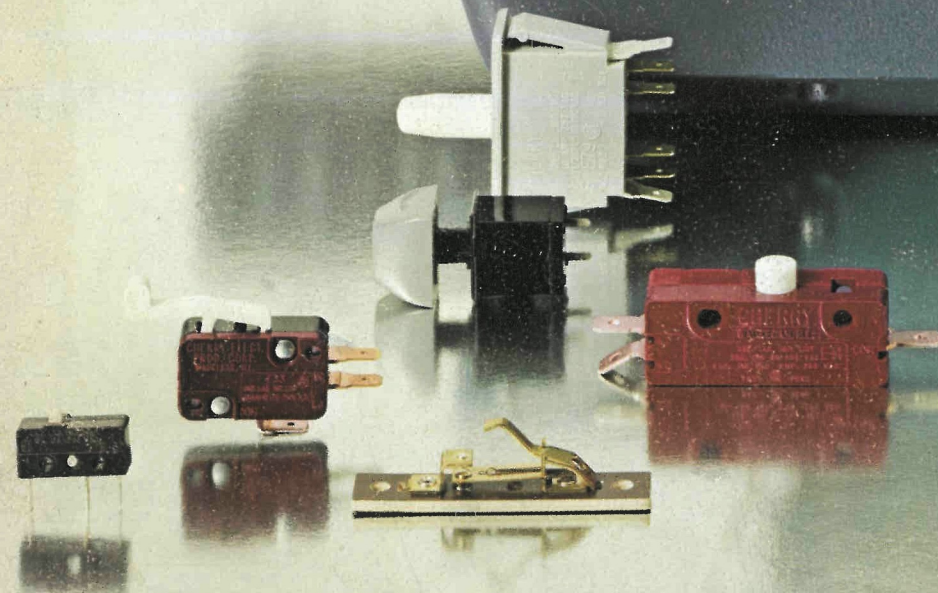


# CHERRY

switches & keyboards





# CHERRY

## Ultra-modern facilities . . . specially-designed machines and equip

All Cherry products are designed and manufactured under the constant technical guidance of an experienced staff of mechanical, electrical, tool, industrial and manufacturing engineers. Personnel trained in many skills operate advanced assembly and fabrication machinery to provide Cherry customers with the highest quality at prices that are truly competitive.

CHERRY ELECTRICAL PRODUCTS CORP. • 150,000 SQUARE FOOT MAIN PLANT • WAUKEGAN, ILLINOIS • USA

HENRY DAYMOND SALES LIMITED Manufacturers' Representatives

262 Kerr Street OAKVILLE, ONTARIO Area Code 416-844-6721

BOB MACDONALD

ELECTRICAL AND DECORATIVE COMPONENTS

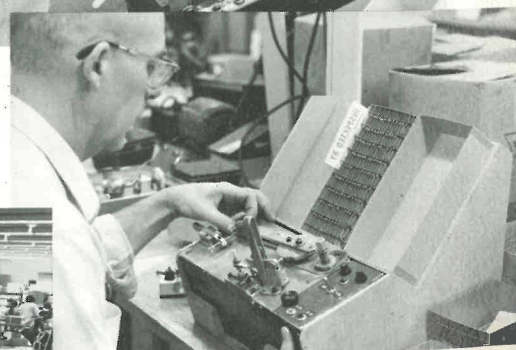


### ENGINEERING

of a simple modification of an existing standard switch or keyboard . . . or an entirely new design . . . is a service of Cherry's application engineering. Every Cherry product is backed by sound basic design performed by competent electrical and mechanical design engineers.

### ASSEMBLY

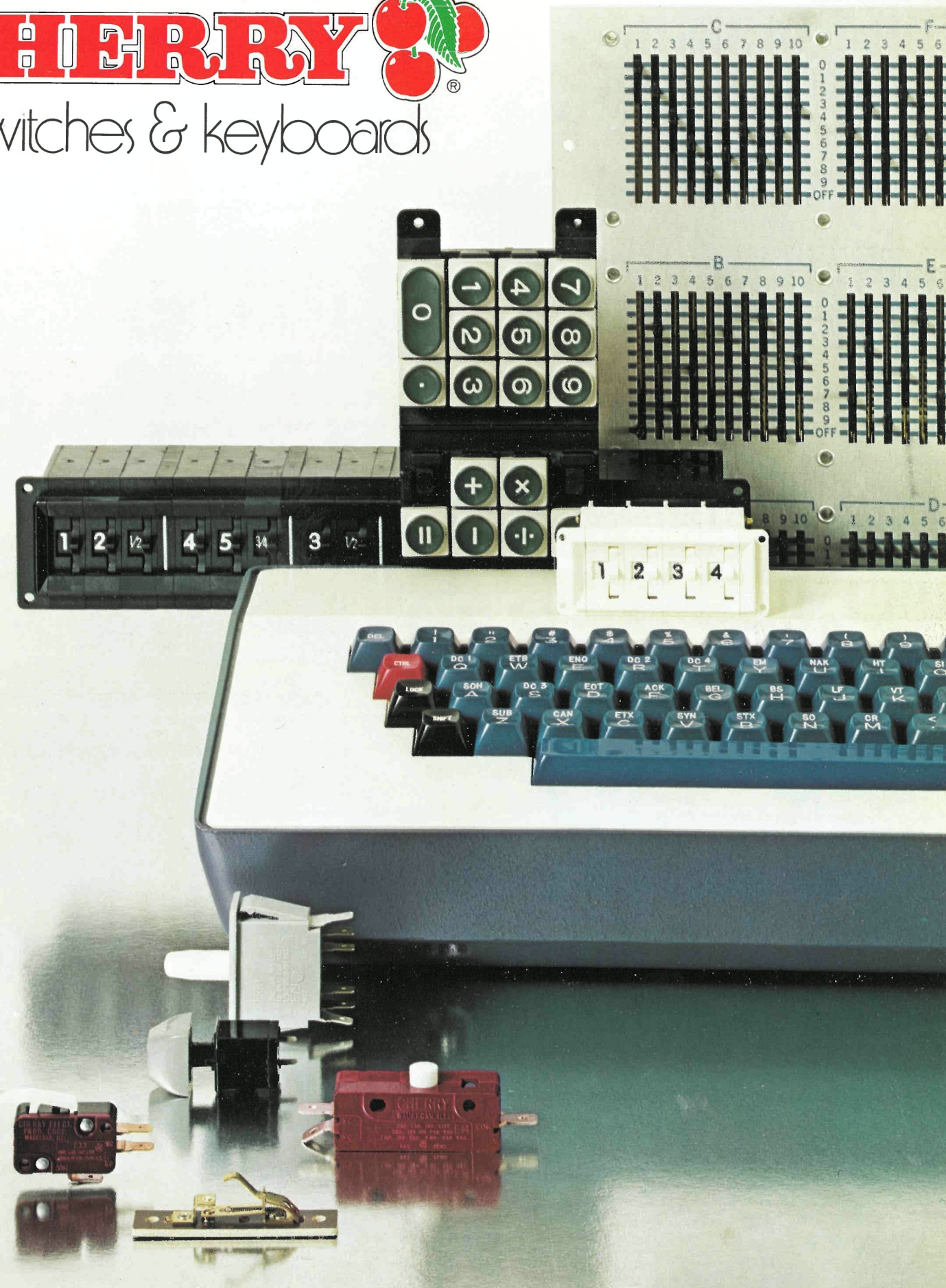
of all switches and keyboards utilizes many special fixtures, methods and machines that assure ultimate precision of all Cherry products.



All Cherry products are

# CHERRY

switches & keyboards



CATALOG C-73

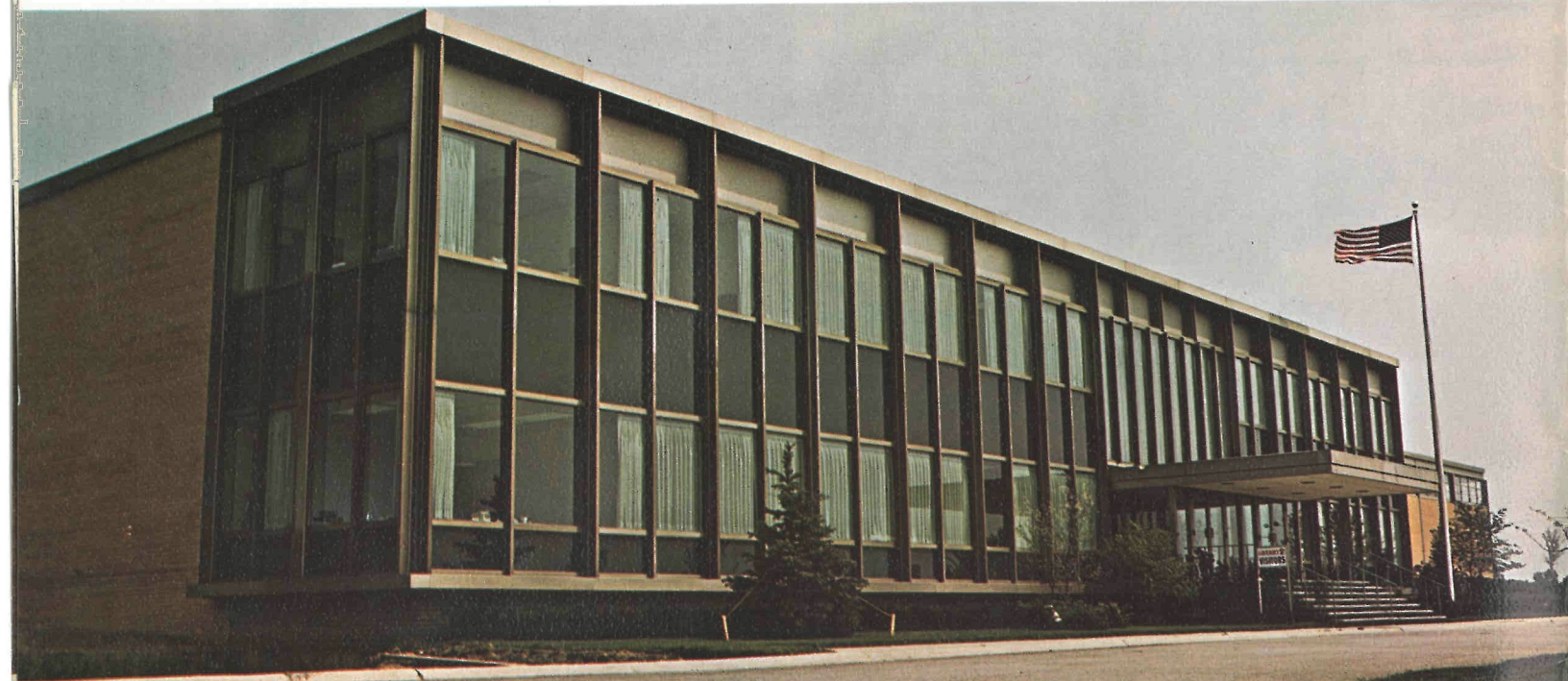




## Ultra-modern facilities . . . specially-designed machines and equip

All **Cherry products** are designed and manufactured under the constant technical guidance of an experienced staff of mechanical, electrical, tool, industrial and manufacturing engineers. Personnel trained in many skills operate advanced assembly and fabrication machinery to provide Cherry customers with the highest quality at prices that are truly competitive.

CHERRY ELECTRICAL PRODUCTS CORP. • 150,000 SQUARE FOOT MAIN PLANT • WAUKEGAN, ILLINOIS • USA

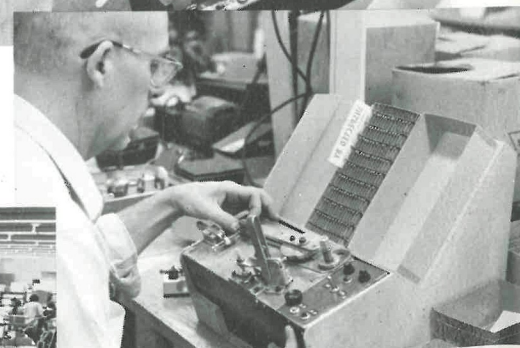


### ENGINEERING

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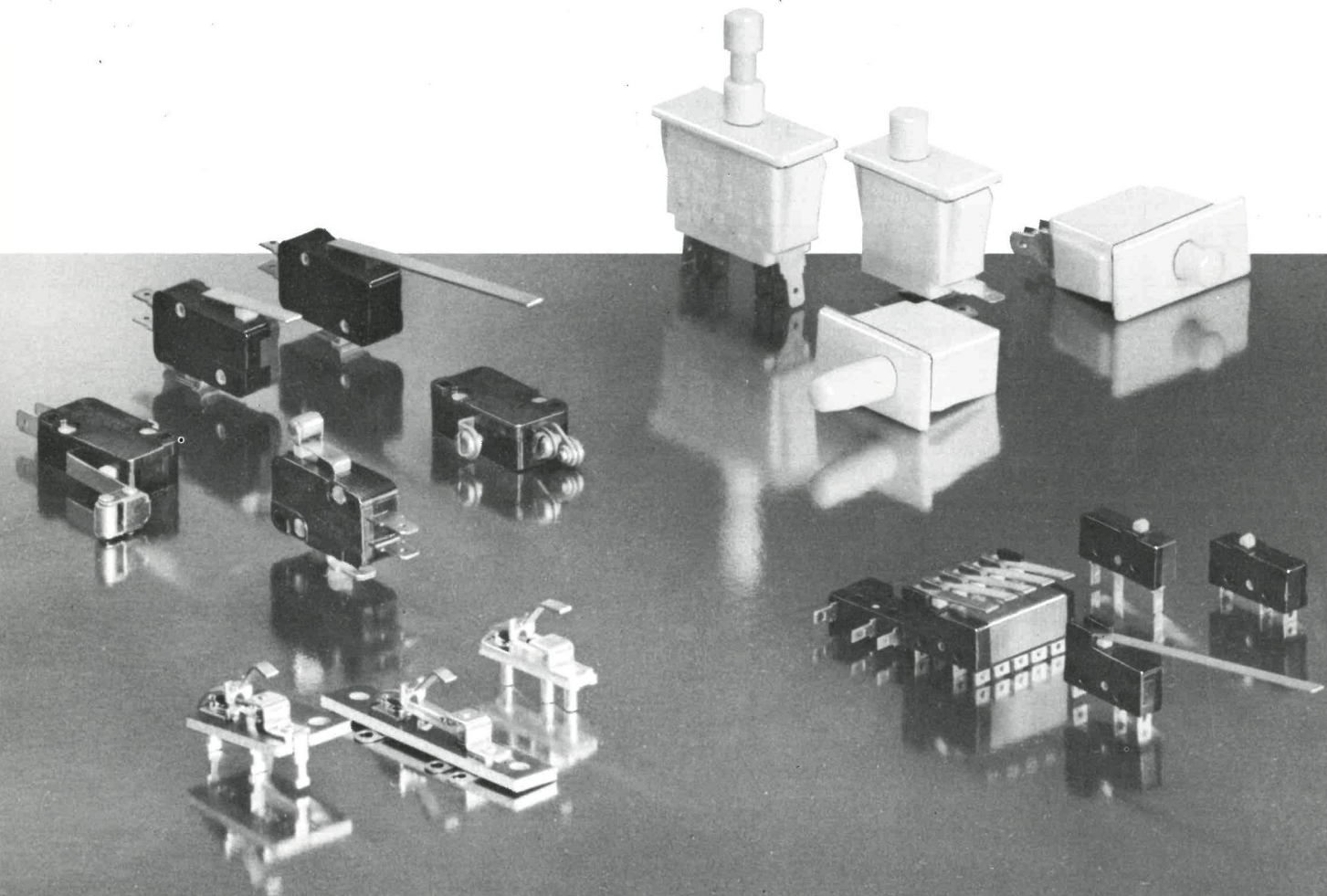
### ASSEMBLY

of all switches and keyboards utilizes many special fixtures, methods and machines that assure ultimate precision of all Cherry products.



All Cherry products are

. . . with long life stainless steel coil spring mechanism.





# switch selector-locator

- **GOLD CROSSPOINT CONTACT SWITCHES**—for low energy circuits..... see pages 30 thru 33
- **KEYBOARDS AND KEYBOARD SWITCHES**..... see pages 34 thru 47
- **THUMBWHEEL AND LEVERWHEEL SWITCHES**..... see pages 48 thru 65
- **MATRIX TYPE SELECTOR SWITCHES**—100 to 2784 crosspoints..... see pages 66 thru 69
- **SNAP ACTION SWITCHES**

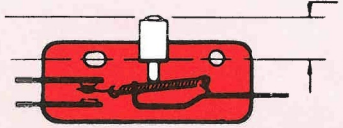
SWITCH RATING*				Switch Operating Force†	Switch Movement Differ'tial†	Switch Circuitry Available	Switch Type	Switch Series Number	Located on Page Number
Electrical		Horsepower							
125 V AC	250 V AC	125 VAC	250VAC						
2 Amp	1 Amp	—	—	2½ Ozs.	.040	S.P.N.O. only	Enclosed	E16	29
3 Amp	—	—	—	75 Grams	.010	S.P.D.T. and S.P.S.T.	Miniature	E22	22-23
3 Amp	—	—	—	10 Grams	.010	S.P.D.T. and S.P.S.T.	Light Force Miniature	E22 "X"	24-25
3¼ Amp	—	—	—	7 Ozs.	.040	S.P.N.O. only	Enclosed	E18	29
5 Amp	5 Amp	—	—	90 Grams	.004	S.P.D.T.,S.P.S.T. Also 2, 3, 4 and 5 Pole D.T.	Subminiature	E61	18, 19, 20
5 Amp	5 Amp	—	—	4.0 inch gramstorque	3° Min.	S.P.D.T. and S.P.S.T.	Low torque	E51	16-17
5 Amp	—	—	—	3 Ozs.	.070	S.P.D.T. and S.P.S.T.	Light Force Open	S23	26-27
5 Amp	5 Amp	1/4	1/4	45 Grams	.010	S.P.D.T. and S.P.S.T.	Light Force Miniature	E23 "X"	24-25
5 Amp	5 Amp	1/4	1/4	6 Ozs.	.016	S.P.D.T. and S.P.S.T.	Miniature	E23	22-23
6 Amp	3 Amp	—	—	3 Ozs.	.040	S.P.N.C. only	Enclosed	E15	29
7½ Amp	5 Amp	—	—	4 Ozs.	.140	S.P.D.T. and S.P.S.T.	Single Pole Stack	S37	29
7½ Amp	5 Amp	—	—	6 Ozs.	.125	D.P.D.T. and D.P.S.T.	Double Pole Stack	S36	29
10 Amp	5 Amp	1/3	—	4½ Ozs.	.040	S.P.N.C. only	Enclosed	E10	29
10 Amp	5 Amp	1/6	1/6	7½ Ozs.	.085	S.P.D.T. and S.P.S.T.	Miniature Open	S30	28
10 Amp	5 Amp	1/4	1/4	9½ Ozs.	.070	S.P.D.T. and S.P.S.T.	Basic Open	S25	26-27
10 Amp	10 Amp	1/3	1/3	15 Ozs.	.045	S.P.D.T. and S.P.S.T.	Panel Mount Push Button	E69	12-13
10 Amp	10 Amp	1/3	—	24 Ozs.	.075	D.P.D.T. and D.P.S.T.	Panel Mount Push Button	E79	14-15
10 Amp	10 Amp	1/2	1/2	75 Grams	.010	S.P.D.T. and S.P.S.T.	Light Force Miniature	E33 "X"	24-25
10 Amp	10 Amp	1/2	1/2	10 Ozs.	.016	S.P.D.T. and S.P.S.T.	Miniature	E33	22-23
10 1 Amp	10.1 Amp	1/4	—	212 Grams	.004	S.P.D.T.,S.P.S.T. Also 2, 3, 4 and 5 Pole D.T.	Subminiature	E62	18, 19, 20
15 Amp	15 Amp	1/2	1/2	100 Grams	.010	S.P.D.T. and S.P.S.T.	Light Force Miniature	E34 "X"	24-25
15 Amp	15 Amp	1/2	1/2	14 Ozs.	.016	S.P.D.T. and S.P.S.T.	Miniature	E34	21-22-23
15 Amp	15 Amp	3/4	1-1/2	20 Ozs.	.015	S.P.D.T. and S.P.S.T.	Single Pole General Purpose	E13	8-9
15 Amp	15 Amp	3/4	1-1/2	30 Ozs.	.015	D.P.D.T. and D.P.S.T.	Double Pole General Purpose	E19	10-11
20 Amp	20 Amp	1	2	45 Ozs.	.015	D.P.D.T. and D.P.S.T.	Double Pole General Purpose	E20	10-11
25 Amp	25 Amp	1	2	30 Ozs.	.015	S.P.D.T. and S.P.S.T.	Single Pole General Purpose	E14	8-9

\* All snap-action switches are Underwriters Laboratory Inc. Inspected and Canadian Standards Assn. Approved except as follows:  
S36 Series and S37 Series (Not CSA Approved).

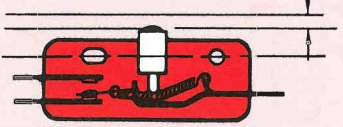
† Movement Differential and Operating Forces shown are maximums (except as indicated for E51) for basic types and are measured at switch button.  
To convert ounces into grams multiply by 28.349527  
To convert inches into millimeters multiply by 25.40  
To convert grams into ounces multiply by 0.03527  
To convert millimeters into inches multiply by 0.03937

# snap-action switch terms

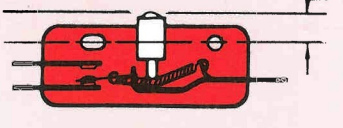
Throughout this catalog various terms are used to describe each switch. Illustrated by a closed switch, the technical terms apply to all snap-action switches.



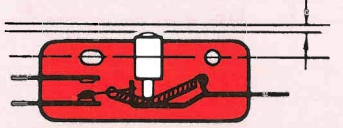
**REST POSITION . . .**  
is the position the switch button (or actuator) assumes when no force is exerted against it. Rest position is dimensioned from the top of the switch button (or actuator) to the mounting hole centerline, top of switch panel or other specified reference.



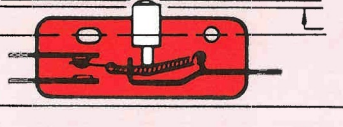
**PRETRAVEL . . .**  
is the distance of button (or actuator) movement from rest position to the point of operation. Pretravel is frequently specified as maximum.



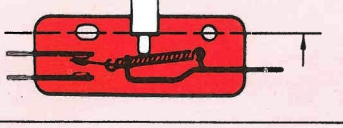
**OPERATING POINT . . .**  
is the position of the switch button (or actuator) at which initial switch contact transfer takes place. Operating point is dimensioned from the top of the switch button (or actuator) to mounting hole centerline, top of switch panel or other specified reference point.



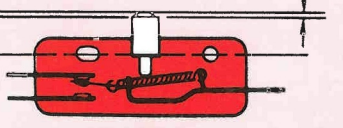
**OVERTRAVEL . . .**  
is the continued switch button (or actuator) movement possible after initial contact transfer, without bottoming or damage to the switch mechanism. Overtravel is frequently specified as a minimum.



**MOVEMENT DIFFERENTIAL . . .**  
is the button (or actuator) movement required between operating point to reset point. This is frequently dimensioned as a maximum.



**RESET POINT . . .**  
is the point of actuation at which the second, or return contact transfer takes place. At this point the contacts snap back to their original position. Reset point is dimensioned from top of switch button (or actuator) to mounting hole centerline, top of switch panel or other specified reference point.



**RESET TRAVEL . . .**  
is the continued switch button (or actuator) movement back from reset point.

**OPERATING FORCE . . .**  
is the force required to depress the switch button (or actuator) to trip (operating point). Operating force is always specified as maximum.

**NOTES  
UL & CSA LISTINGS**

Most of the switches shown in this catalog have UL and CSA listing. These are indicated with a notation "Und. Lab. Inc. listed and CSA approved" in each section just above or below the rating.


Underwriters Laboratory Incorporated listing:  
Guide 380-W-19.19.19P File E23301

Canadian Standards Association listing:  
Guide 380-W-19.19.19P File 16503  
Class 6241

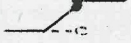
**TOLERANCES**

All dimensions shown carry the following tolerances unless otherwise specified:  
Fractions: ± 1/64" Decimals: ± .005  
Angles: ± 5°


**CIRCUITRY**



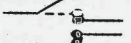
**S.P.S.T.-N.O.** Single pole, single throw, normally open.



