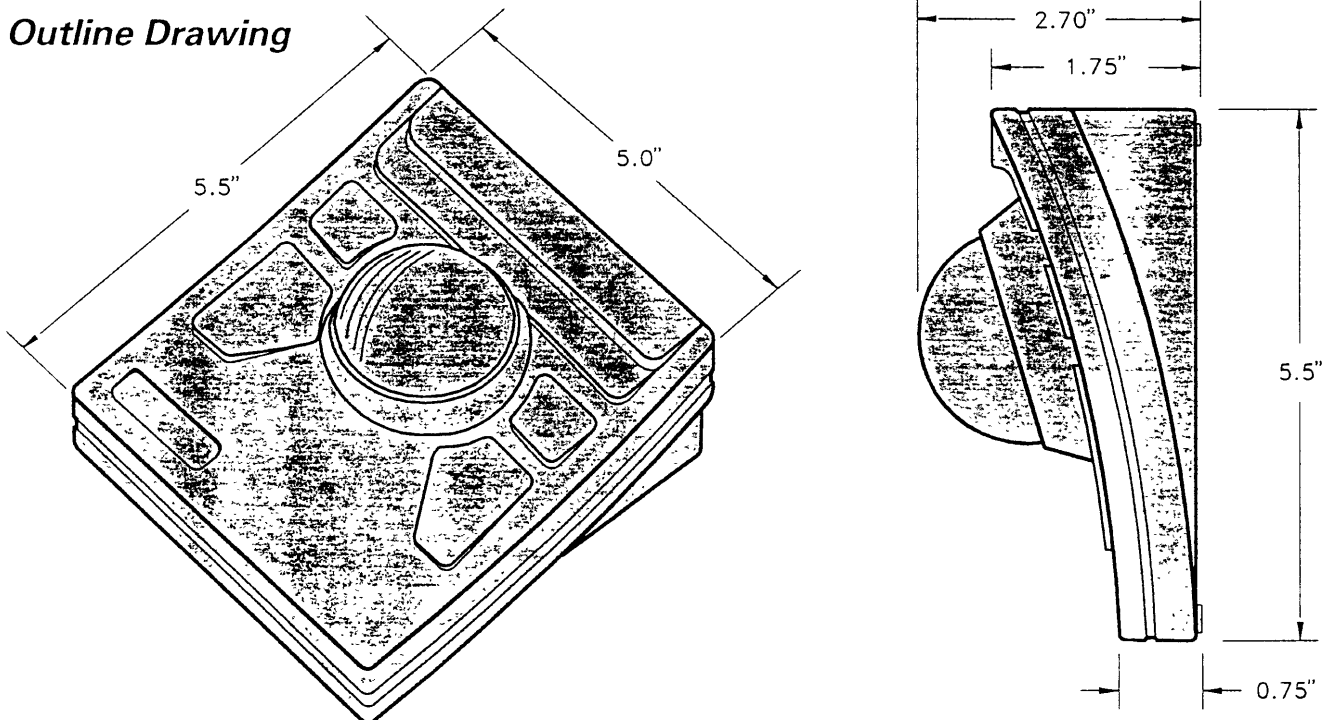
The DT225 is our industrial grade Desktop Trackball for all pointing device needs where precision and reliability are of prime concern. Designed to work with most popular computers and protocol standards, the DT225 attaches directly to the computers' mouse port. Long life, no drift and a smooth running surface are guaranteed by the optomechanical design, stainless steel shafts and five point encased ball bearing support system. Enclosed in an IBM gray high impact plastic housing, the contoured case has four ergonomically placed buttons surrounding a large 2.25 inch IBM gray precision thermostat phenolic ball. Variable resolutions of 180, 360 and 720 PPR (pulses per revolution) are available. It is FCC approved and comes complete with a shielded cable assembly. See page 14 for complete features and specifications.