**S.P.S.T.-N.C.** Single pole, single throw, normally closed.



**S.P.D.T.** Single pole, double throw.

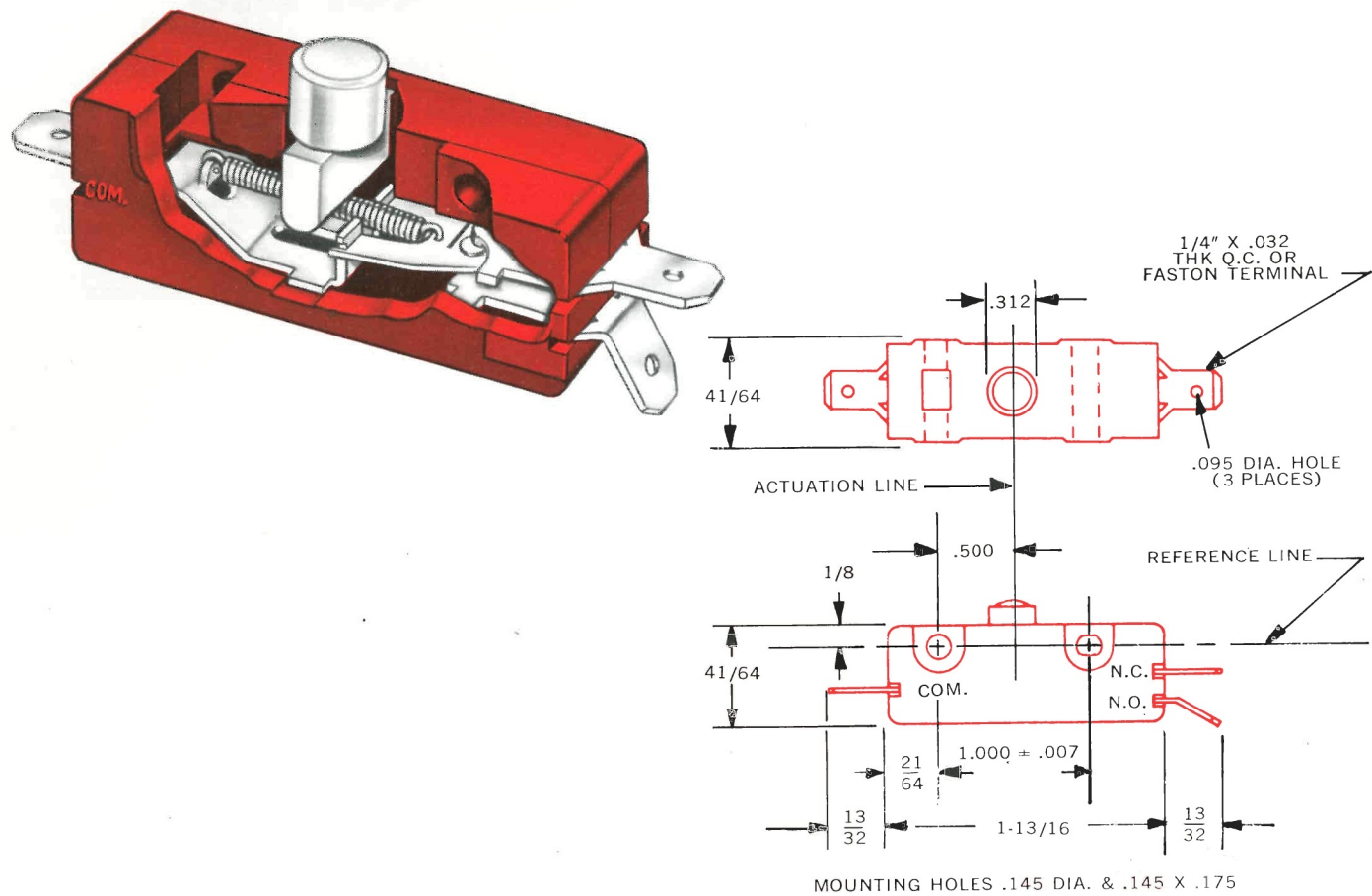


**D.P.D.T.** Double pole, double throw.



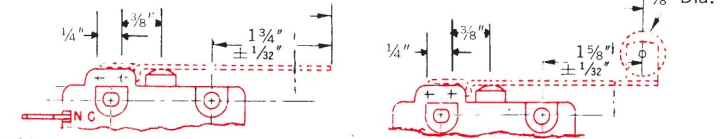
general purpose

SERIES E13—STANDARD  
SERIES E14—HIGH CAPACITY



- Long Life Coil Spring Mechanism
- Large Overtravel
- Rock Wipe Contact Action
- Wear Resistant Nylon Button
- Integral Hinged Actuators
- Custom Designs

**ACTUATORS**—Many special forms and lengths of actuators are available with tooling charges applying. Standard type integral hinged lever and roller actuators are available in choice of 2 pivot positions. Actuator lengths are dimensioned from centerline of switch mounting hole as shown here.



**CIRCUITRY**—Contact arrangement available in choice of single pole double throw or single pole single throw, either normally open or normally closed. In general normally open may be specified by changing suffix number from 00 to 01 and normally closed by changing suffix number to 02. Example: E13-00E is double throw, E13-01E is normally open, and E13-02E is normally closed.

**TERMINALS**—Standard 1/4 inch QC terminals can be furnished with angle formed up or down on common as well as open or closed terminal. Forms include straight, 30, 45, 85 degrees up or down. Other forms can be provided at nominal extra charge.

**BUTTON VARIATIONS**—Several button lengths are available without extra charge. Special button lengths, forms and colors may be had with nominal set-up and/cr tooling charge.

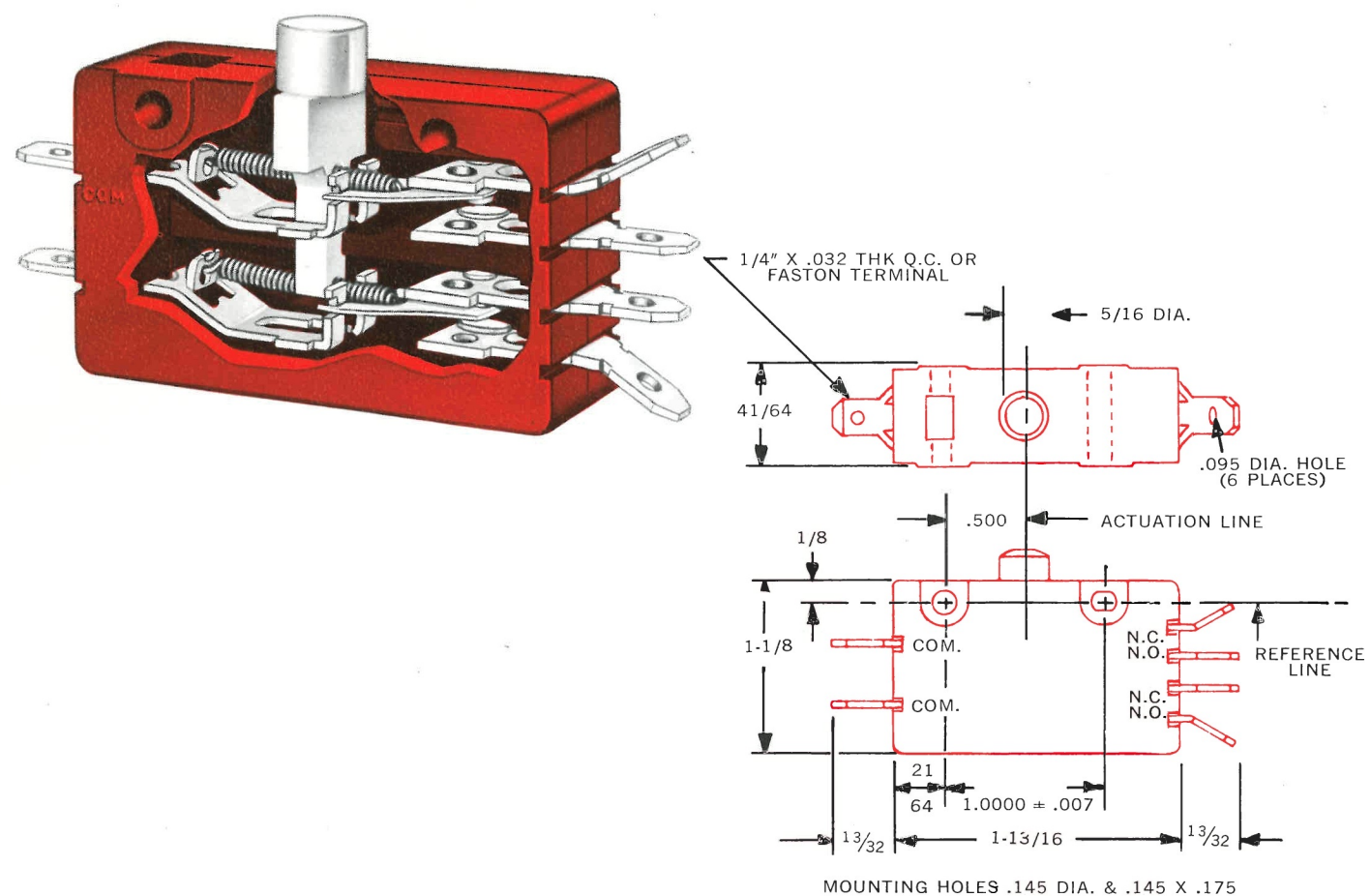
MATERIALS		
PARTS	SERIES E13	SERIES E14
Case	General purpose phenolic	General purpose phenolic
Actuating button	Nylon	Nylon
Common terminal	Brass (70% Copper, 30% Zinc)	Silver Plated Brass (.00002 to .00005 thick)
NO and NC terminals	Brass (70% Copper, 30% Zinc)	Copper
Moving Blade	Spring Brass	Silver Plated Berylco (.00002 to .00005 thick)
Contacts	Silver-Cadmium Oxidized	Silver-Cadmium Oxidized
Spring	Stainless steel	Stainless steel
Aux. Actuators	Cold-Rolled Steel—White Nickel Plated (.00002 to .00005 thick)	Cold-Rolled Steel—White Nickel Plated (.00002 to .00005 thick)
Roller	Sintered Stainless Steel	Sintered Stainless Steel

<b>RATING:</b> E13—15 amps 125/250 VAC 3/4 H.P., 125 VAC—1 1/2 H.P., 250 VAC <b>RATING:</b> E14—25 amps 125/250 VAC 1 H.P., 125 VAC—2 H.P., 250 VAC <small>Und. Lab. Inc. listed, and CSA approved.</small>													
	E13-00E	E14-00A	E13-00R	E13-00J	E13-00M	E13-00H	E14-00H	E13-50H	E14-50H	E13-00K	E14-00K	E13-50K	E14-50K
<b>OPERATING FORCE</b> (Max. in ozs.)	15	30	11	15	15	3 1/2	10	2 1/4	6	3 1/2	10	2 1/4	6
<b>PRETRAVEL</b> (Max. inches)	.050	.100	.040	.050	.050	.250	.312	.343	.525	.250	.291	.343	.483
<b>OPERATING POINT*</b> (in inches)	.285±.020	.248±.020	.269±.030	.670±.030	.812±.030	.312±.062	.468±.062	.218±.062	.437±.062	.718±.062	.860±.062	.687±.062	.828±.062
<b>OVERTRAVEL</b> (Min. inches)	.100	.050	.032	.100	.218	.187	.150	.187	.234	.187	.130	.187	.218
<b>MOVEMENT DIFFERENTIAL</b> (Max. inches)	.015	.015	—	.015	.015	.093	.050	.140	.080	.093	.045	.140	.073
Reset Button Pretravel (Max. inches)	—	—	.040	—	—	—	—	—	—	—	—	—	—
Reset Button Operating Point	—	—	.670±.030	—	—	—	—	—	—	—	—	—	—
<b>ACTUATOR LENGTH</b> (Tolerance ± 1/32")	—	—	—	—	—	1 1/2"	2 7/32"	1 3/4"	1 3/32"	1 3/8"	1 1/16"	1 5/8"	1 5/16"
<b>REMARKS:</b> *Measured above reference line. NOTE: Nominal button rest height is 2 1/64" NOTE: Reset button 1/4" diameter NOTE: Ferrule on "J" and "M" type is 3/16"—32 NEF thread with .312" flats .406" high Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.													



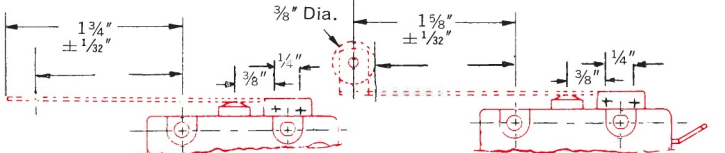
general purpose / double pole

SERIES E19—STANDARD  
SERIES E20—HIGH CAPACITY



- Double Circuit Control
- Long Life Coil Spring Mechanism
- Rock Wipe Contact Action
- Wear Resistant Nylon Button
- Integral Hinged Actuators
- Custom Designs

**ACTUATORS**—Many special forms and lengths of actuators are available with tooling charges applying. Standard type integral hinged lever and roller actuators are available in choice of 2 pivot positions. Actuator lengths are dimensioned from centerline of switch mounting hole as shown here.



**CIRCUITRY**—Contact arrangement available in choice of double pole double throw or double pole single throw either normally open or normally closed. In general normally open may be specified by changing suffix number from 00 to 01 and normally closed by changing suffix number to 02. Example: E19-00J is double throw, E19-01J is normally open, and E19-02J is normally closed.

**TERMINALS**—Standard 1/4 inch QC terminals can be furnished with angle formed up or down on common as well as open or closed terminal. Forms include straight, 30, 45, 85 degrees up or down. Other forms can be provided at nominal extra charge.

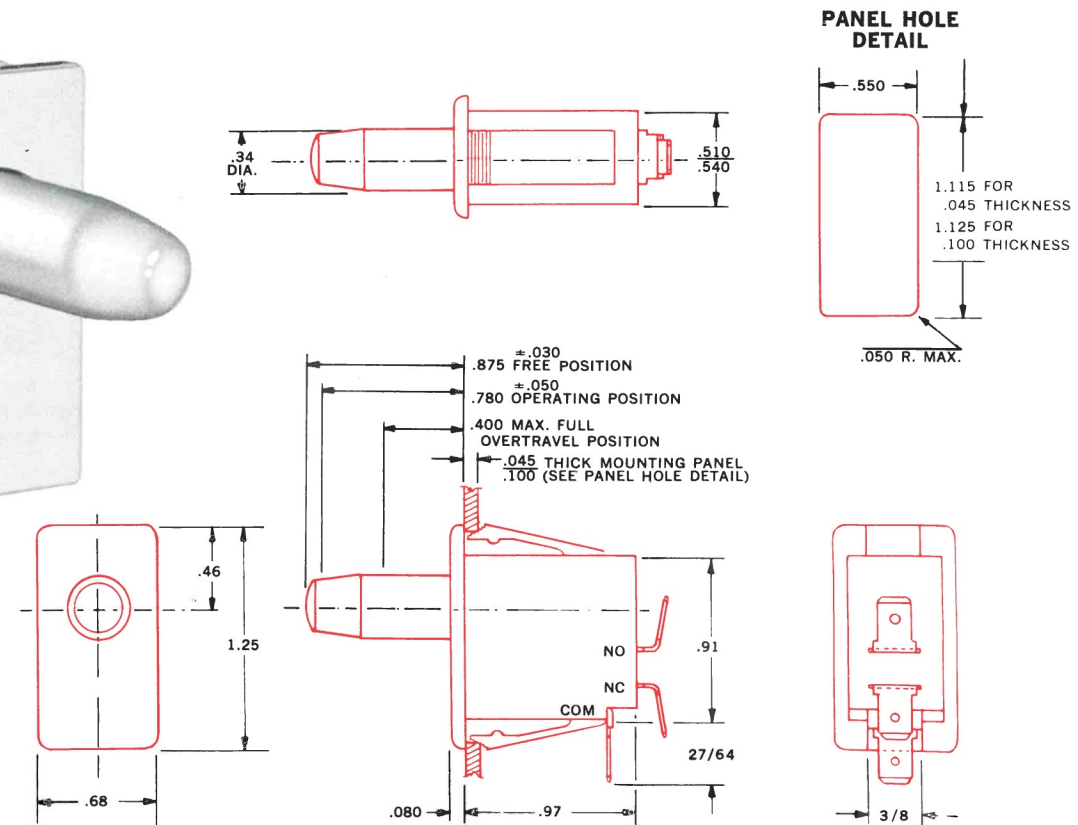
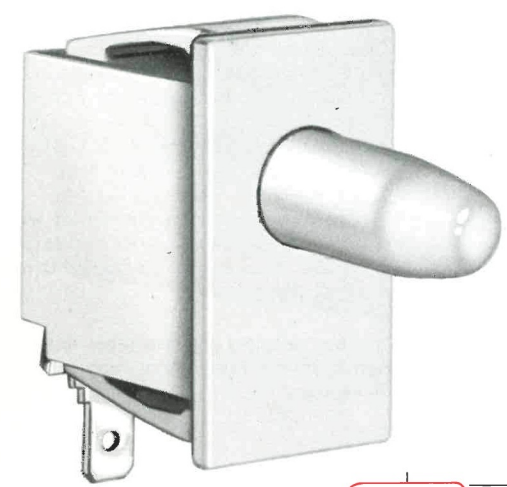
**BUTTON VARIATIONS**—Several button lengths are available without extra charge. Special button lengths, forms and colors may be had with nominal set-up and/or tooling charge.

MATERIALS		
PARTS	SERIES E19	SERIES E20
Case	General purpose phenolic	General purpose phenolic
Actuating button	Nylon	Nylon
Common terminal	Brass (70% Copper, 30% Zinc)	Silver Plated Brass (.00002 to .00005 thick)
NO and NC terminals	Brass (70% Copper, 30% Zinc)	Copper
Moving Blade	Spring Brass	Silver Plated Berylco (.00002 to .00005 thick)
Contacts	Silver-Cadmium Oxidized	Silver-Cadmium Oxidized
Spring	Stainless steel	Stainless steel
Aux. Actuators	Cold-Rolled Steel—White Nickel Plated (.00002 to .00005 thick)	Cold-Rolled Steel—White Nickel Plated (.00002 to .00005 thick)
Roller	Sintered Stainless Steel	Sintered Stainless Steel

<b>RATING:</b> E19—15 amps 125/250 VAC 3/4 H.P., 125 VAC—1 1/2 H.P., 250 VAC  <b>RATING:</b> E20—20 amps 125/250 VAC 1 H.P., 125 VAC—2 H.P., 250 VAC  Und. Lab. Inc. listed, and CSA approved.														
	E19-00A	E20-00A	E19-00R	E19-00H	E20-00H	E19-50H	E20-50H	E19-00K	E20-00K	E19-50K	E20-50K	E19-00J	E20-00J	E19-00M
<b>OPERATING FORCE</b> (Max. in ozs.)	30	45	22	7	15	4 1/2	8 1/2	7	15	4 1/2	9	30	45	30
<b>PRETRAVEL</b> (Max. in inches)	.050	.100	.080	.250	.312	.343	.525	.250	.312	.312	.525	.050	.100	.050
<b>OPERATING POINT</b> (in inches)	.285±.030	.248±.030	.269±.030	.312±.062	.468±.062	.281±.062	.437±.062	.718±.062	.860±.062	.687±.062	.828±.062	.670±.030	.630±.030	.812±.030
<b>OVERTRAVEL</b> (Min. in inches)	.080	.050	.032 (either direction)	.187	.156	.187	.156	.187	.156	.187	.146	.080	.050	.218
<b>MOVEMENT DIFFERENTIAL</b> (inches, ea. pole)	.015	.015	—	.093	.050	.140	.080	.093	.045	.140	.073	1.015	.015	.015
Reset Button Pretravel (Max. in inches)	—	—	.080	—	—	—	—	—	—	—	—	—	—	—
Reset Button Operating Point (in inches)	—	—	1.156±.030	—	—	—	—	—	—	—	—	—	—	—
<b>ACTUATOR LENGTH</b> (Tolerance ± 1/32")	—	—	—	1 1/2"	2 7/32"	1 3/4"	1 3/32"	1 3/8"	1 1/16"	1 5/8"	1 5/16"	—	—	—
<b>REMARKS:</b> *Measured above reference line NOTE: Nominal button rest height is 2 1/4"														
NOTE: Reset button 1/8" diameter														
Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.														
NOTE: Ferrule on "J" and "M" type is 3/8"—32 NEF thread with .312" flats .406" high														



panel mount pushbutton/single pole



MOMENTARY-PUSH-PULL (RESET)-"CHEAT" INTERLOCK-PUSH-PUSH

- Rock-Wipe Contact Action
- Custom Designs
- Snap-in Panel Mounting
- Large Overtravel
- Long-Life Coil Spring Snap-Action Mechanism

ALSO AVAILABLE WITH GOLD CROSSPOINT CONTACTS

Gold alloy contact prisms welded to contact brackets, at right angles to each other, make low energy switching possible without the necessity of redesigning. Metallurgically bonded contacts contribute to reliable performance in applications from 5 to 100 milliamperes at 4 to 30 volts. Initial insertion resistance far below 50 milliohms.

**CIRCUITRY**—Available in single pole double throw or single pole single throw. Double pole panel mount switches also available. (See pages 14-15 for complete information.)

**TERMINALS**—This switch series has quick connect terminals .187" x .020".

**APPLICATIONS**—Door and drawer light/interlock switch; test function switch; EDP and business machine start switch; photocopy machines and other equipment requiring either manual or mechanical actuation and panel mounting.

Switch E69-50A has button with special shaft to accept auxiliary push buttons for manual actuation.

MATERIALS	
Case	White Nylon
Actuating Button	White Acetal
Terminals	Brass
Moving Blade	Beryllium Copper
Contacts	Silver Cadmium Oxidized
Spring	Stainless Steel

**SINGLE POLE PUSH-PUSH PANEL MOUNT SWITCH E69-60A**

**OPERATING CHARACTERISTICS**

Rest Position	1.030 ± .035
Pretravel	.250 Stroke
Full Overtravel	.750 ± .030
Operating Force	30 oz. Max.
Electrical Rating	10 Amp, 125/250 VAC 1/3 H.P. 125/250 VAC

Und. Lab. Inc. listed, and CSA approved.

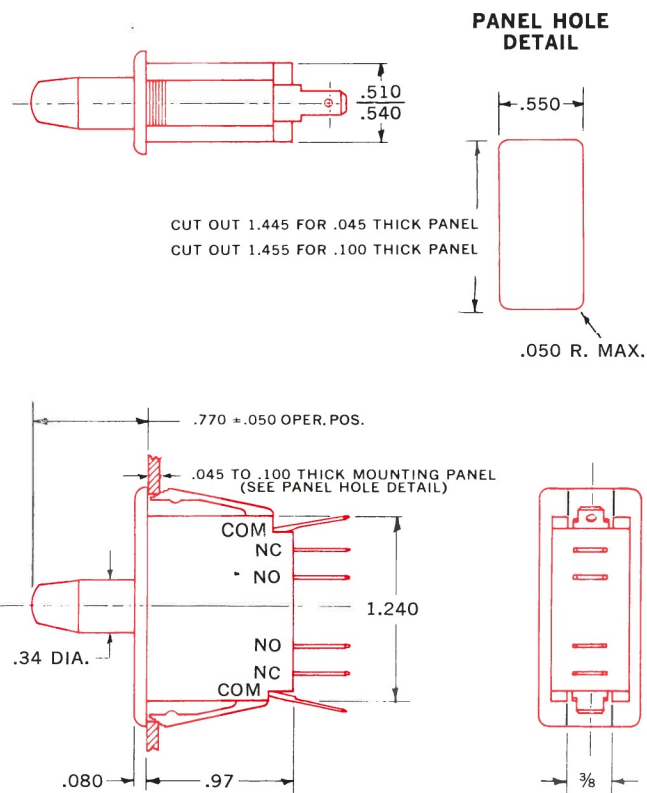
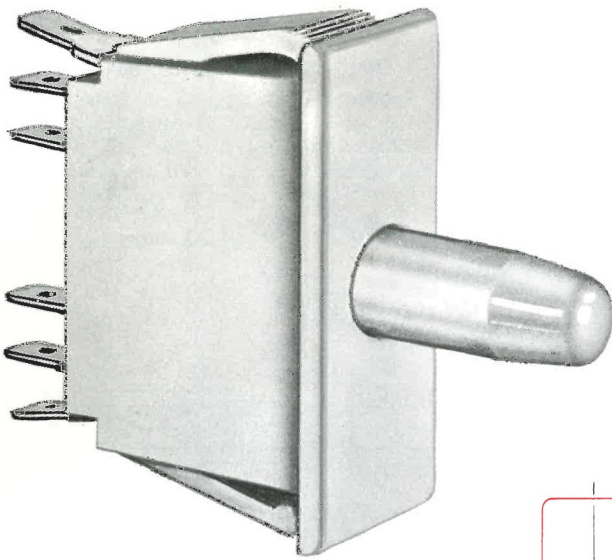
Technical drawings of the E69-60A pushbutton showing various views and dimensions:

- PANEL HOLE DETAIL:** Shows a rectangular hole with a width of .550 and a height of 1.115 for .045 thickness and 1.125 for .100 thickness. The hole has a .050 R. MAX. radius.
- Side View:** Shows the button with a .34 DIA. shaft and a .510 x .540 base.
- Front View:** Shows the button with a .46 height and a .68 width.
- Internal Mechanism:** Shows the internal components with dimensions: .875 FREE POSITION, .780 OPERATING POSITION, .400 MAX. FULL OVERTRAVEL POSITION, .045 THICK MOUNTING PANEL, .100 (SEE PANEL HOLE DETAIL), .080, .97, .91, 27/64, and 3/8.

	E69-00A	E69-40A	E69-50A	E69-20A	E69-30A	E69-60A
<b>RATING:</b> 10 amp, 125/250 VAC 1/3 H.P. 125/250 VAC  Und. Lab. Inc. listed, and CSA approved.	 Basic Momentary Action	 Short Button Momentary	 For Auxiliary Push Button	 Push-Pull (Reset)	 Momentary "Cheat" Interlock	 Push-Push (Alt Action)
<b>REST POSITION</b>	.845 — .905	.440 — .500	.420 — .480	.920 — .980	.730 — .790	.995 — 1.065
<b>PRETRAVEL</b> Max. (in inches)	.125	.125	.155	.150	.125	.250
<b>OPERATING POINT*</b>	.720 — .820	.315 — .415	.360 — .410	.800 — .900	.710 — .610	—
<b>OVERTRAVEL</b> Min. (in inches)	.375	.375	.175	.300	.100	—
<b>MOVEMENT DIFFERENTIAL</b> Max. (in inches)	.045	.045	.045	.045	.045	—
<b>OPERATING FORCE</b> Max. (in inches)	15 oz.	15 oz.	15 oz.	6 oz.	15 oz.	30 oz.
<b>FULL OVERTRAVEL POSITION</b> Max. (in inches) "A" Dimension	.400	.080	.120	.500	.520	.780
<b>REMARKS:</b> *Measured above reference line. Also available with Gold Crosspoint Contacts for low energy switching applications . . . see pages 30 thru 33.						
<b>BUSHING DETAIL</b>	<p>Side View: .310, .145, .311, .055/.060</p> <p>Button Receiving Slot: .215 DIA., .220, .138, .142, .225 DIA., .725, .030</p>					
<b>BUTTON DETAIL</b>	<p>Side View: .315 DIA., .080, .350</p> <p>Front View: .125, .450</p> <p>PULLED OUT: .730/.790, .750 ± .030</p>					



panel mount pushbutton/double pole



MOMENTARY—PUSH-PULL (RESET) — “CHEAT” INTERLOCK — “PUSH-PUSH”

- Rock-Wipe Contact Action
- Custom Designs
- Snap in Panel Mounting
- Large Overtravel
- Long Life Coil Spring Snap-Action Mechanism

ALSO AVAILABLE WITH GOLD CROSSPOINT CONTACTS

Gold alloy contact prisms welded to contact brackets, at right angles to each other, make low energy switching possible without the necessity of redesigning. Metallurgically bonded contacts contribute to reliable performance in applications from 5 to 100 milliamperes at 4 to 30 volts. Initial insertion resistance far below 50 milliohms.

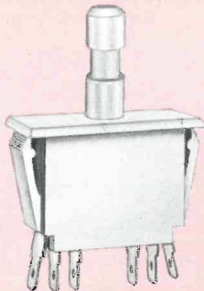
**CIRCUITRY**—Available in double pole double throw or double pole single throw. Single pole panel mount switches also available. (See pages 12-13 for complete information.)

**TERMINALS**—This switch series has quick connect terminals .187" x .020".

**APPLICATIONS**—Door and drawer light/interlock switch; test function switch; EDP and business machine start switch; photo-copy machines and other equipment requiring either manual or mechanical actuation and panel mounting.

Switch E79-50A has button with special shaft to accept auxiliary push buttons for manual actuation.

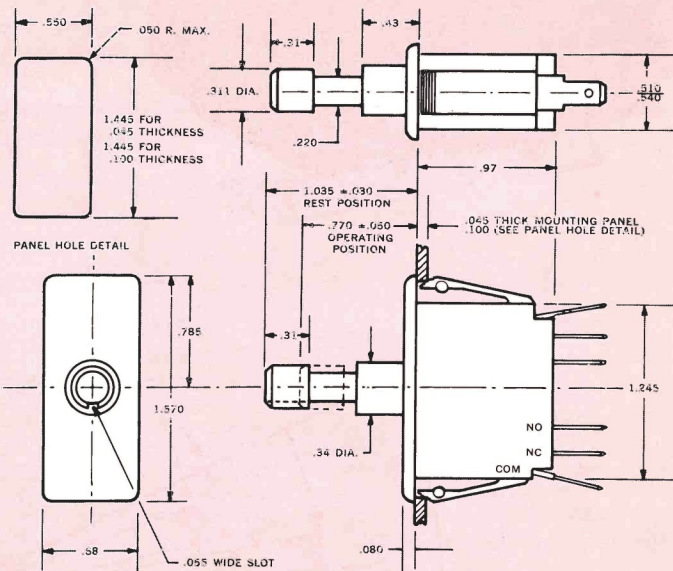
MATERIALS	
Case	White Nylon
Actuating Button	White Acetal
Terminals	Brass
Moving Blade	Beryllium Copper
Contacts	Silver Cadmium Oxidized
Spring	Stainless Steel



DOUBLE POLE PUSH-PUSH  
PANEL MOUNT SWITCH  
E79-60A  
OPERATING CHARACTERISTICS

Rest Position	1.030 ± .035
Pretravel	.250 Stroke
Full Overtravel	.750 ± .030
Operating Force	35 oz. Max.
Electrical Rtg.	10 Amp, 125/250 VAC
	1/3 H.P. 125/250 VAC

Und. Lab. Inc. listed, and CSA approved.

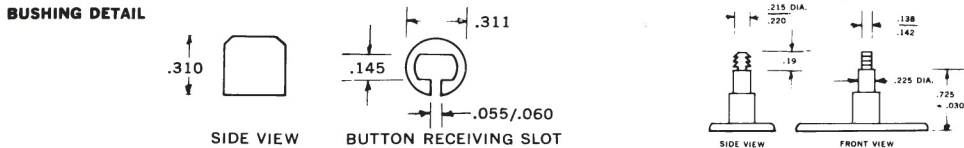


**RATING:** 10 Amp, 125/250 VAC  
1/3 H. P. 125/250 VAC

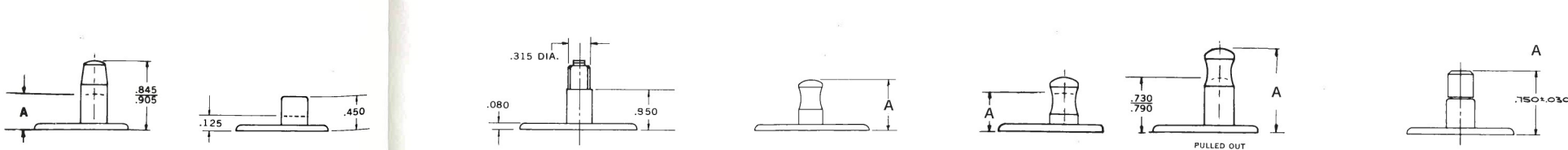
Und. Lab. Inc. listed, and CSA approved.

	E79-00A	E79-40A	E79-50A	E79-20A	E79-30A	E79-60A
Basic Momentary Action						
Short Button Momentary						
For Auxiliary Pushbutton						
Push-Pull (Reset)						
Momentary "Cheat" Interlock						
Push-Push (Alt. Action)						
REST POSITION (in inches)	.845—.905	.440—.500	.420—.480	.920—.980	.730—.790	.995—1.065
PRETRAVEL Maximum (in inches)	.125	.125	.125	.150	.125	.250 Stroke
OPERATING POINT* (in inches)	.720—.820	.315—.415	.300—.400	.800—.900	.710—.610	—
OVERTRAVEL Minimum (in inches)	.375	.375	.175	.300	.100	.050
MOVEMENT DIFFERENTIAL Maximum (in inches)	.075	.075	.075	.075	.075	.030
OPERATING FORCE Maximum	24 oz.	24 oz.	24 oz.	18 oz.	26 oz.	20 oz.
FULL OVERTRAVEL POSITION Maximum (in inches) "A" Dimension	.400	.080	.120	.500	.520	.980

**REMARKS:** \*Measured above reference line  
Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.



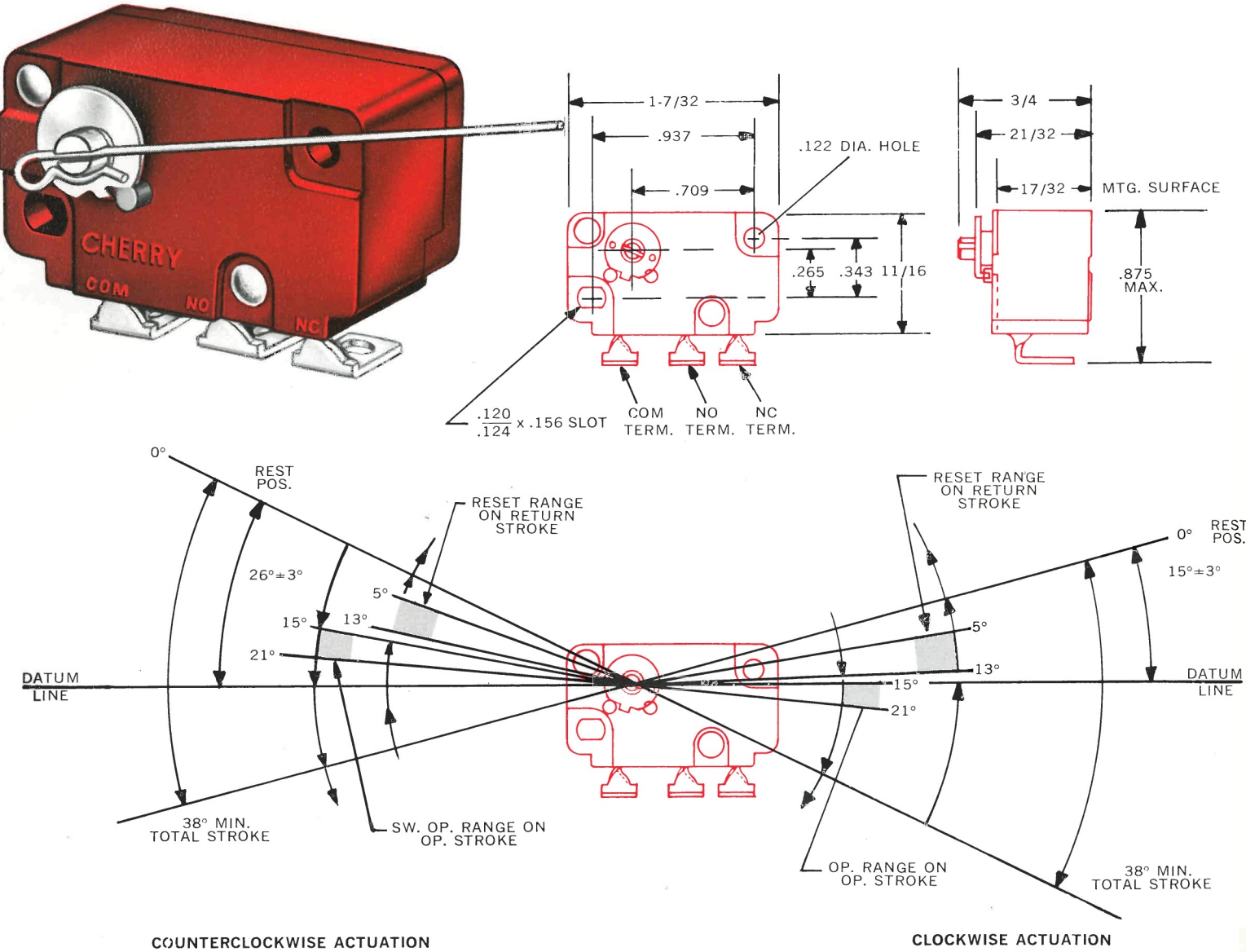
BUTTON DETAIL





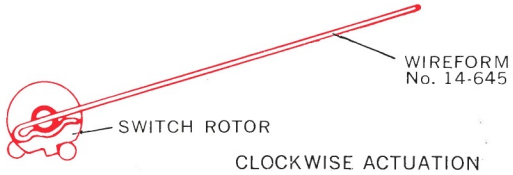
low torque switches

SERIES E51



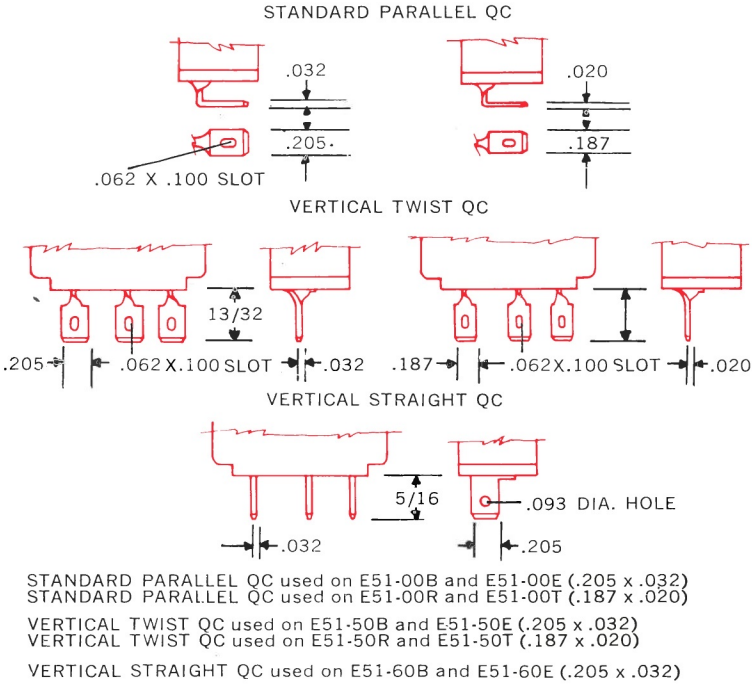
- Long Life Coil Spring Mechanism
- Low Torque Rotary Actuation
- Clockwise or Counter Clockwise
- Rock Wipe Contact Action
- Combination Quick Connect & Solder Terminals
- Double Rivet Sturdy Case Construction

**ACTUATORS**—Wireform actuators are supplied unassembled with each E51 switch. Wireforms may be readily assembled to switch rotor as illustrated below.



**CIRCUITRY**—E51 series is available in single pole double throw and single pole single throw either normally open or normally closed. In general normally open may be specified by adding 01 to suffix numbers, and normally closed by adding 02. For example E51-00B is double throw, E51-01B is normally open and E51-02B is normally closed.




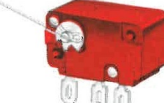
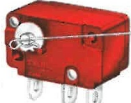
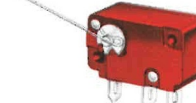
**TERMINALS**—All terminals are combination quick connect and solder. Several types are available as shown below.



ALL E51 SERIES SWITCHES HAVE THESE CHARACTERISTICS:

OPER. TORQUE MAX. 4.0 inch grams  
OVERTRAVEL 15° Min.  
MOVEMENT DIFF. 3° Min.

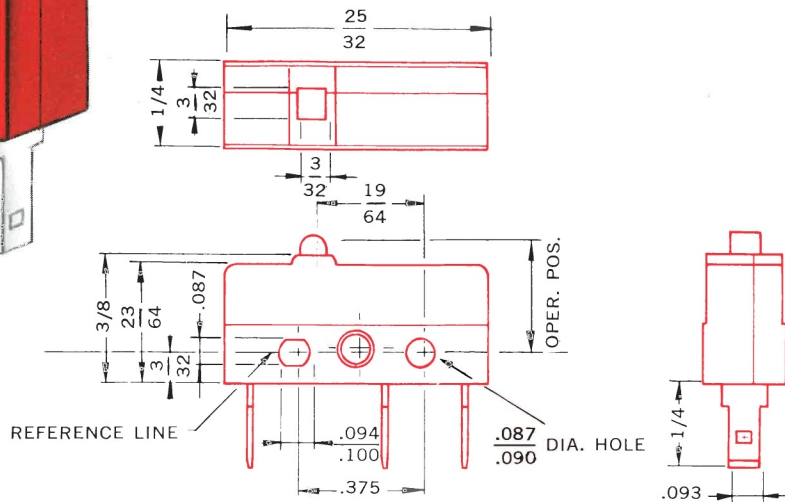
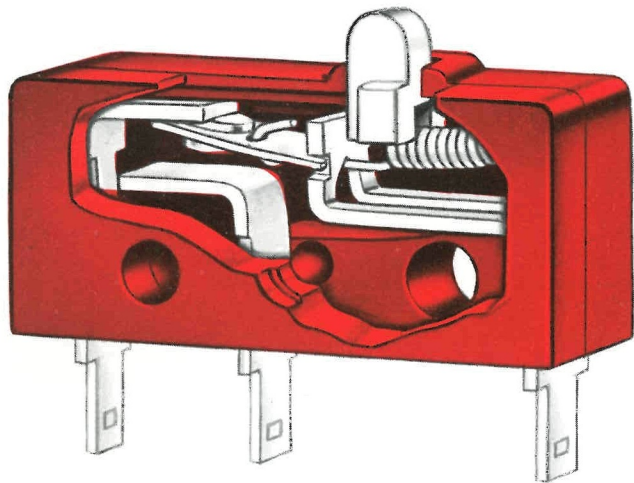
MATERIAL	
PARTS	E51 SERIES
Case	General purpose phenolic
Common terminal	Silver Plated Brass (.00002 to .00005 thick.).
NO and NC terminals	Silver Plated Brass (.00002 to .00005 thick.).
Moving blade	Spring Brass
Contacts	Gold Flashed (.00003 to .00004 thick.) Silver-Cadmium Oxidized.
Spring	Stainless Steel

RATING: E51—5 amps., 125/250 VAC Und. Lab. Inc. listed, and CSA approved.										
	E51-00B	E51-00R	E51-00E	E51-00T	E51-50B	E51-50R	E51-50E	E51-50T	E51-60B	E51-60E
DIRECTION OF ACTUATOR	Clockwise	Clockwise	Counter Clockwise	Counter Clockwise	Clockwise	Clockwise	Counter Clockwise	Counter Clockwise	Clockwise	Counter Clockwise
TERMINALS	Standard Parallel .205"	Standard Parallel .187"	Standard Parallel .205"	Standard Parallel .187"	Vertical Twist .205"	Vertical Twist .187"	Vertical Twist .205"	Vertical Twist .187"	Vertical Straight	Vertical Straight
REMARKS:	Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.									



subminiature

SERIES E61—LIGHT FORCE  
SERIES E62—STANDARD FORCE



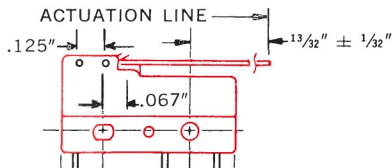
- Long Life Coil Spring Mechanism
- Large Overtravel
- Rock Wipe Contact Action
- Integral Hinged Actuator
- Small Compact Size
- Custom Designs

NOTE: .093" Quick Connect terminals are standard. To order solder terminals add 10 to suffix number. To order .110" Quick Connect terminals add 30 to suffix number. For example: The basic E61-00A becomes E61-10A for solder terminals and E61-30A for .110" QC terminals. See chart below.

TERMINAL TYPES	S.P.D.T.	S.P.S.T.N.O.	S.P.S.T.N.C.
.093" QC	E61-00A	E61-01A	E61-02A
SOLDER	E61-10A	E61-11A	E61-12A
.110" QC	E61-30A	E61-31A	E61-32A

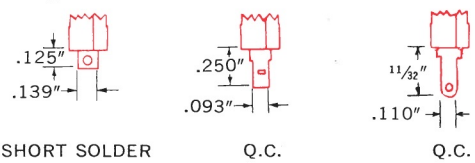
Also applies to E62 Series.

ACTUATORS—Many special forms and lengths of actuators are available with tooling charges applying. Standard type integral hinged lever and roller actuators are available in choice of 2 pivot positions. Actuator lengths are dimensioned from centerline of switch mounting hole as shown.



CIRCUITRY—Contact arrangement available in choice of single pole double throw or single pole single throw, either normally open or normally closed. In general normally open may be specified by changing suffix number from 00 to 01 and normally closed by changing suffix number to 02. Example: E61-00A is double throw, E61-01A is normally open, and E61-02A is normally closed. (Note: Ganged modules to provide 2, 3, 4, and 5 switches side by side are available (refer to page 38 in this catalog).

TERMINALS—Subminiature series is available with quick connect .093" wide (mates with AMP part no. 60432-1) and .110" wide (mates with AMP part no. 42399-2). Also available in short solder terminal .139" wide x .125" long.



MATERIALS	
PARTS	SERIES E61 & SERIES E62
Case	General purpose phenolic
Actuating button	Acetal
Common terminal	Silver Plated Brass (.00002 to .00005 thick)
NO and NC terminals	Silver Plated Commercial Bronze (.00002 to .00005 thick)
Moving blade	Beryllium
Contacts	Fine Silver
Spring	Stainless Steel
Auxiliary Actuators	Cold-Rolled Steel—White Nickel Plated (.00002 to .00005 thick)

RATING: E61—5 Amps., 125/250 VAC  
RATING: E62—10.1 Amps., 125/250 VAC—1/4 H.P., 125 VAC  
Und. Lab. Inc. listed, and CSA approved.



E61-00A/E62-00A

OPERATING FORCE E61 SERIES (Maximum Grams)	90
OPERATING FORCE E62 SERIES (Maximum Grams)	212
PRETRAVEL (Maximum inches)	.030
OPERATING POINT* (in inches)	.330 ± .015
OVERTRAVEL (Minimum inches)	.035
MOVEMENT DIFFERENTIAL (Maximum inches)	.004
ACTUATOR LENGTH (Tolerance of ± 1/32")	—

REMARKS: \*Measured above reference line  
NOTE: Nominal button rest height is .353" ± .015"  
Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.



E61-00H/E62-00H

24
56
.125
.350 ± .030
.040
.020
9/32"



E61-50H/E62-50H

8
20
7/16"
.350 ± .030
.050
.050
13/32"



E61-00K/E62-00K

26
65
7/64"
.570 ± .030
.030
.020
13/64"



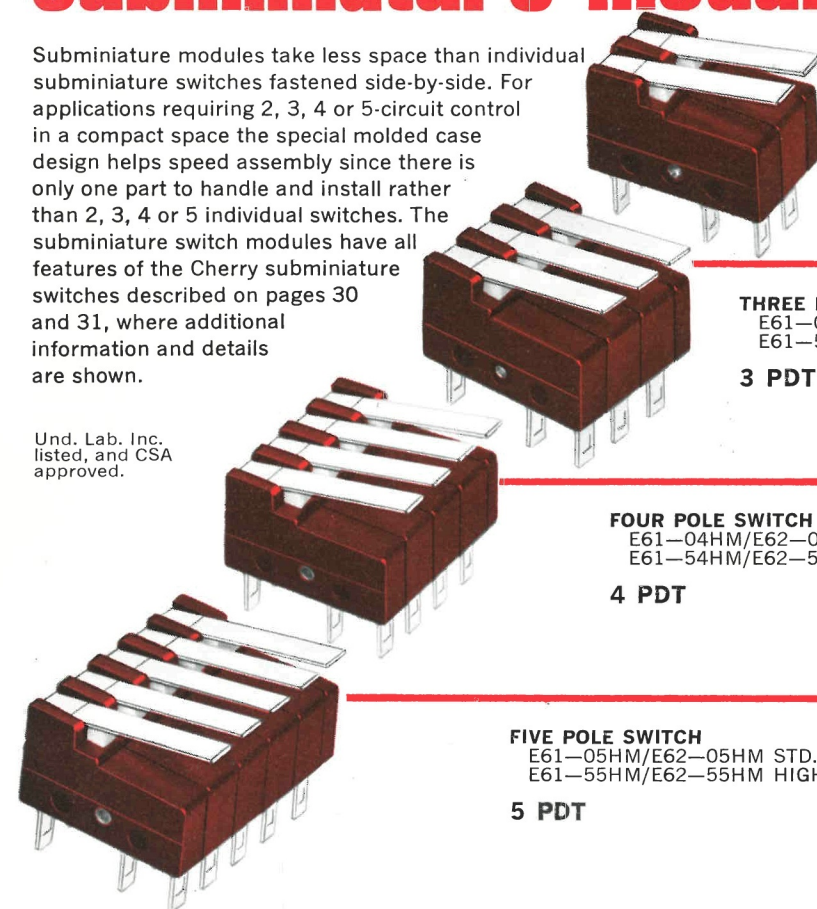
E61-50K/E62-50K

9
22
13/32"
.570 ± .030
.040
.050
21/64"

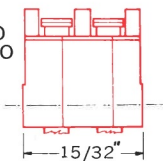


## SERIES E62

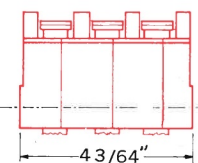
Und. Lab. Inc.  
listed, and CSA  
approved.