### Typical Applications

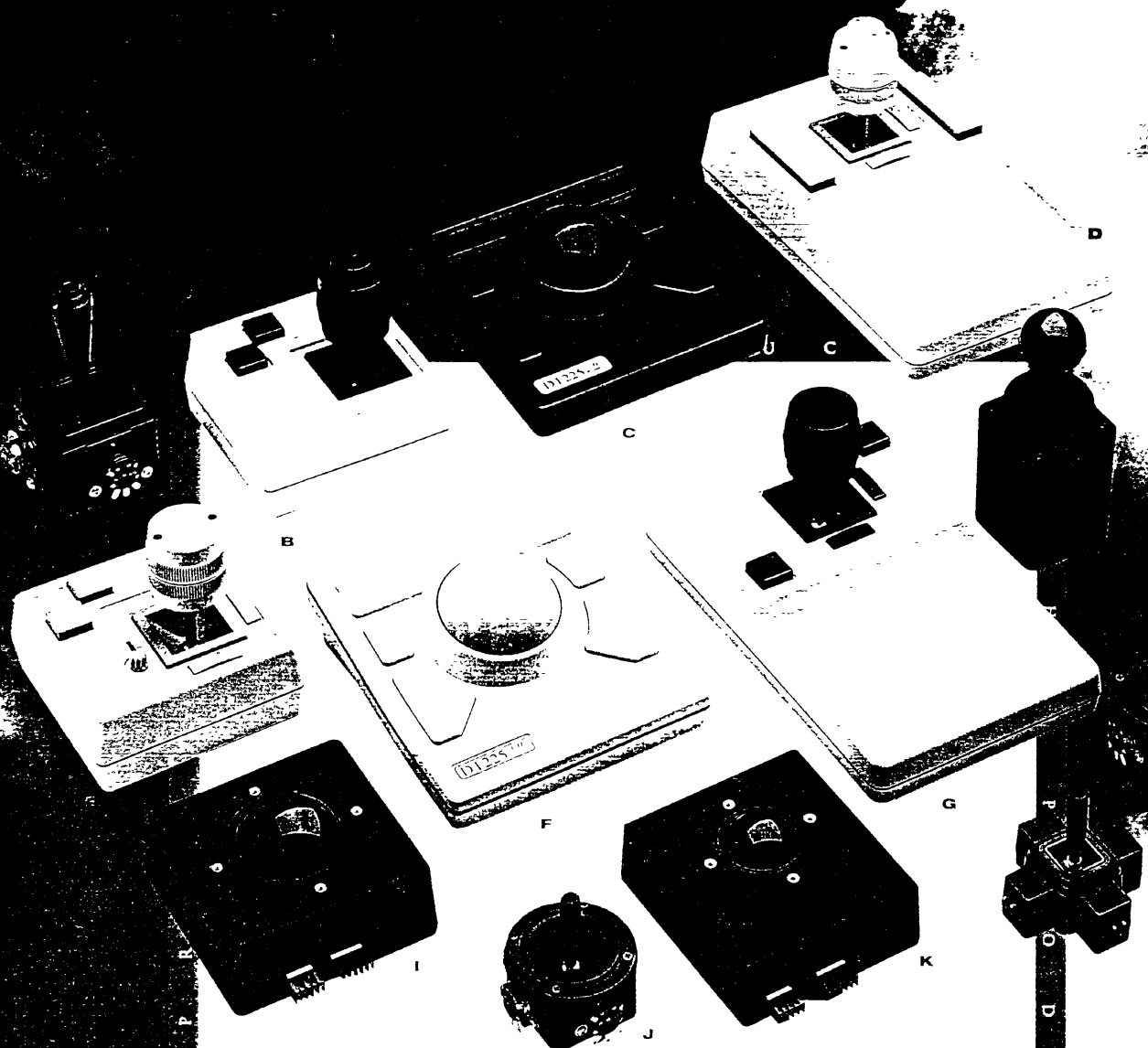
- Robot Positioning Controls
- Medical Diagnostic Equipment
- Automated Machine Controls
- Process Control
- Video Editing Equipment
- CAD / CAM / CAE
- Imaging and Computer Graphics
- Non-Destructive Test and Measurement

### Outline Drawing



### Interface Description

Model	Connector	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Cable Length
Serial-RS232	(DB9) Female		RD	TD	DTR	GND		RTS			7 ft
Serial-5V	(DB9) Female		DATA		+5V	GND					7 ft
PS/2	(6-Pin Mini Din)	DATA		GND	+5V	CLK					7 ft
Bus	(9-Pin Mini Din)	+5V	XA	XB	YA	YB	BTN1	BTN2	BTN3	GND	7 ft
ADB	(4-Pin Mini Din)	DATA	CLK	GND	+5V						7 ft
Sun	(8-Pin Mini Din)		GND	+5V	DATA						4 ft
ACCESS.bus	(4-Pin Modular)	GND	SDA	+5V	SCL						7 ft



- A Model 200 Joystick with Standard Base
- B Model 400 Joystick in SJ Housing
- C DT225 (black) Trackball
- D Model 400 Joystick in FJ Housing
- E Model 300 Joystick in CJ Housing
- F DT225 (IBM gray) Trackball
- G Model 300 Joystick in MJ Housing
- H Inductive Joystick
- I P200 Trackball
- J Model 100 Joystick with Miniature Base
- K P150 Trackball
- L SwitchStick
- M Model 300 Joystick with Miniature Base



C H P R O D U C T S