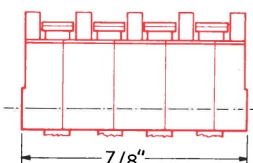
2 PDT



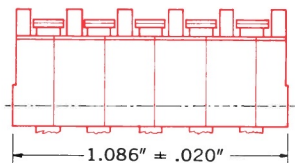
### 3 PDT



#### 4 PDT



5 PDT



Q.C.

SOLDER

Q.C.

.250

.125

.139

11/32

.093

.110

HOLE .058" DIA.

MATES WITH AMP. PART NO. 60432-1

**ACTUATORS**—Many special forms and lengths of actuators are available with tooling charges applying. Standard type integral hinged lever and roller actuators are available in choice of 2 pivot positions. Actuator lengths are dimensioned from centering of switch mounting hole as shown.

ACTUATION LINE  
STANDARD LEVER RATIO  
PIVOT POSITION

ACTUATION LINE  
HIGH LEVER RATIO  
PIVOT POSITION

REFERENCE LINE

ACTUATOR LENGTH  
MEASURED FROM  
CENTERLINE OF  
SWITCH MOUNTING HOLE  
TO ACTUATION LINE

3 1/64

.375

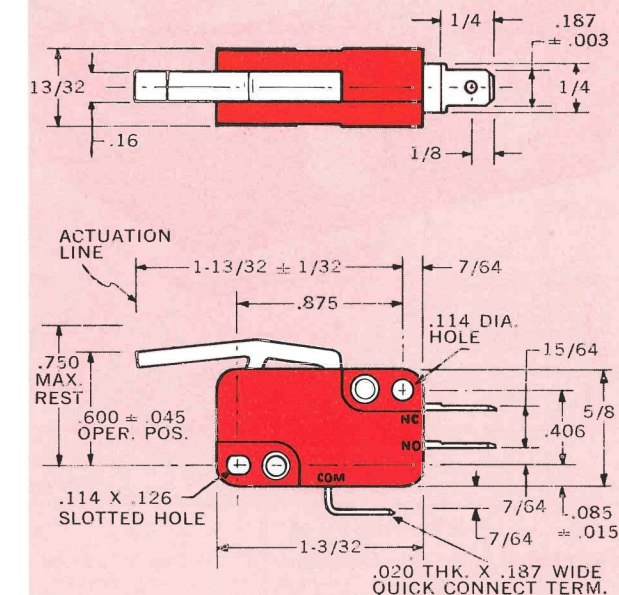
FOR COMPLETE DIMENSIONS SEE PAGES 18 AND 19.

**miniature** **SERIES E34-50N**  
**SERIES E34-90N**

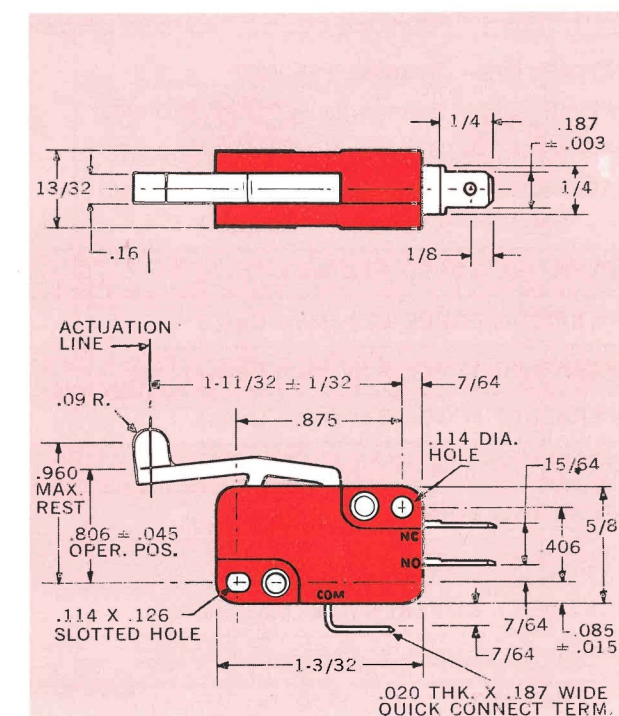
Molded Delrin unitary hinged lever combines switch actuator and button.



Molded Delrin lever combines actuator and button. Has action similar to conventional one-inch-long metal actuators. Except for unitary hinged lever is similar to E34-50H shown on pages 22-23. Molded Delrin lever also available on E22, E23 and E33 Series.



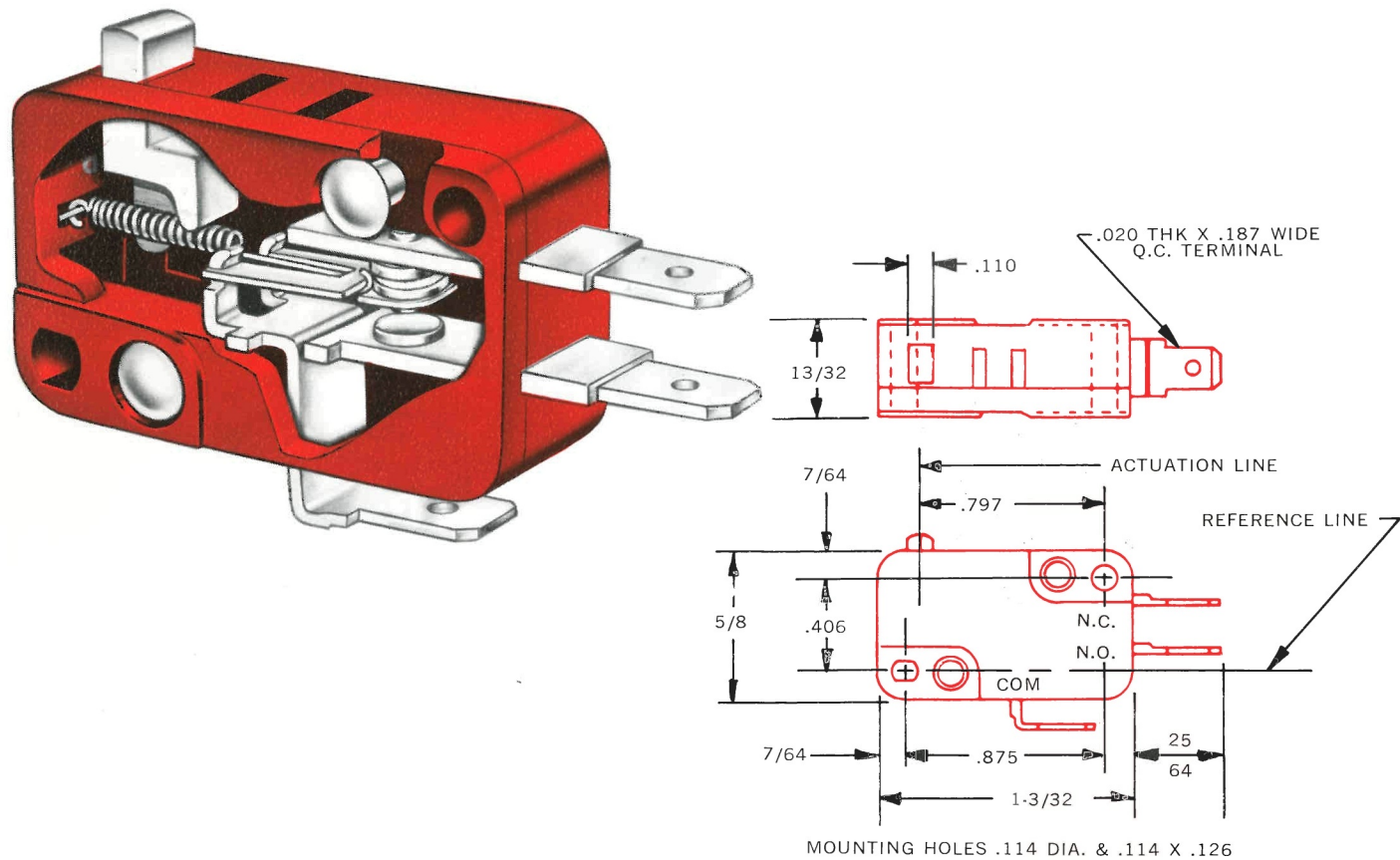
Molded Delrin lever combines actuator and button to simulate roller type actuators. Accepts dual-direction cam or slide actuation. Except for unitary hinged lever is similar to E34-50K shown on pages 22-23. Molded Delrin lever also available on E22, E23 and E33 Series.





standard force/miniature

SERIES E22 SERIES E33  
SERIES E23 SERIES E34



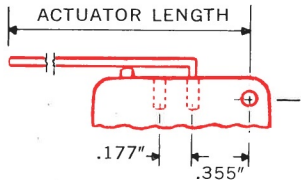
- Long Life Coil Spring Mechanism
- Large Overtravel
- Rock Wipe Contact Action
- Wide Rounded Wear Resistant Button
- Integral Hinged Actuators
- Custom Designs

NOTE: .187" Quick Connect terminals are standard. To order screw terminals add 10 to suffix number. To order solder terminals add 20 to suffix number. For example: The basic E23-00A becomes E23-10A for screw terminals and E23-20A for solder terminals. See chart below.

TERMINAL TYPES	S.P.D.T.	S.P.S.T.N.O.	S.P.S.T.N.C.
QC	E23-00A	E23-01A	E23-02A
SCREW	E23-10A	E23-11A	E23-12A
SOLDER	E23-20A	E23-21A	E23-22A

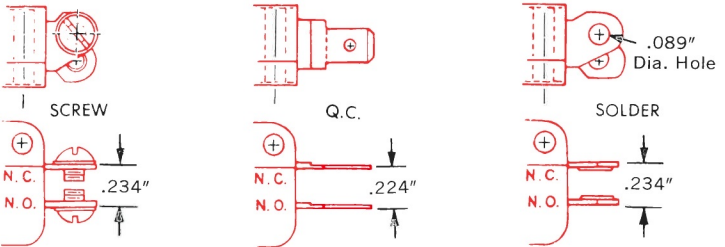
Also applies to E22, E33 and E34 Series.

ACTUATORS—Many special forms and lengths of actuators are available with tooling charges applying. Standard type integral hinged lever and roller actuators are available in choice of 2 pivot positions. Actuator lengths are dimensioned from centerline of switch mounting hole as shown here.



CIRCUITRY—Contact arrangement available in choice of single pole double throw or single pole single throw, either normally open or normally closed. In general normally open may be specified by changing suffix number from 00 to 01 and normally closed by changing suffix number to 02. Example: E34-00A is double throw, E34-01A is normally open and E34-02A is normally closed.

TERMINALS—Choice of Screw, Solder, or Quick Connect Terminals. Unless otherwise specified switches are furnished with QC terminals .187 wide x .020 thick. Also available are .250 wide x .032 QC terminals.



MATERIALS

PARTS	SERIES E22	SERIES E23, E33	SERIES E34
Case	General purpose phenolic	General purpose phenolic	General purpose phenolic
Actuating button	Acetal Resin	Acetal Resin	Acetal Resin
Common terminal	Silver Plated Brass (.00002 to .00005 thick)	Silver Plated Brass (.00002 to .00005 thick)	Silver Plated Brass (.00002 to .00005 thick)
NO and NC terminals	Brass (70% Copper, 30% Zinc)	Brass (70% Copper, 30% Zinc)	Copper
Moving blade	Spring Brass	E23 Spring Brass, E33 Silver Plated Beryllium Copper	Silver Plated Beryllium Copper (.00002 to .00005 thick)
Contacts	Fine Silver	Silver Cadmium Oxidized	Silver-Cadmium Oxidized
Spring	Stainless Steel	Stainless Steel	Stainless Steel
Auxiliary Actuators	Aluminum used on 2 3/4" Long actuator	Cold Rolled Steel-White Nickel Plated (.00002 to .00005 thick)	Cold Rolled Steel-White Nickel Plated (.00002 to .00005 thick)
Roller		Sintered Stainless Steel	Sintered Stainless Steel

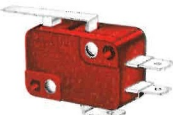
RATING: E22— 3 Amps., 125 VAC  
RATING: E23— 5 Amps., 1/4 H.P., 125/250 VAC  
RATING: E33—10 Amps., 1/2 H.P., 125/250 VAC  
RATING: E34—15 Amps., 1/2 H.P., 125/250 VAC  
Und. Lab. Inc. listed, and CSA approved.



—00A



—00H



—50H

OPERATING FORCE E22 (Max. Gms.)	75	75	35
OPERATING FORCE E23 (Max. Gms.)	170	170	86
OPERATING FORCE E33 (Max. Gms.)	285	285	144
OPERATING FORCE E34 (Max. Gms.)	400	400	200
PRETRAVEL (Max. inches)	.047	.062	.125
OPERATING POINT* (in inches)	.578 ± .020	.600 ± .020	.600 ± .045
OVERTRAVEL (Minimum inches)	.050	.050	.090
MOVEMENT DIFFERENTIAL (Max. inches)	.010	.016	.030
ACTUATOR LENGTH (Tolerance of ± 1/32")	—	27/32"	1 13/32"

REMARKS: \*Measured above reference line  
NOTE: Nominal button rest height is 39/64"

Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.



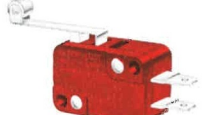
—50HL



—00K



—50K



—50KL



—50P

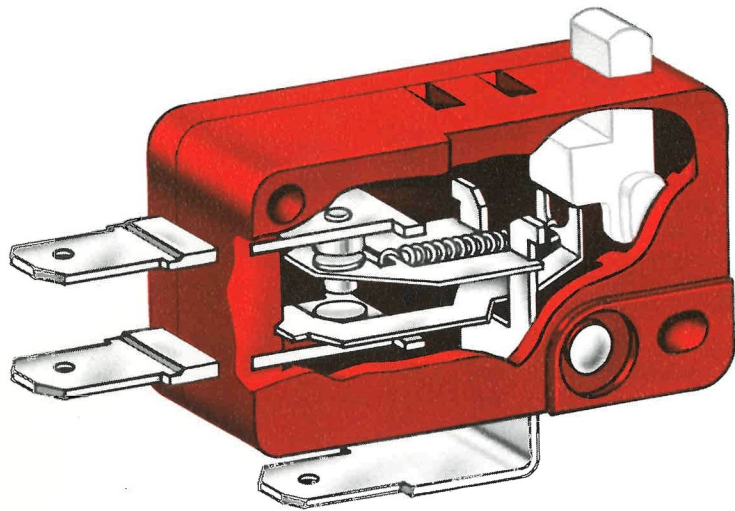
15	75	35	15	35
51	170	86	51	86
86	285	144	86	144
120	400	200	120	200
.200	.047	.125	.200	.125
.600 ± .062	.806 ± .030	.806 ± .045	.806 ± .062	1.045 ± .045
.140	.040	.085	.140	.085
.050	.010	.030	.050	.030
1 9/16"	1 3/16"	1 11/32"	1 1/2"	1 11/32"



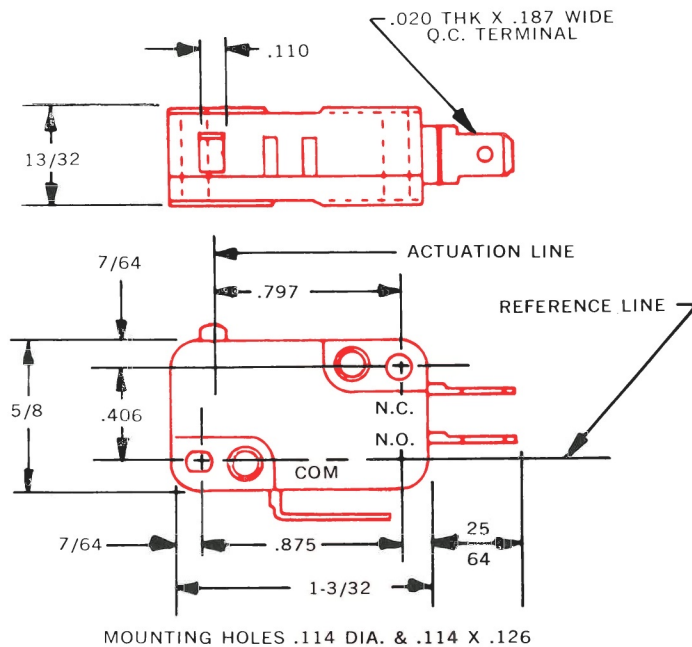
# light force/miniature

## SERIES E22—SERIES E23

## SERIES E33—SERIES E34



Added internal actuator increases leverage, reduces operating force while maintaining high contact pressure.



- Low Operating Force
- Long Life Coil Spring Mechanism
- Large Overtravel
- Rock Wipe Contact Action
- Integral Hinged Actuators
- Custom Designs

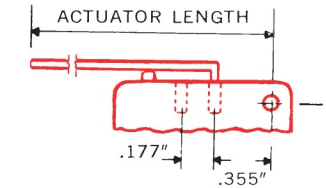
**NOTE:** .187" Quick Connect terminals are standard. Normally, to order screw terminals add 10 to suffix number. To order solder terminals add 20 to suffix number. For example: The basic E22-00AX becomes E22-10AX for screw terminals and E22-20AX for solder terminals. See chart below.

**EXCEPTIONS:** When ordering —55HX, —75HX, —75KX or —85HX switches, do **not** change suffix number. Simply state on order whether QC, screw or solder terminal types are desired.

TERMINAL TYPES	S.P.D.T.	S.P.S.T.N.O.	S.P.S.T.N.C.
QC	E22-00AX	E22-01AX	E22-02AX
SCREW	E22-10AX	E22-11AX	E22-12AX
SOLDER	E22-20AX	E22-21AX	E22-22AX

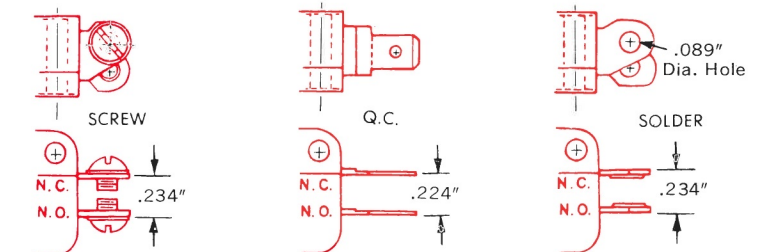
Also applies to E23, E33 and E34 Series.

**ACTUATOR**—Many special forms and lengths of actuators are available with tooling charges applying. Standard type integral hinged lever and roller actuators are available in choice of 2 pivot positions. Actuator lengths are dimensioned from centerline of switch mounting hole as shown here.



**CIRCUITRY**—Contact arrangement available in choice of single pole double throw or single pole single throw, either normally open or normally closed. In general normally open may be specified by changing suffix number from 00 to 01 and normally closed by changing suffix number to 02. Example: E22-00AX is double throw, E22-01AX is normally open and E22-02AX is normally closed.

**TERMINALS**—Choice of Screw, Solder, or Quick Connect Terminals. Unless otherwise specified switches are furnished with QC terminals .187 wide x .020 thick. Also available are .250 wide x .032 QC terminals.



### MATERIALS

PARTS	SERIES E22	SERIES E23, E33	SERIES E34
Case	General purpose phenolic	General purpose phenolic	General purpose phenolic
Actuating button	Acetal Resin	Acetal Resin	Acetal Resin
Common terminal	Silver Plated Brass (.00002 to .00005 thick)	Silver Plated Brass (.00002 to .00005 thick)	Silver Plated Brass (.00002 to .00005 thick)
NO and NC terminals	Brass (70% Copper, 30% Zinc)	Brass (70% Copper, 30% Zinc)	Copper
Moving blade	Spring Brass	E23 Spring Brass, E33 Silver Plated Beryllium Copper	Silver Plated Beryllium Copper (.00002 to .00005 thick)
Contacts	Fine Silver	Silver Cadmium Oxidized	Silver-Cadmium Oxidized
Spring	Stainless Steel	Stainless Steel	Stainless Steel
Auxiliary Actuators	Aluminum used on 2 3/4" Long actuator	Cold Rolled Steel-White Nickel Plated (.00002 to .00005 thick)	Cold Rolled Steel-White Nickel Plated (.00002 to .00005 thick)
Roller		Sintered Stainless Steel	Sintered Stainless Steel

**RATING:** E22 Series—3 Amp., 125 VAC  
**RATING:** E23 Series—5 Amp., 1/4 H.P., 125/250 VAC  
**RATING:** E33 Series—10 Amp., 1/2 H.P., 125/250 VAC  
**RATING:** E34 Series—15 Amp., 1/2 H.P., 125/250 VAC  
 Und. Lab. Inc. listed, and CSA approved.

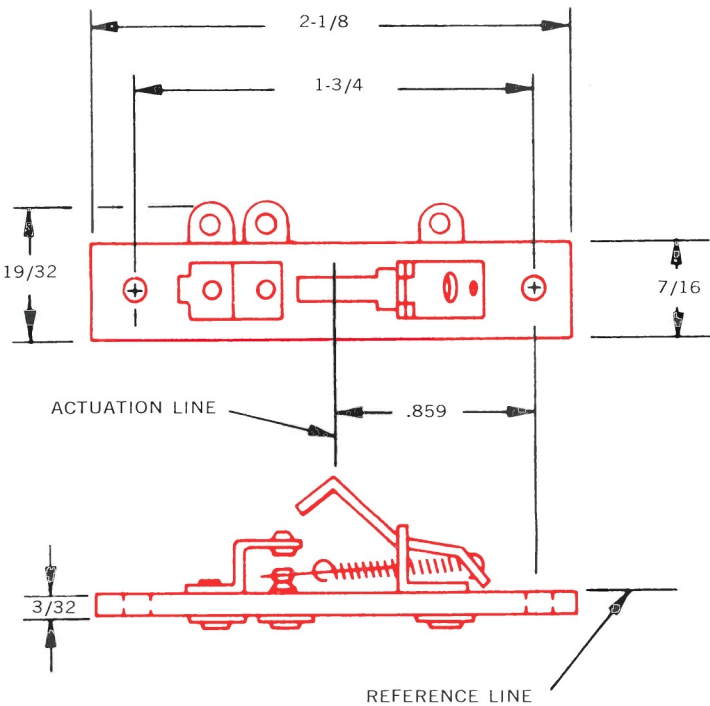
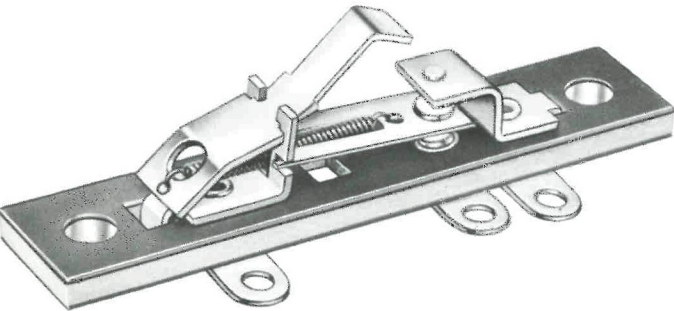
	—00AX	—50HX	—75HX	—50KX	—75KX	—55HX	—85HX
<b>E22 OPERATING FORCE</b> (Max. in grams)	15	8	5	—	—	3 1/2	2
<b>E23 OPERATING FORCE</b> (Max. in grams)	45	22	14	22	14	10	6
<b>E33 OPERATING FORCE</b> (Max. in grams)	75	37	22	37	22	17	10
<b>E34 OPERATING FORCE</b> (Max. in grams)	100	50	30	50	30	22	13
<b>PRETRAVEL</b> (Max. in inches)	.047	.125	.200	.125	.200	.300	.500
<b>OPERATING POINT*</b> (in inches)	.578 ± .020	.600 ± .045	.600 ± .062	.806 ± .045	.806 ± .062	.600 ± .078	.600 ± .125
<b>OVERTRAVEL</b> (Minimum in inches)	.050	.090	.140	.090	.140	.187	.312
<b>MOVEMENT DIFFERENTIAL</b> (Max. in inches)	.010	.030	.050	.030	.050	.065	.100
<b>ACTUATOR LENGTH</b> (Tolerances of ± 1/32")	—	1 13/32"	1 9/16"	1 11/32"	1 1/2"	2 3/4"	2.932"

**REMARKS:** \*Measured above reference line  
 NOTE: Nominal button rest height is 3 9/16"  
 Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.



basic open

SERIES S23 LIGHT FORCE  
SERIES S25 STANDARD

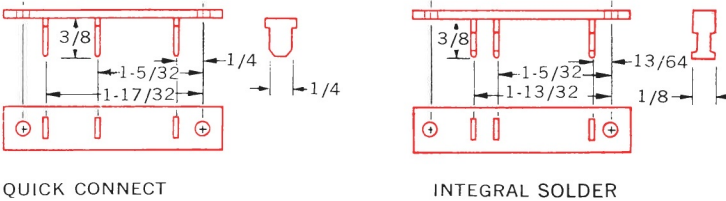


- Long Life Coil Spring Mechanism
- Rock Wipe Contact Action
- Choice of Circuitry, Terminals and Actuators
- Custom Designs

**ACTUATORS**—In addition to the standard actuators shown here many other actuator forms are available at no extra cost. Special forms can be supplied with partial tooling charge.

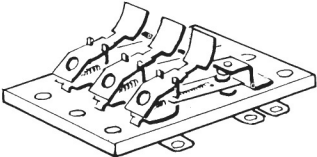
**CIRCUITRY**—Choice of single pole, double throw or single throw, either normally open or normally closed. In general, single throw may be specified by changing suffix number by 01 for normally open and 02 for normally closed. For example S25-60T is double throw, normally open is S25-61T and normally closed is S25-62T. Applies to S23 Series.

**TERMINALS**—Three standard terminal types include flat solder, integral solder and Quick Connect as shown here.

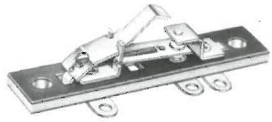
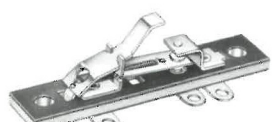
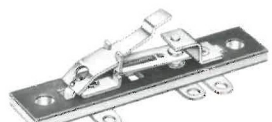
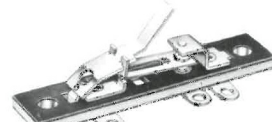
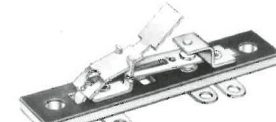


**NOTE:**  
To specify quick connect terminals change suffix "T" to "Z". To specify integral solder terminals change suffix "T" to "W".

**OTHER VARIATIONS**—Several switches can be ganged on a single panel for applications requiring multiple circuits. Mounting brackets can be provided for use other than standard panel mounting holes.



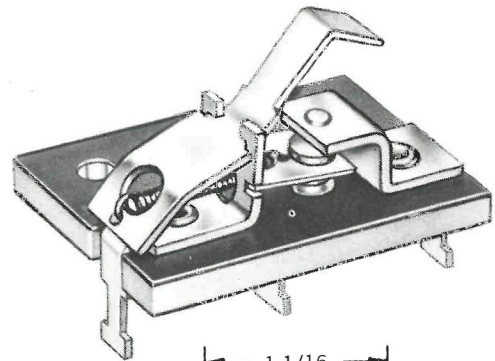
MATERIALS	
PARTS	SERIES S-23 & S-25
Panel	XXP Bakelite
Movable Blade	Spring Brass
Coil Spring	Stainless Steel
Actuator Arm	Brass
Flat Solder Terminals	Tin Plated Brass
Integral Solder Terminals	Cadmium Plated Brass
Quick Connect Terminals	Brass
Contacts	Silver Cadmium Oxidized

<b>RATING: S23</b> 5 amp, 125 VAC <b>RATING: S25</b> 10 amp, 125 VAC—5 amp, 250 VAC ¼ H.P. 125/250 VAC Und. Lab. Inc. listed, and CSA approved.						
	S23-00T/S25-00T	S23-20T/S25-20T	S23-30T/S25-30T	S23-40T/S25-40T	S23-60T/S25-60T	
	OPERATING FORCE SERIES S23 (In Ounces)	3	2¾	1½	1½	1
	OPERATING FORCE SERIES S25 (In Ounces)	9½	10	5	5	3
REST* (Maximum in inches)	.504	.507	.452	.675	.525	
OPERATING POINT* (Minimum in inches)	.353	.378	.293	.375	.300	
OVERTRAVEL (Minimum in inches)	.045	.040	.040	.093	.040	
MOVEMENT DIFFERENTIAL (Maximum in inches)	.070	.070	.070	.200	.150	
<b>REMARKS:</b> *Measured above reference line.  NOTES: 1. The S23 and S25 series switch actuator is electrically "live" and must be operated by a non-conductive part or insulated by means of nylon insulators. These are applicable to a limited number of actuator designs. (Of the types shown here only the -20T and -40T will accept insulator.) 2. Operating point is measured from top of panel to top of actuator. 3. Actuator arms shown are ½" wide, except—60T which is ¾" wide. 4. Operating force is measured at highest point on actuator.  Also available with Gold Crosspoint Contacts for low energy switching applications . . . see pages 30 thru 33.						



# miniature open

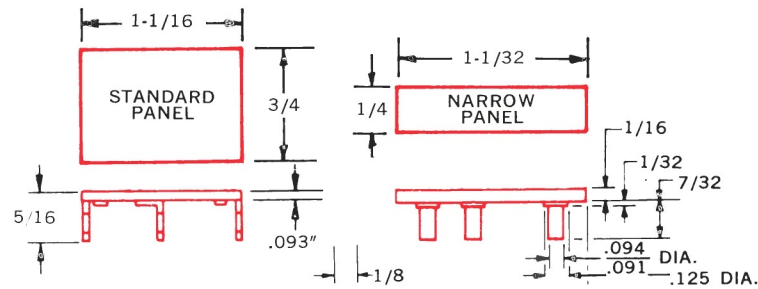
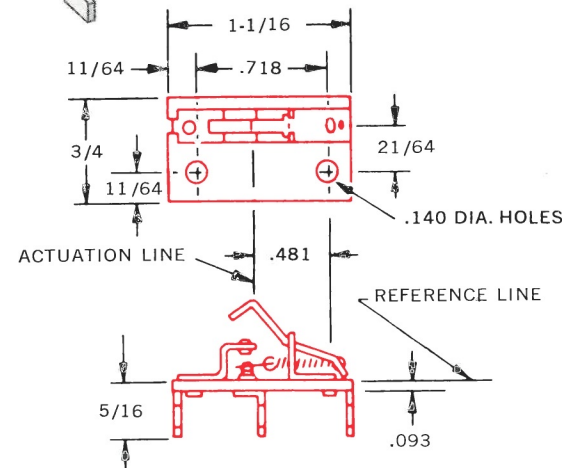
## SERIES S30



**ACTUATORS**—In addition to the standard actuator forms shown here there are many other forms available at no extra cost. Special actuator forms and lengths can be supplied with nominal tooling charge.

**CIRCUITRY**—Choice of single pole double throw or single pole single throw either normally open or normally closed. In general single throw may be specified by changing suffix number by 01 for normally open and 02 for normally closed. For example S30-20W is double throw, S30-21W is normally open and S30-22W is normally closed.

**TERMINALS**—Three standard terminal types include flat solder, integral solder and quick connect. Printed circuit terminal is available on narrow panel only (S30-20P)



**NOTE:** To specify flat solder terminals change suffix "W" to "T". To specify quick connect terminals change suffix "W" to "Z".

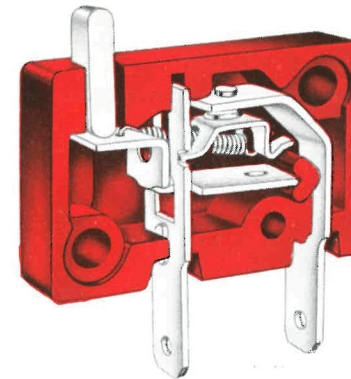
MATERIALS	
PARTS	SERIES S30
Panel	XXP Bakelite
Movable Blade	Spring Brass
Narrow Type Panel for PC Terminals	Glass Epoxy
Coil Spring	Stainless Steel
Actuator Arm	Brass
Terminals:	
Integral Solder	Cadmium Plated Brass
Printed Circuit Type	Silver Plated Brass
Contacts	Silver Cadmium Oxidized

- Long Life Coil Spring Mechanism
- Rock Wipe Contact Action
- Choice of Circuitry, Actuators and Terminals
- Custom Designs

<b>RATING:</b> 10 Amps. 125 VAC 5 Amps. 250 VAC 1/6 HP. 125/250 VAC Und. Lab. Inc. listed, and CSA approved.				
	<b>S30-00W</b>	<b>S30-20W</b>	<b>S30-50W</b>	<b>S30-20P</b>
	<b>OPERATING FORCE (Max.)</b>	7½ ozs.	7½ ozs.	6 ozs.
	<b>REST POSITION (Max.)</b>	.533"	.526"	.520"
	<b>OPERATING POINT (Min.)</b>	.378"	.382"	.360"
<b>REMARKS:</b> The S30 series switch actuator is electrically "live" and must be operated by a non-conductive part, or insulated by means of a nylon insulator. Insulators are applicable to a limited number of actuator designs (only S30-20W of ones shown here).  NOTES: Operating point is measured from top of panel to top of actuator. Operating force is measured at highest point on actuator.	<b>OVERTRAVEL (Min.)</b>	.045"	.080"	.100"
	<b>MOVEMENT DIFFERENTIAL (Max.)</b>	.085"	.085"	.085"
<b>NOTE:</b> For dimensional details on S30-20P See S31-20P drawings on Page 40 and 41  S30-20P also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.				

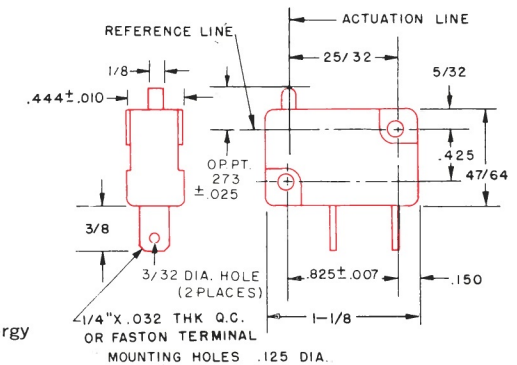
# enclosed/single throw

SERIES E10—SERIES E15  
SERIES E16—SERIES E18



- Large Overtravel
- Long Life Coil Spring
- Light Operating Force

Also available with Gold Crosspoint Contacts for low energy switching applications... see pages 30 thru 33.

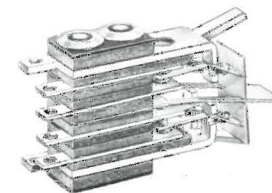


MATERIALS		Operating Characteristics and Ordering Information			
SERIES: E10, E15, E16 & E18		Catalog Nos.	E10-00M	E15-00M	E16-00M
Case	General purpose phenolic	Circuitry—Single Pole	Norm. Closed	Norm. Closed	Norm. Open
Actuating button	Nylon	Operating Point	.273 ± .025	.273 ± .025	.273 ± .025
Common terminal	Silver Plated Brass .00002 to .00005 thick plating	Movement Diff.	.040 Max.	.040 Max.	.040 Max.
NO and NC terminals	Silver Plated Brass .00002 to .00005 thick plating	Overtravel	.090 Min.	.090 Min.	.090 Min.
Moving Blade	Spring Brass	Operating Force	4½ ozs.	3 ozs.	2½ ozs.
Contacts	Silver-Cadmium Oxidized	Rating	10 amp 125 VAC 5 amp 250 VAC 1/2 H.P. 125 VAC	6 amp 125 VAC 3 amp 250 VAC	2 amp 125 VAC 1 amp 250 VAC
Spring	Stainless Steel	Und. Lab. Inc. listed, and CSA approved.	3½ amp 125 VAC		

# stack switches

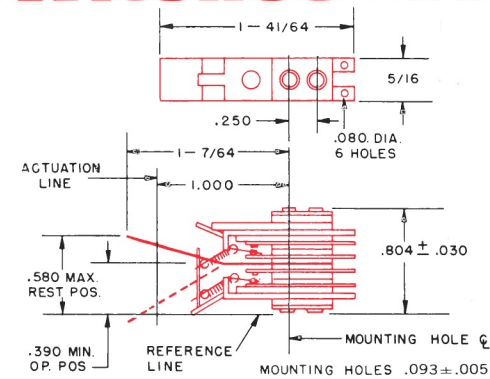
## SERIES S36

## SERIES S37



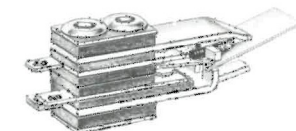
Double Pole S36-20E RESET

Also Available: S36-40E MOMENTARY



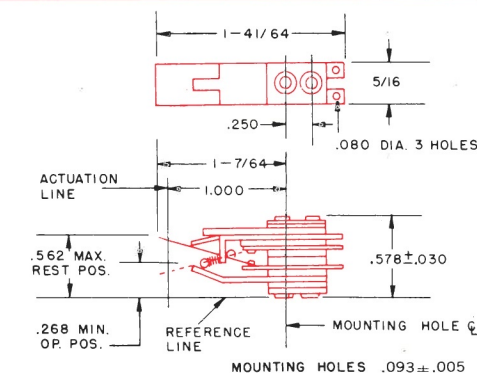
### Operating Characteristics

Rest\*.....Max. .580 in.  
Pretravel.....Min. .390 in.  
Operating Position\*.....Min. .075 in.  
Overtravel.....Max. .125 in.  
Movement Differential.....Max. 3 oz.—S36-20E  
Operating Force.....Max. 6 oz.—S36-40E  
\*Measured above reference line (either direction)  
Und. Lab. Inc. listed  
RATING—7½ Amps, 125 VAC  
5 Amps, 250 VAC



Single Pole S37-10E RESET

Also Available in: S37-20E MOMENTARY



### Operating Characteristics

Rest\*.....Max. .562 in.  
Pretravel.....Min. .268 in.  
Operating Position\*.....Max. .140 in.  
Overtravel.....Max. 4 oz.—S37-20E  
Movement Differential.....Max. 2 oz.—S37-10E  
Operating Force.....Max. 2 oz.—S37-10E  
\*Measured above reference line (either direction)  
Und. Lab. Inc. listed  
RATING—7½ Amps, 125 VAC  
5 Amps, 250 VAC

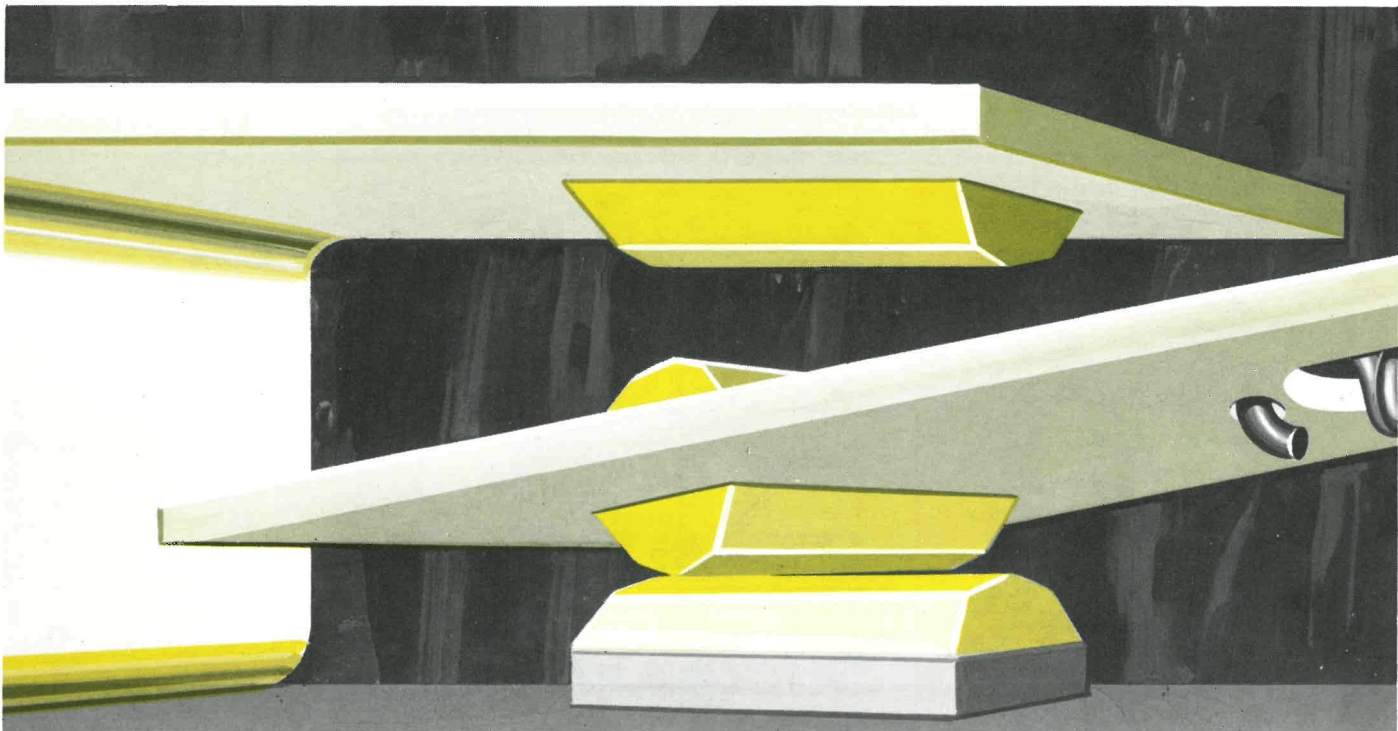


Cherry gold "crosspoint" contact switches for low energy circuits





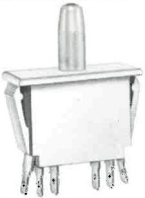
Engineers can now take a completely new approach to switching of low energy circuits. The Gold "Crosspoint" Contact switch design provides reed switch reliability, with snap action switch precision and utility. No need for magnets and installation adjustments. The result is much lower installed cost.

Positive Snap-Action Switching of Low Energy Solid State Circuits

- High reliability in low level switching applications from 4 to 100 milliamperes at 4 to 30 volts
  - Long Life . . . measured in millions of operations
  - Initial insertion resistance far below 50 milliohms (lower than reed switches)
- Very high force per unit area (contact pressures)
  - Reduced susceptibility to contact closure interference from foreign particles
  - Reed switch reliability with snap-action switch precision and utility



Close-up view of gold "Crosspoint" contacts  
Gold crosspoint contacts are W/E Alloy #1 . . . 69% Gold, 25% Silver, 6% Platinum

RATING: 0.1 Amp, 125 VAC  Und. Lab. Inc. listed, and CSA approved.					
	E21-00A	E21-50H	E21-50K	E68-00A	E78-00A
OPERATING FORCE Maximum	75 grams	35 grams	35 grams	15 ozs.	24 ozs.
REST POSITION* Maximum	.635"	—	—	.845" — .905"	.845" — .905"
PRETRAVEL* Maximum	.047"	.125"	.125"	.125"	.125"
OPERATING POINT*	.578" ± .020"	.600" ± .045"	.806" ± .045"	.720" — .820"	.720" — .820"
OVERTRAVEL Minimum	.050"	.090"	.085"	.375"	.375"
MOVEMENT DIFFERENTIAL Maximum	.010"	.030"	.030"	.045"	.075"
REMARKS: *Measured above reference line.  **Materials as well as other specifications, operating characteristics and engineering drawings on Gold "Crosspoint" Contact Switches are to be found elsewhere in this catalog as follows:  Except for contacts and ratings E21-00A is similar to E22-00A shown on pages 22-23 E21-50H is similar to E22-50H shown on pages 22-23 E21-50K is similar to E22-50K shown on pages 22-23 E68-00A is similar to E69-00A shown on pages 12-13 E78-00A is similar to E79-00A shown on pages 14-15 (Note: Gold Crosspoint Contacts are also available on all other configurations of the E22 series, E69 series, E79 series shown in this catalog.)					

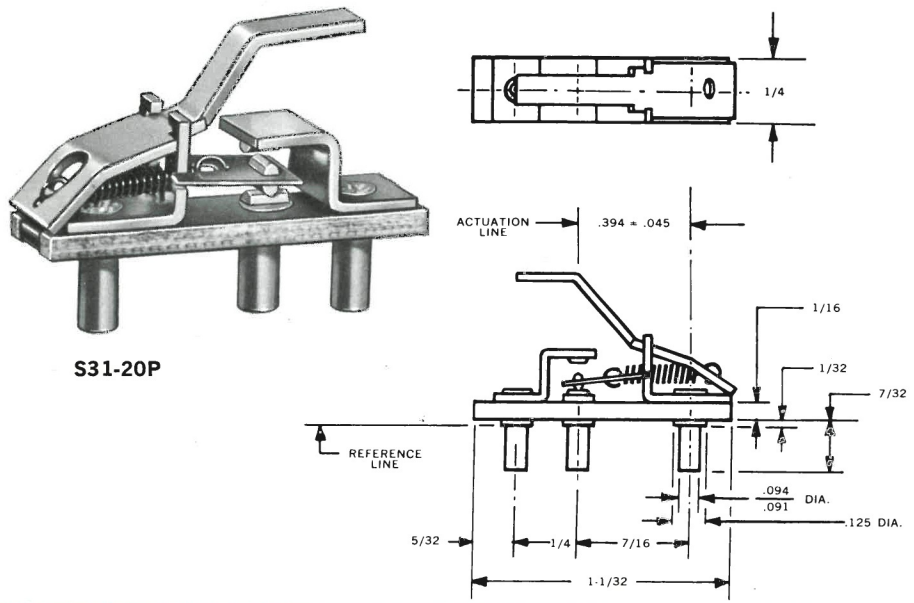


gold "crosspoint" contact switches

offer versatility in application

VERSATILITY IN APPLICATION

Cherry Gold "Crosspoint" Contact switches are available in a wide variety of switch types, sizes and mountings for a broad range of electronic applications. In addition to the switches shown on pages 30 thru 33, many other configurations are available with gold crosspoint contacts. These are indicated by notation under "REMARKS" at the bottom of pages 8 thru 29.



**S31-20P**

ACTUATION LINE

REFERENCE LINE

1/4

.394 ± .045

1/16

1/32

7/32

.094 DIA.

.091

.125 DIA.

1-1/32

**S31-20P MATERIALS**

Movable Blade..... Spring Brass

Narrow Panel For PC Terminals..... Glass Epoxy

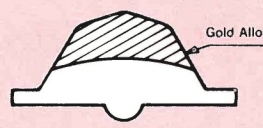
Coil Spring..... Stainless Steel

Actuator Arm..... Brass

Terminals: PC Type..... Silver Plated Brass

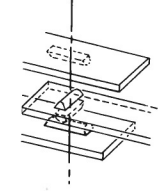
Contacts..... Gold Alloy

**CONTACT CROSS SECTION**



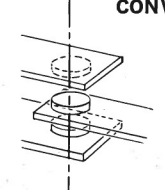
The contacts in these switches are W/E Alloy #1 . . . 69% Gold, 25% Silver, 6% Platinum

**"CROSSPOINT" CONTACTS**



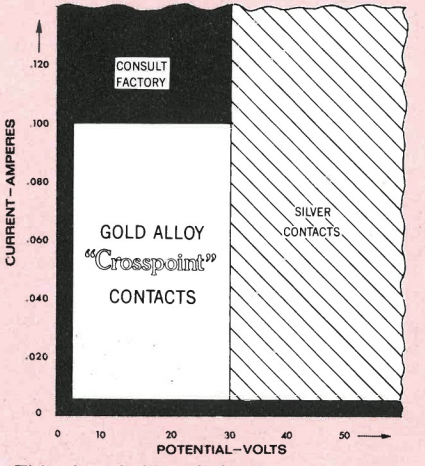
The gold contact prisms are welded at right angles to each other, providing maximum contact pressure and minimum hazard of contact closure interference.

**CONVENTIONAL CONTACTS**






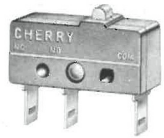
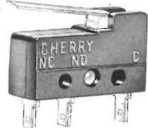

Ordinary contacts provide far less actual contact pressure and are susceptible to contact closure interference caused by foreign matter.

**AMPERES VS VOLTS**



This chart is intended only as a general guide. Application of information with respect to electrical and mechanical life requirements and type of actuation may require deviation from suggested contact materials.

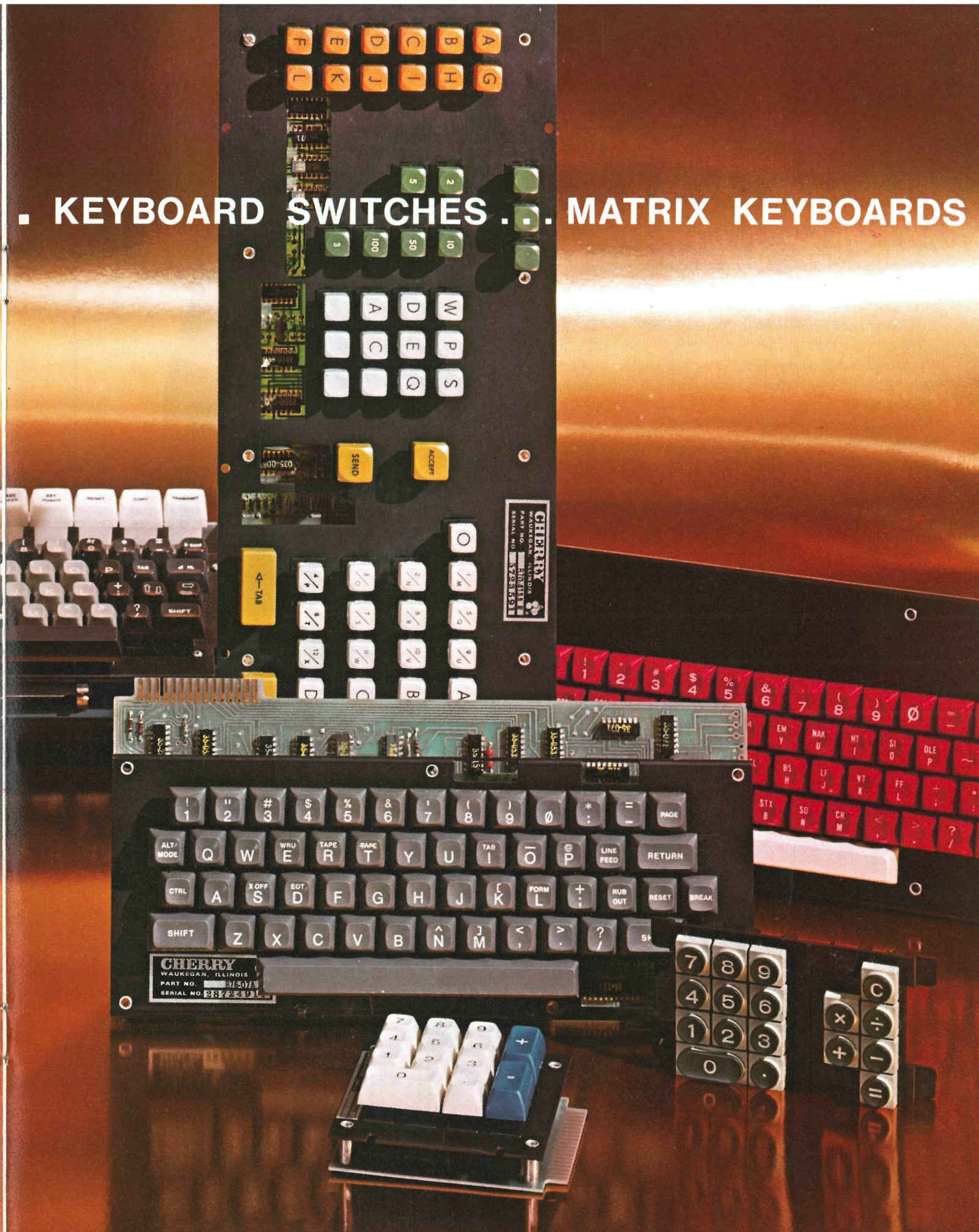
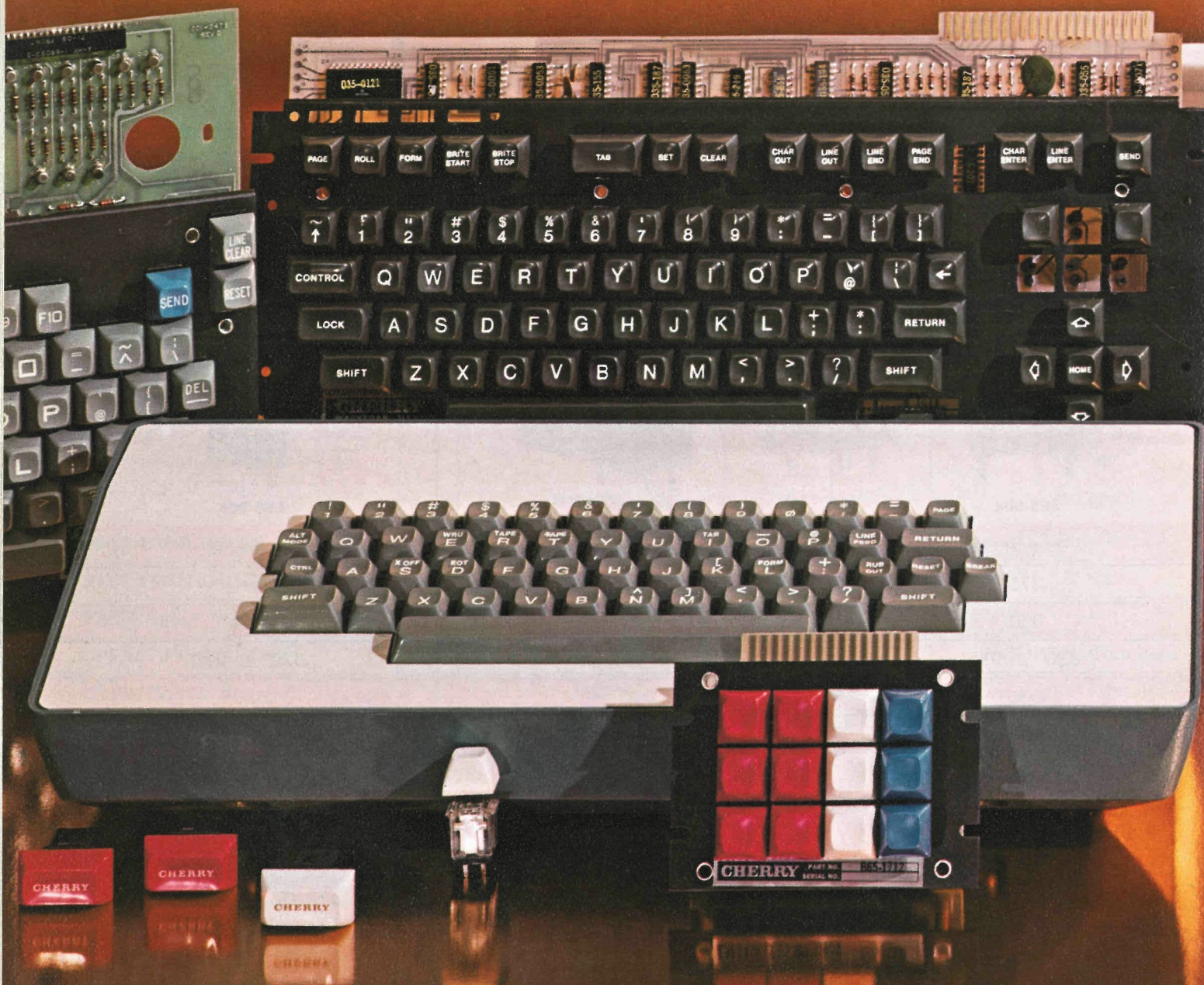
<b>RATING:</b> 0.1 Amp, 125 VAC  Und. Lab. Inc. listed, and CSA approved	 <b>G13-00E</b>	 <b>S31-20P</b>	 <b>E53-00B</b>
	15 ozs.	7½ ozs.	4.0" gms. Torque
<b>OPERATING FORCE</b> Maximum	15 ozs.	7½ ozs.	4.0" gms. Torque
<b>REST POSITION*</b> Maximum	—	.533"	18° Max.
<b>PRETRAVEL*</b> Maximum	.050"	—	—
<b>OPERATING POINT*</b>	.285" ± .020"	.378"	21° Max. from Rest
<b>OVERTRAVEL</b> Minimum	.100"	.045"	15° Min.
<b>MOVEMENT DIFFERENTIAL</b>	.015"	.085"	3° Min.
<b>REMARKS:</b> *Measured above reference line  Materials as well as other specifications, operating characteristics and engineering drawings on Gold "Crosspoint" Contact Switches are to be found elsewhere in this catalog as follows: Except for contacts and rating: G13-00E is similar to E13-00E shown on pages 8-9. E53-00B is similar to E51-00B shown on pages 16-17. E63-00A is similar to E61-00A shown on pages 18-19. E63-00H is similar to E61-00H shown on pages 18-19. E63-00K is similar to E61-00K shown on pages 18-19. (Note: Gold Crosspoint Contacts are also available on all other configurations of the E13 series, E51 series, E61 series shown in this catalog.)			

 <b>E63-00A</b>	 <b>E63-00H</b>	 <b>E63-00K</b>
90 grams	24 grams	26 grams
.375"	—	—
.030"	.125"	7/64"
.330" ± .015"	.350" ± .030"	.570" ± .030"
.035"	.040"	.030"
.004"	.020"	.020"



# ELECTRONIC DATA ENTRY KEYBOARDS . . .

# KEYBOARD SWITCHES . . . MATRIX KEYBOARDS





# the complete line of keyboard switches

FOR MODERN ELECTRONIC DESK TOP CALCULATORS...  
COMPUTER TERMINALS...CREDIT CARD VALIDATORS

## KEY MODULE:

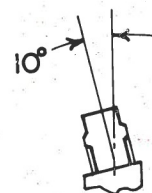
Another CHERRY design first. Gold "Crosspoint" Contact Switch (two Gold prisms at right angles to each other) has provided highly reliable keyboard switching for several years in thousands of the most sophisticated electronic desk top calculators and computer terminals.

This proven design concept (crossed knife edge contact configuration) provides high force per unit of contact area and virtually eliminates contact closure interference by contaminants.

Precious metal contact material (W/E Alloy #1) consists of 69% Gold, 25% Silver and 6% Platinum. Contact interfaces are inert to chemical action with resultant low contact resistance (typically 25 milliohms).

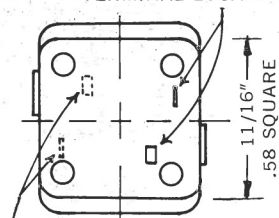
Lower profile key module ( $\frac{3}{4}$ " ) reduces overall keyboard height to  $1\frac{1}{2}$ " from key top to printed circuit board.

### 10° OFFSET KEY STEM for Stepped Keyboards (OPTIONAL)

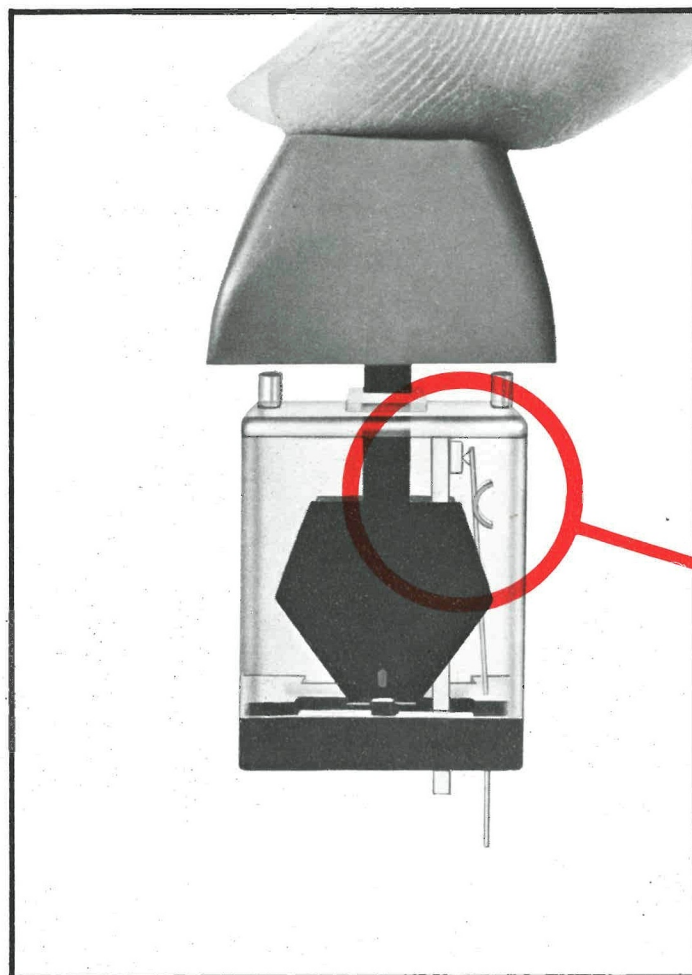


### KEY MODULE BASE

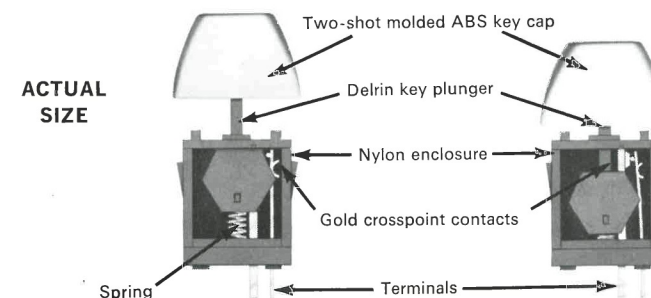
SINGLE FORM A  
TERMINAL LOCATIONS



FOR  
DUAL FORM A  
ADD THESE  
TERMINAL LOCATIONS

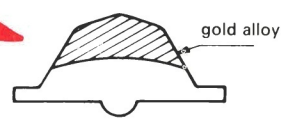


## CHERRY LOW PROFILE KEY SWITCHES WITH GOLD "CROSSPOINT" CONTACTS



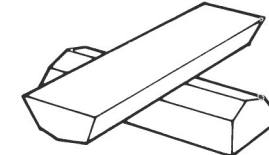
## CONTACT INNOVATION

### Cross Section of Contact



W/E #1 69% Gold, 25% Silver, 6% Platinum

### Crosspoint Configuration

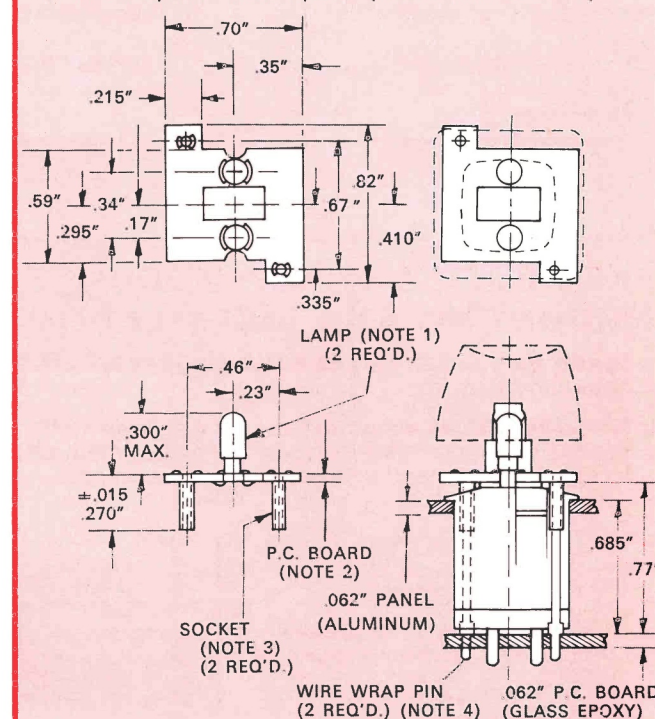


A proven design concept—the new gold "crosspoint" contact innovation provides positive switching of low energy solid state circuits.

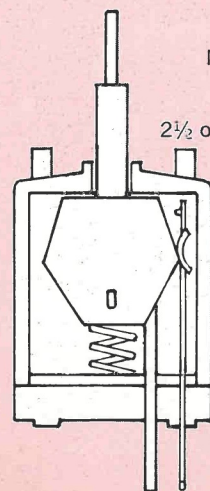
Contacts are normally held apart for greatest shock resistance. No microphonics or bounce during turn-off or at rest.

## SPECIAL LAMP SWITCH.

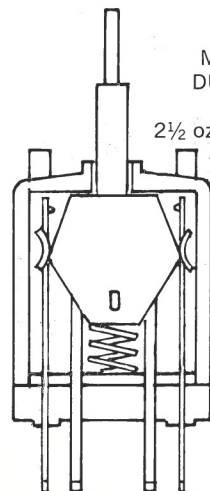
1. Lamp—T-1 Unbased Industry No. (USASI) 683  
5 Volts—.060 Amps. Candle Power M.S.C.P. .050 + 15%  
Rated Avg. Lab Life 100 M Hours
2. PC Board—3/64" Thick Glass Epoxy Clad on 1 side
3. Socket—Berg Part No. 47796 or 75302-1
4. Wire Wrap Pin—.025 Square (AMP. PART 86144-3)



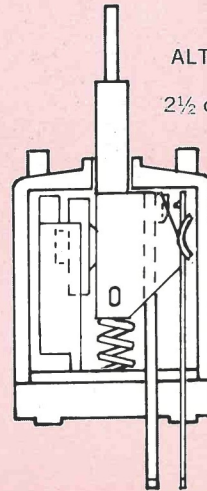
## CHOOSE FROM THESE FIVE TYPES...WITH STRAIGHT OR ANGLED STEMS FOR SLOPED OR STEPPED KEYBOARDS



**M61-0100**  
MOMENTARY  
FORM A  
(SPST-NO)  
2½ oz. operating force

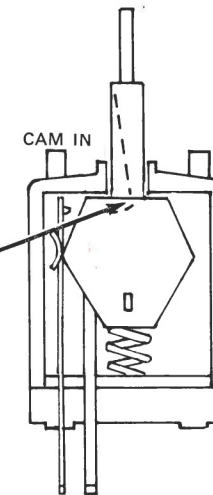
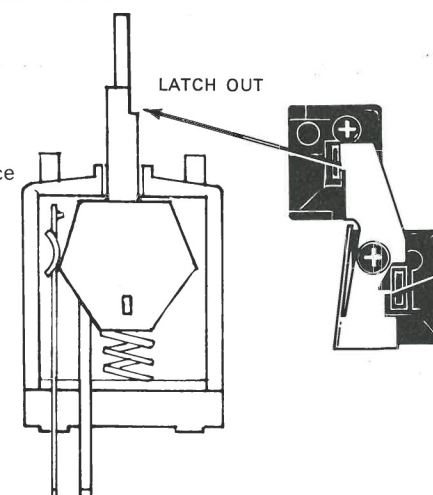


**M62-0100**  
MOMENTARY  
DUAL FORM A  
(DPST-NO)  
2½ oz. operating force



**M61-0800**  
ALTERNATE ACTION  
(SPST)  
2½ oz. operating force

**SHIFT**  
**M61-0300**  
MOMENTARY  
FORM A  
(SPST-NO)  
2½ oz. operating force



**SHIFT LOCK**  
**M61-0500**  
MOMENTARY/LATCH  
(SPST-NO)  
2½ oz. operating force



# mechanical & electrical specifications

## MECHANICAL

Operating Force.....	2½ oz. ± ½ oz. Std. (Also available with 6 oz. Oper. Force)
Pretravel.....	.085 ± .030 Std. (Alternate action version pretravel .030 ± .055)
Total Travel.....	.160 ± .020 Std.
Key Module Case Material.....	Thermoplastic (Nylon)
External Terminal.....	Tin Plated Brass Alloy
Temperature	
Operating.....	0°/60°C
Storage.....	-35°C/65°C

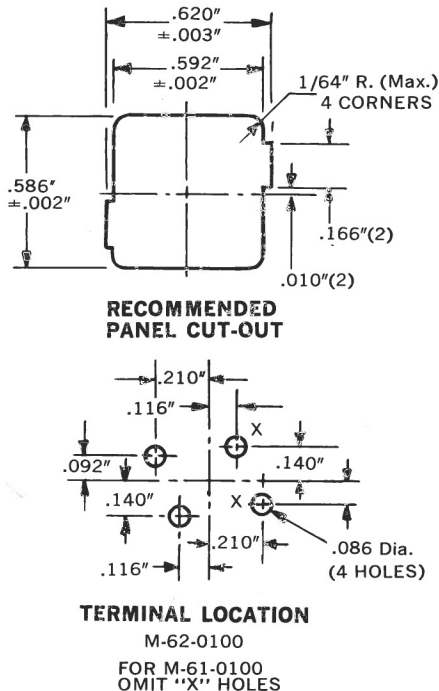
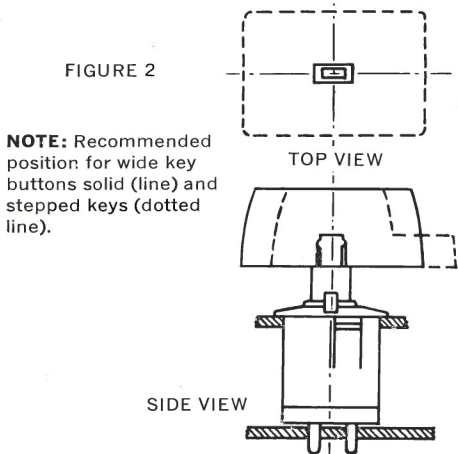
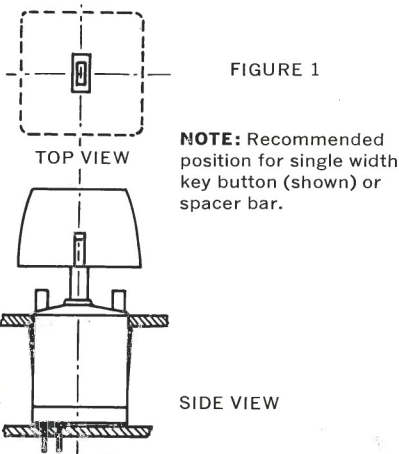
## ELECTRICAL

Contact Rating (Form A contacts)	
DC Resistive.....	3W max.
AC Resistive.....	3VA max.
Current.....	0.125 amp. max. switching 0.5 amp. max. carry
Voltage.....	28V max.
Initial Contact Resistance.....	200 milliohms max. (typically 25 milliohms)

## KEY BUTTON & KEY MODULE MOUNTING AND INSTALLATION

Spacer bars and single width (¾" size) key buttons should be mounted as shown in figure 1.

Wide key buttons must be mounted with their width along the wide axis of the key stem as shown in figure 2. The key stem width supports the extra key button width and prevents key button wobble.



## ORDERING INFORMATION

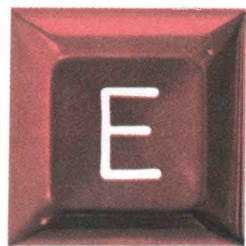
Cherry Key Modules are ideal for electronic desk top calculators. To install individual Cherry Key Modules in a calculator, care is necessary when soldering to avoid contamination of switch contacts.

Some helpful hints on soldering are contained in Cherry's *Detailed Procedure for Process Control on Wave Solder Machine*. Copies are available upon request. Just write or phone New Products' Manager.

PART NUMBERS		DESCRIPTION		
Straight Stem	10° Offset Stem			
M61-0100	M61-0110	MOMENTARY	FORM A	(SPST-NO)
M62-0100	M62-0110	MOMENTARY	DUAL FORM A	(DPST-NO)
M61-0800	M61-0810	ALTERNATE ACTION		(SPST)
M61-0300	M61-0310	SHIFT	MOMENTARY	(SPST-NO)
M61-0500	M61-0510	SHIFT LOCK	MOMENTARY/LATCH	(SPST-NO)
M01-0005	M01-0005	ADAPTER FOR LIGHTS		

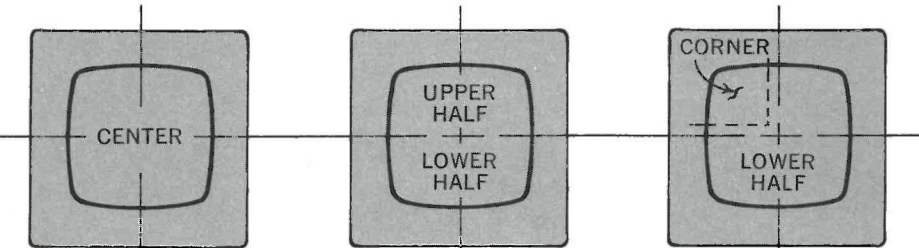
# cherry molded key tops

## KEY BUTTON:



Many standard and custom characters in broad selection of popular ABS colors. Contoured, truncated key button (optional) is two-shot molded for permanence. Keys will provide standard array with spacing ¾" center-to-center. Key stems available straight for sloped keyboards or with 10° angle stem for stepped keyboards.

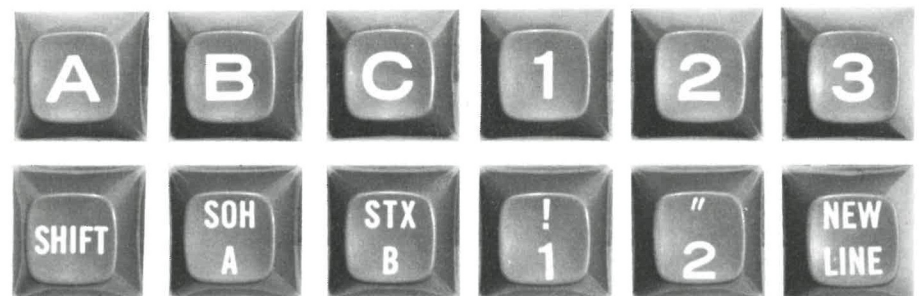
## KEY BUTTON LEGEND POSITIONS



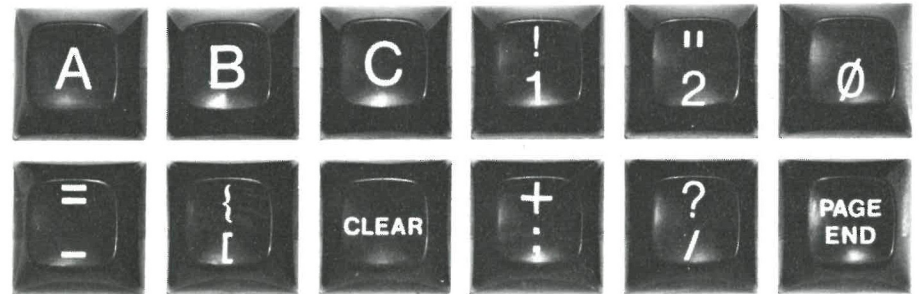
Legends on two-shot molded key buttons may be located in center position, on upper and lower half, or lower half.

## LEGEND TYPE STYLES

### TRADE GOTHIC BOLD



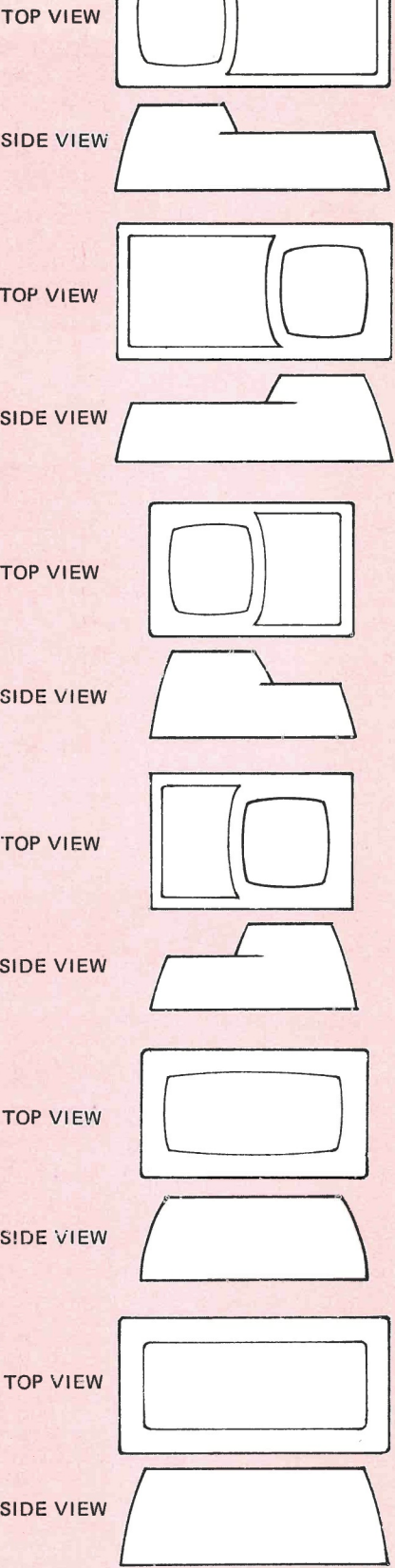
### HELVETICA



## COMPLETE LIST OF TOOLED KEYS

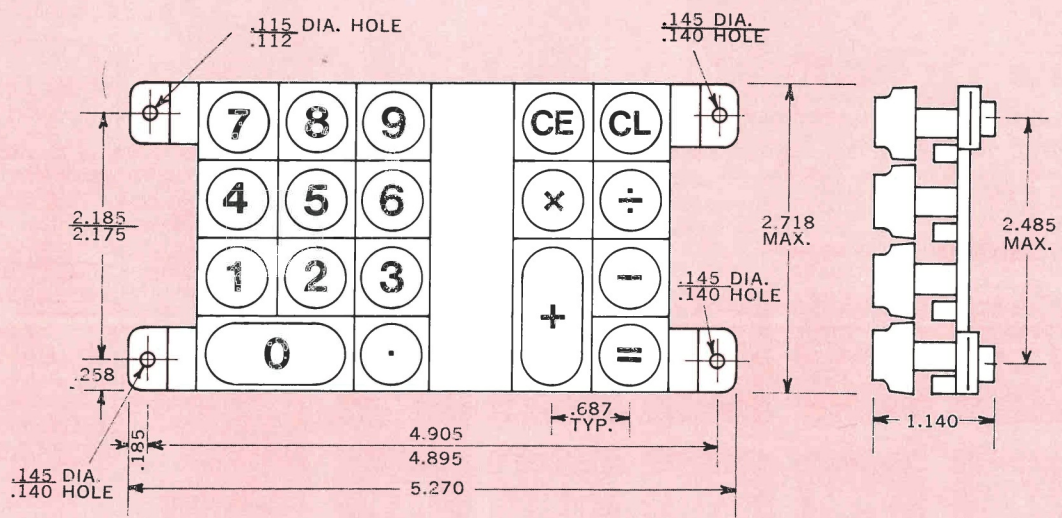
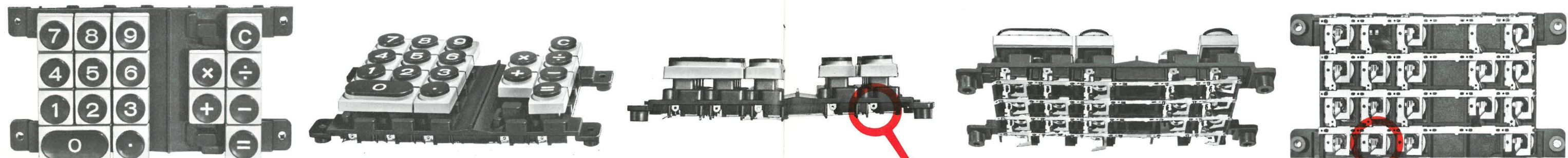
A brochure illustrating and listing all tooled Key Button legends is available on request. Write or phone New Products' Manager.

## ACTUAL SIZES

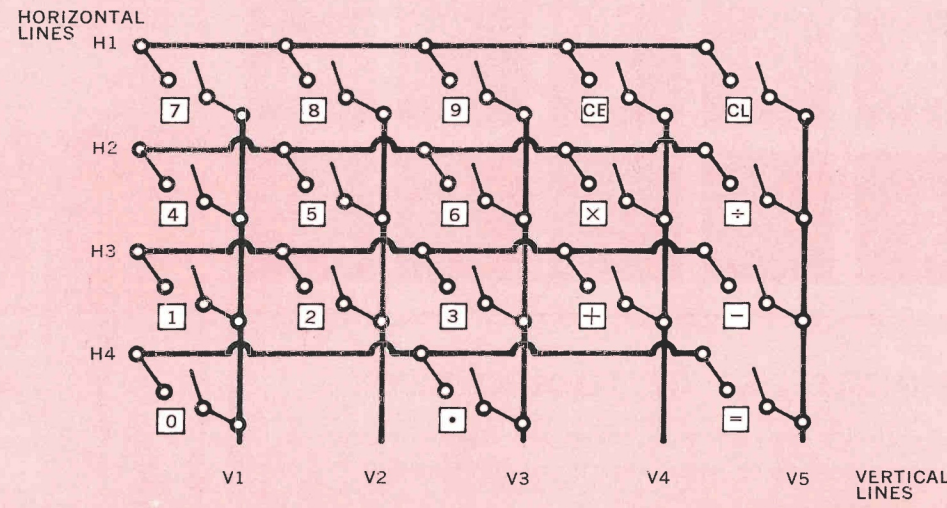




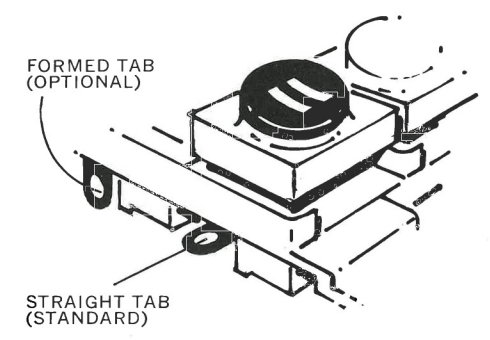
# unique...cherrys' new design...low cost...matrix keyboard



## MATRIX KEYBOARD SCHEMATIC (TOP VIEW)

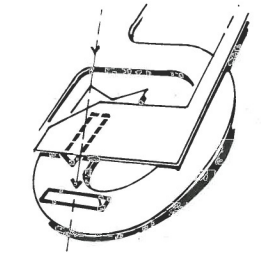


TERMINAL DETAIL



4 horizontal line and 5 vertical line terminals have .055" diameter solder hole. The vertical line terminals can be furnished either straight (standard) or formed down (optional).

CONTACT DETAIL



### GOLD CROSSPOINT CONTACTS

A proven design concept (two prisms at right angles to each other) these gold alloys contacts (W/E #1—69% Gold, 25% Silver, 6% Platinum) are welded at right angles. Knife-edge closure gives high unit force, low resistance.

- Compact
- Flat-pack profile
- Ruggedized molded construction
- Economical
- Up to 20 key stations

Provides a compact, economical and rugged molded one piece keyboard with up to 20 key stations in a 4 x 5 array that is ideal for low cost electronic calculators. The design provides flexibility in choice of key size and positioning. Precious metal contact material provides interface inert to chemical action, low contact resistance for reliable long life performance.

## CHERRY MATRIX KEYBOARD OPERATING CHARACTERISTICS

1. Key Depression Force: Initial—20 grams min., Final—175 grams max.
  2. Circuit to close at .075" ± .025" depression of key.
  3. Contact Bounce 5 milliseconds, maximum.
  4. Mechanical Life: 1 million closures per key at 1 milli-amp. 25 volts D.C. resistive.
  5. Temperature Range: Operating—0° C to 50° C, Storage—-20° C to 85° C.
  6. Keys "Two-Shot" Molded.
- \*Contact Rating (Form A Contact):**  
D.C. Resistive—3W max.  
A.C. Resistive—3VA max.  
Current—0.125 amp max. Switching,  
0.5 amp max. carry.  
Voltage—28V max.



# a new kind of keyboard... a uniquely simple design... low profile

## New CHERRY Electronic Data Entry Keyboards Feature



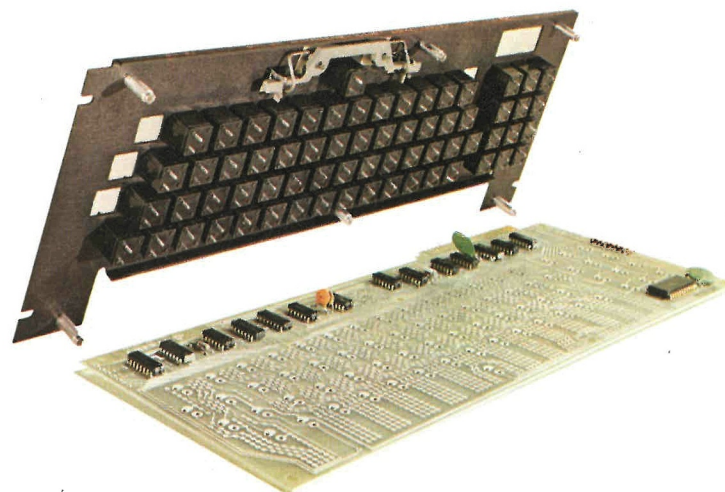
- Low cost
- Long life
- Low profile
- Inherent 2 Key Rollover
- Wire "OR"able output
- Low power consumption

**RUGGED CONSTRUCTION** Keys are mounted in rugged metal frame for increased protection of printed circuit board against mechanical abuse.

**TWO KEY ROLLOVER** Standard keyboard units have 2 key rollover between all data keys, control, shift, and shift lock keys to simulate true typewriter sequencing.

**KEYBOARD FLEXIBILITY** Standard keyboard units include:

- 66 Key Tri Mode ASCII, negative logic (with provision to add 4 extra keys)
- 53 Key Quad Mode ASCII (ASR 33), positive logic
- 12 Key Numeric, straight output
- 16 Key Numeric, straight output



All electronic components are Standard MSI and available from multiple sources. Electronics are mounted on a single pc board.

In addition, custom designs in mono, dual, tri and quad mode operation available on volume applications, with modest engineering, tooling, and artwork charges.

### SPECIAL FEATURES AVAILABLE:

Positive logic resting "low" outputs or Negative logic resting "high" outputs. Open collector buffer outputs for hard wire "OR"ing available at no extra cost. Buffer output capable of driving terminated twisted pair or 90 ohm coaxial is optional. Repeating strobe is optional. Key locations may be geographically mixed. Special mono mode encoded keys may be added to configuration. Any of parity and/or data outputs optional may be later changed for modest revision charges.

## KEYBOARD SPECIFICATIONS

### ELECTRICAL

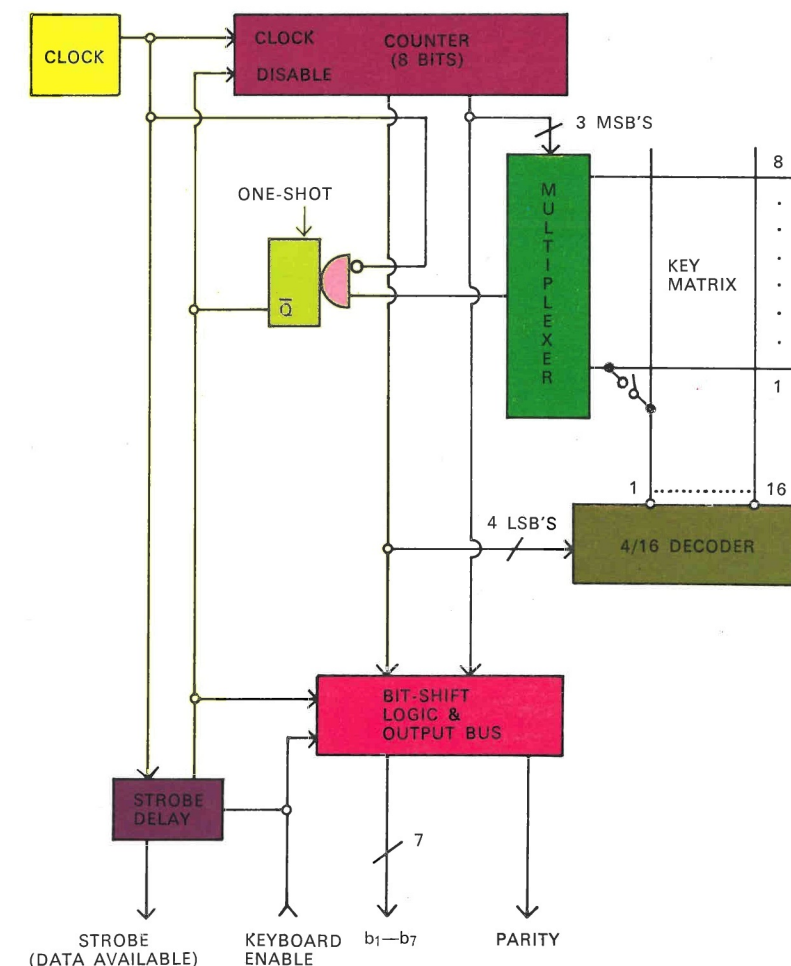
- Power Requirement:** +5.0 VDC  $\pm$  10% @ 200 milliamps typically  
TTL compatible  
Logic "0" + 2.4 volts minimum  $\equiv$  HIGH  
Logic "1" + 0.45 volts maximum  $\equiv$  LOW  
Outputs capable of sinking 16 milliamps (ten 7400 type standard loads)
- Input:** Keyboard Disable (disable strobe & data bits forced High, Logic "0")  
1.6 milliamps sink current required by source and +5.5 volt input maximum
- Output:** 7 bits with optional odd/even parity 8th bit  
Function key outputs—open circuit with closure to ground when depressed  
Strobe (Data Available) Output: Negative-going level  $\geq$  500 nanoseconds after data has settled

## Keyboard Electronics Utilizes Scanning Technique

The keyboard encoder is based on a scanning technique employing an 8 bit counter, a multiplexer and a 4 to 16 line decoder. Encoded keys form a crosspoint matrix with each key connected to the decoder output and the multiplexer input. The decoder is addressed by the 4 least significant bits and the multiplexer by the 3 most significant bits of the counter.

When a key is depressed a matrix connection between

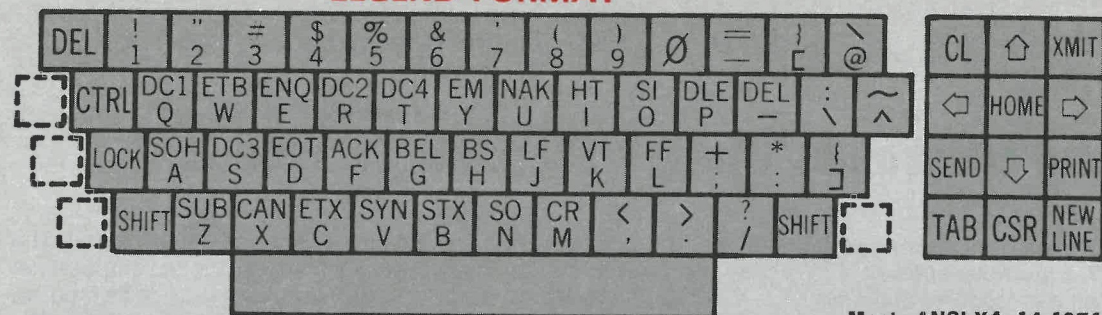
the decoder and multiplexer is accomplished. When the counter reaches the appropriate key code, the multiplexer output goes high and a retriggerable one-shot is fired on the trailing edge of the counter clock stopping the counter. The one-shot is continually refreshed until the key is released. The bit-shift logic translates the counter address into an upper case data word if the shift and/or control key is depressed.





## B80-3766 CHERRY 66-KEY ASCII TRI MODE

### LEGEND FORMAT



Meets ANSI X4. 14-1971

## LEGEND FORMATS

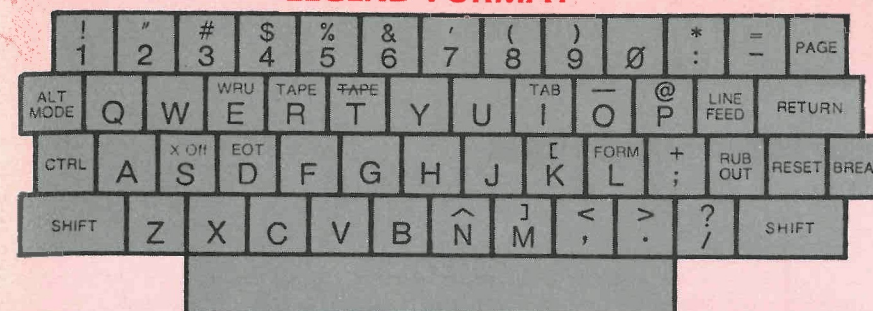
**B80-3766** with 66 keys, including 12 Function keys at right hand side. Provisions are made in cover plate for addition of up to four additional key modules (dotted lines). Generates full 128 symbol ASCII character set; can be modified for special applications.

**B70-4753** with 53 keys is similar to ASR 33. Standard communications configuration generates ASCII. Can be modified for special applications.

**B65-1712** with 12 keys generates straight output.

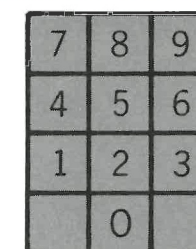
## B70-4753 CHERRY 53-KEY ASCII QUAD MODE

### LEGEND FORMAT



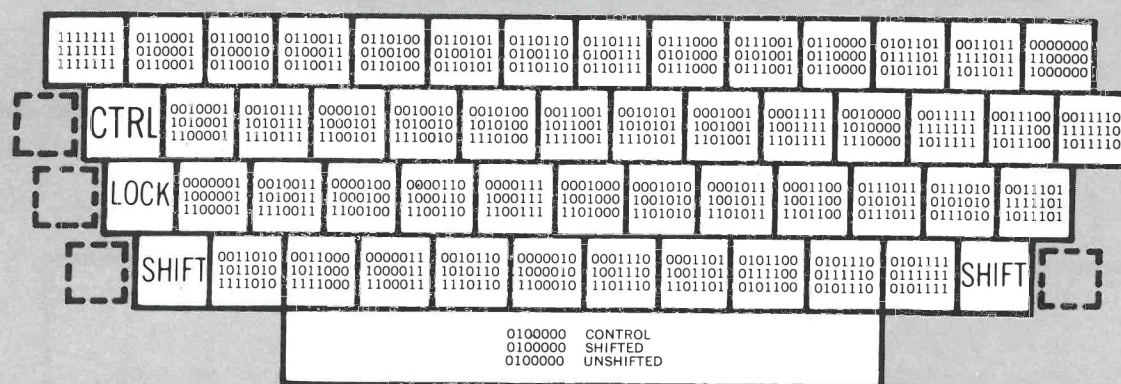
## B65-1712 CHERRY 12-KEY NUMERIC

### LEGEND FORMAT



## B80-3766

### OUTPUT



## CODED OUTPUT

All 7-bit output codes shown are, reading from left to right, **most** significant to **least** significant (765 4321).

**B80-3766**—The Control key of this keyboard has precedence over the Shift key to produce tri-mode.

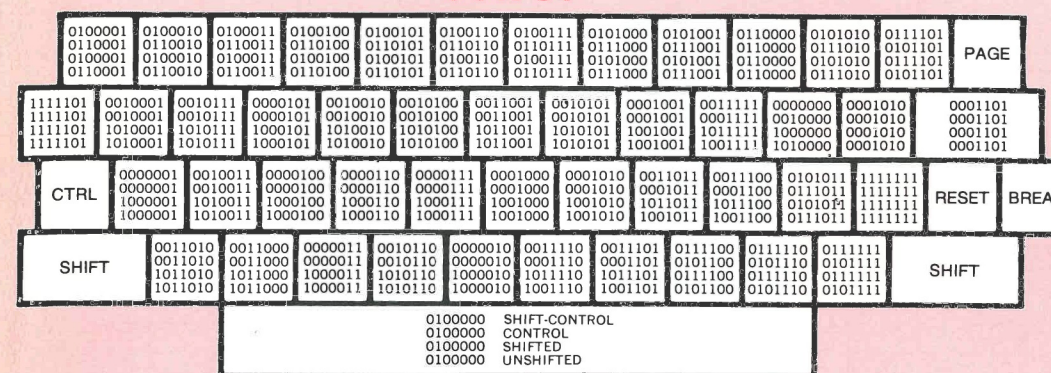
### NOTE:

The 12-key Function section of the B80-3766 keyboard is not encoded and so is not included in the coding diagram at left.

The 12-key Function section has Normally Open switches that may be represented similarly to the diagram of the 12-key unit to the far right of this section.

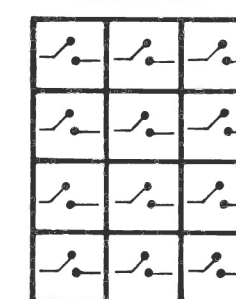
## B70-4753

### OUTPUT



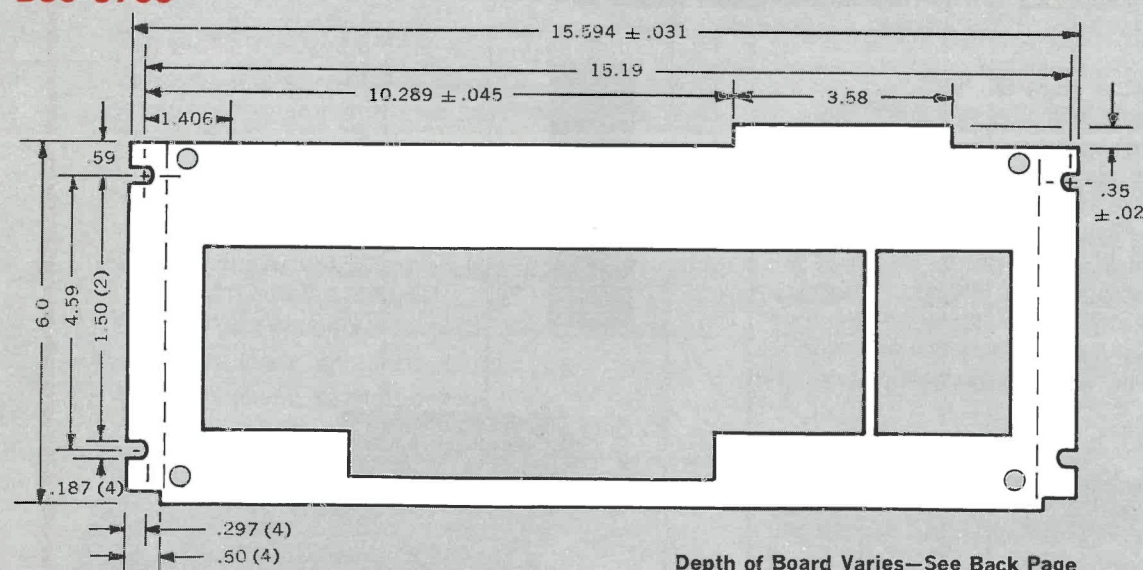
## B65-1712

### OUTPUT



NOTE: B65-1712 is non-encoded. Diagram shows Normally Open key switches.

## B80-3766

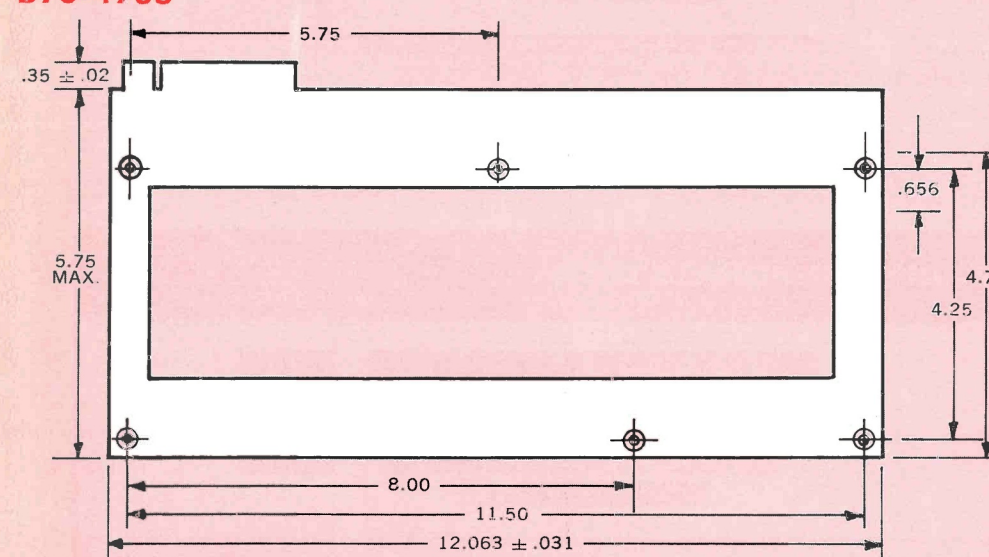


Depth of Board Varies—See Back Page

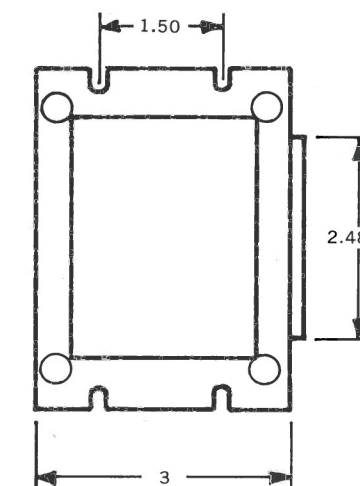
## PANEL CUTOUT and PC BOARD SIZE

Depth from top of faceplate to bottom of printed circuit board varies for each keyboard, depending on the type of key module used. See last page of this brochure.

## B70-4753



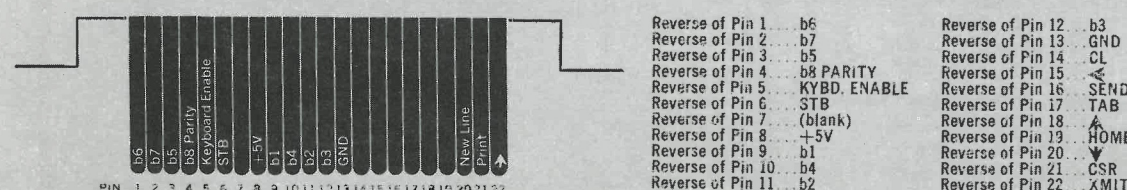
## B65-1712



Depth of Board Varies—See Back Page

## B80-3766 HAS TWO SIDED TERMINAL

VIEWED FROM TOP OF PRINTED CIRCUIT BOARD



## TERMINAL CONFIGURATION

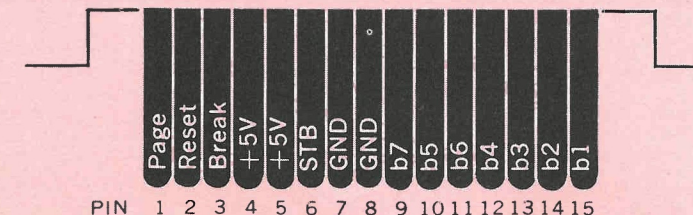
**B80-3766** terminal has standard 22-position, 44-pin, 1/16" thick Card Edge Connector (Cinch #251-22-30-340 or #215-22-30-341; Continental #600-30-3PCDG22; Methode #84-7044).

**B70-4753** terminal has standard 15-pin Card Edge Connector. Plated through for redundancy.

**B65-1712** terminal has standard 15-pin Card Edge Connector (including two pins that represent blank keys at right and left hand side of bottom row of keys).

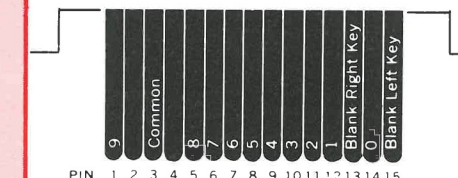
## B70-4753 TERMINAL

VIEWED FROM TOP OF PRINTED CIRCUIT BOARD



## B65-1712 TERMINAL

VIEWED FROM TOP OF PRINTED CIRCUIT BOARD

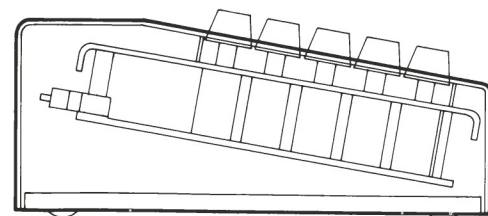




# complete keyboards...

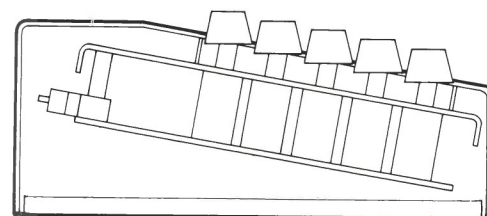
choice of two key button plunger types

**SLOPED**



**STRAIGHT STEM PLUNGER**

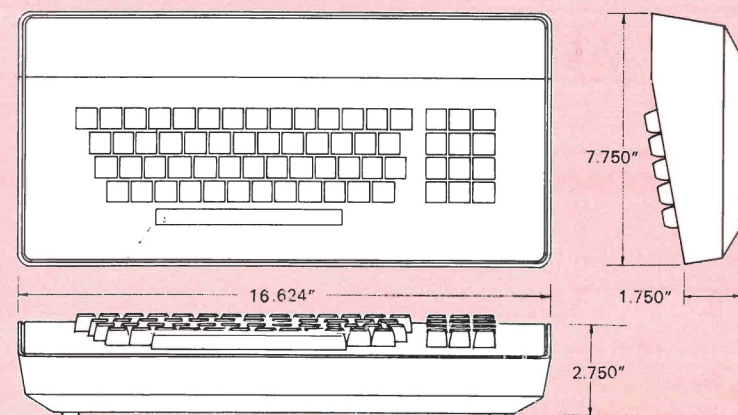
**STEPPED**



**PLUNGER STEM AT 10° ANGLE**

## ENCLOSURE (optional)

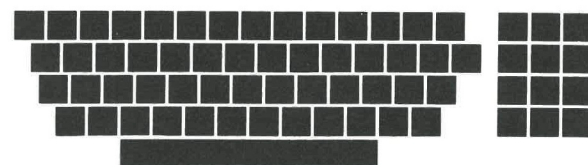
A modern design enclosure in blue and white no glare finish is available for the Cherry B80-3766 and B70-4753 keyboards at nominal extra cost. The enclosure has a cable strain relief and rubber base pads that protect desk tops against scratching. The cast enclosure base has ample weight for stability.



## ORDERING INFORMATION

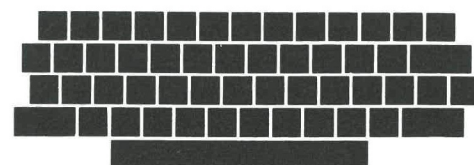
### B80-3766

66 key ASCII Tri-Mode with Gold Crosspoint key modules



### B70-4753

53 key ASCII Quad-Mode with Gold Crosspoint key modules (Similar to ASR 33)



### B65-1712

12 key non-encoded Numeric station with Gold Crosspoint key modules



# standard and custom designs...

complete in-house keyboard capability

Cherry can design and manufacture a keyboard to precisely meet your application requirements. Often at no more cost than that of a standard unit . . . because we make virtually all of the keyboard components right in our own plant. With complete quality control maintained from incoming material inspection thru fabrication and final assembly.

## HERE'S WHY YOU SPECIFY CHERRY WITH CONFIDENCE:

1. Cherry makes a full line of keyboard switch modules, including alternate action switches, lighted switches, double pole switches and shift latching mechanisms.
2. Components and assembled keyboards are made under one roof.
3. We make our own printed circuit boards.
4. We make our own two-shot molded key caps.
5. We have a large assortment of tooled key cap legends in two type faces and a variety of sizes.
6. We offer a wide choice of standard key cap colors.
7. We install and wave solder the electronics to the pc board.
8. We provide a choice of MOS or TTL.

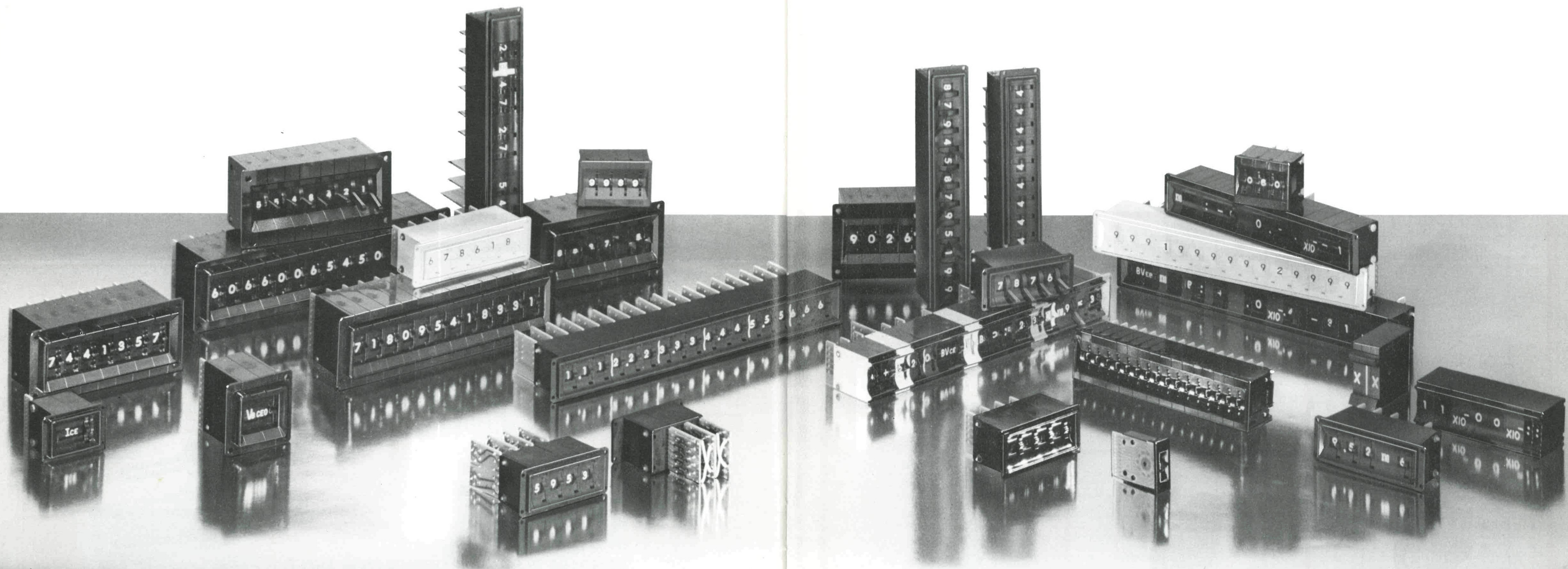
CHERRY KEYBOARDS are backed by 20 years experience in the design and manufacture of precision snap-action switches, matrix selector switches, gold "crosspoint" contact switches and leverwheel/thumbwheel switches.

Write for this handy, six-page  
**KEYBOARD DESIGNERS' SPECIFICATION SHEET**






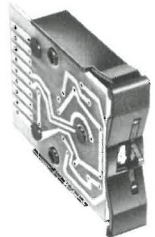
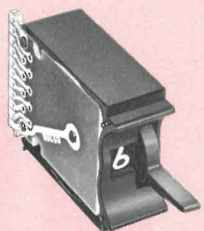
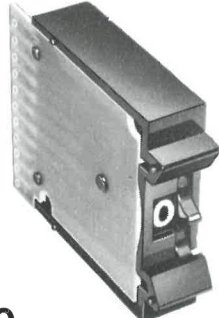

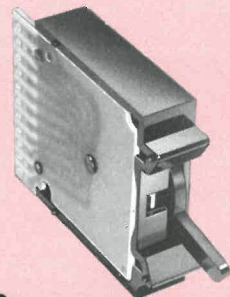
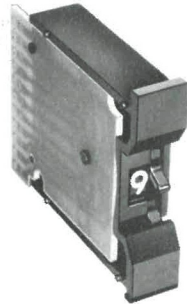

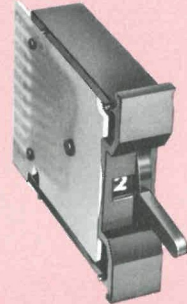
# THUMBWHEEL AND LEVERWHEEL SWITCHES





# thumbwheel & leverwheel switches

☐ Cherry offers these nine basic unit configurations ☐ in a broad range of coded outputs ☐ in individual digits or ☐ in assemblies of several digits mounted side-by-side ☐ complete with end caps ☐ in gloss or matte finished. In addition to standard types, many special optional features are available. These are shown on the following page in table form for easy reference.

THUMBWHEEL SERIES		LEVERWHEEL SERIES
 <b>T-20</b> BACK MOUNT SUBMINIATURE 8, 10 and 16 positions. Width: .500" Height: 1.15" See pages 52-53.	 <b>T-60</b> FRONT MOUNT (SNAP-IN) 10 and 16 positions. Width: .315" (8mm) Height: 1.20" See page 58.	 <b>L-20</b> BACK MOUNT SUBMINIATURE 8, 10 and 12 positions. Width: .500" Height: 1.15" See pages 52-53.
 <b>T-10</b> BACK MOUNT MINIATURE 8, 10 and 16 positions. Width: .500" Height: 1.875" See pages 54-55.	 <b>T-70</b> FRONT MOUNT (SNAP-IN) 10 and 16 positions. Width: .394" (10mm) Height: 1.20" See page 59.	 <b>L-10</b> BACK MOUNT MINIATURE 8 and 10 positions. Width: .500" Height: 1.875" See pages 54-55.
 <b>T-11</b> FRONT MOUNT MINIATURE 8, 10 and 16 positions. Width: .500" Height: 1.875" See pages 56-57.	 <b>T-71</b> INTEGRAL BEZEL FRONT MOUNT DECIMAL POINT SET SWITCH FOR CALCULATORS Width: .520" Height: 1.20" See page 59.	 <b>L-11</b> FRONT MOUNT MINIATURE 8 and 10 positions. Width: .500" Height: 1.875" See pages 56-57.

CHOOSE FROM 9 BASIC TYPES WITH MANY FEATURES AND OPTIONS  
AND FULL RANGE OF ALPHANUMERIC READOUTS AND OUTPUT CODES  
SPECIAL FEATURES AND OPTIONS AVAILABLE

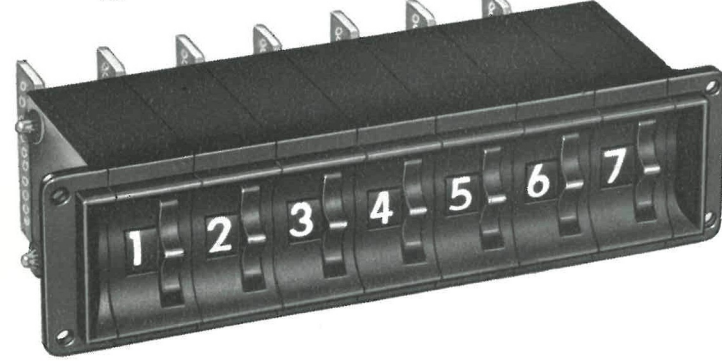
● SYMBOL INDICATES AVAILABLE IN SERIES INDICATED

DESCRIPTION OF SPECIAL FEATURE OR OPTION	CHERRY THUMBWHEEL & LEVERWHEEL SWITCH SERIES								
	T-20	T-10	T-11	T-60	T-70	T-71	L-20	L-10	L-11
1. Dial Positions: (No. of Positions)									
(a) 8	●	●	●				●	●	●
(b) 10	●	●	●	●	●	●	●	●	●
(c) 12							●		
(d) 16	●	●	●	●	●				
2. Component Provision:	●	●	●	●	●	●	●		
3. Dial Rotation Control: (Stops)	●	●	●	●	●	●	●	●	●
4. Finish (Std. black gloss or black matte.)	●	●	●	●	●	●	●	●	●
5. Spacers: (Legends may be hot stamped on all Spacers.)									
(a) 0.5 inch Size	●	●	●				●	●	●
(b) 0.25 inch Size	●	●					●	●	
(c) 0.315 inch (8mm) Size				●					
(d) 0.394 inch (10mm) Size					●				
6. Panel Mounting Configuration:									
(a) Front Mount			●	●	●	●			●
(b) Back Mount	●	●					●	●	
7. Integral End Caps:						●			
8. Circuitboard Termination:									
(a) Card Edge Connectors	●	●	●			●	●	●	●
(b) Direct Wire	●	●	●	●	●	●	●	●	●
(c) Probe Terminals	●	●	●	●	●	●	●	●	●
9. Special Hot Stamp on Switch Case:									
(a) Decimal Point	●	●	●	●	●		●	●	●
(b) Vertical Line	●	●	●				●	●	●
(c) Other Symbols	●	●	●	●	●		●	●	●
10. Double Width Function Readout:									
(a) 10 Position	●	●							
(b) 16 Position		●							
11. Kelvin Varley Voltage Divider:	●								
12. Resistive Decade:	●								
NOTE: For other features required, contact factory for further details.									

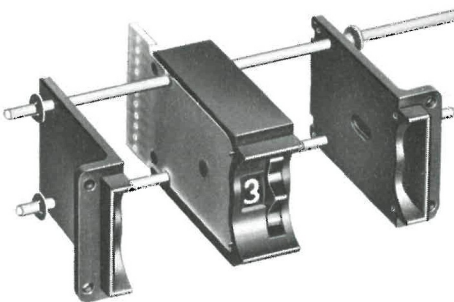


# series T-20 thumbwheel

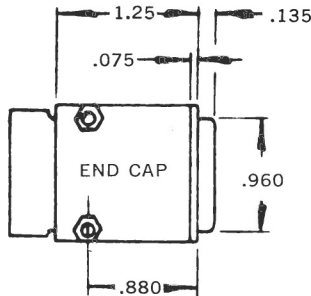
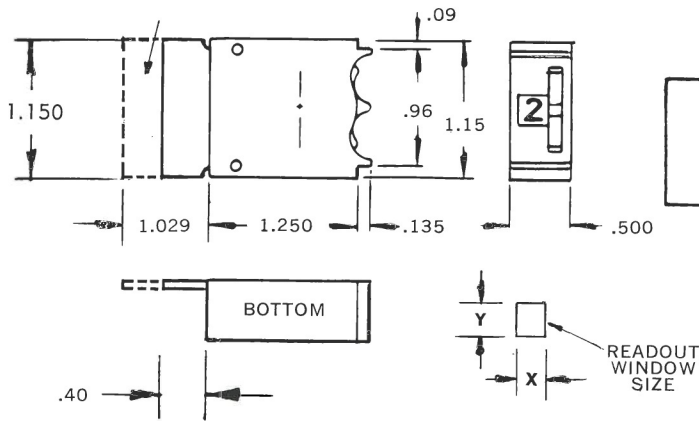
## T-20 BACK MOUNT SUBMINIATURE THUMBWHEEL SWITCHES



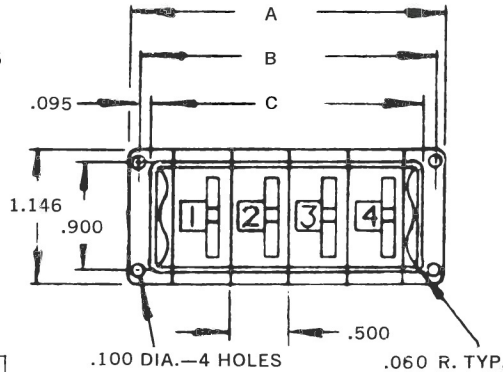
Available in 8, 10 and 16 positions with widest range of output codes. Double width "function" switch available. Dial characters are .200" high on both 8 and 10 position models and .110" high on 16 position units. This type of thumbwheel can be furnished with extended printed circuit board to provide mounting of other components. Spacers are available in choice of 1/4" and 1/2" width with legends such as decimal points, vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation as required.



EXTENDED PANEL (Option available on some codes)

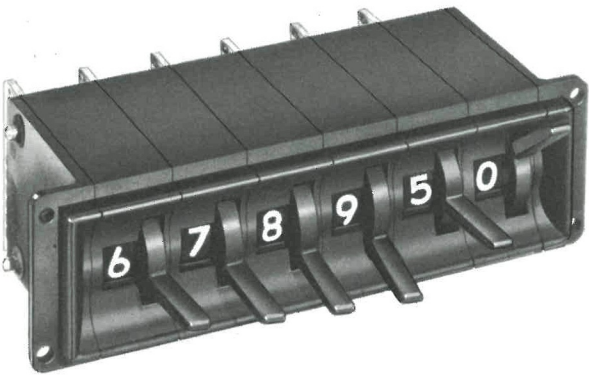


POSITIONS	Readout Window Size	Dial Character Height
8 & 10	X = .205" Y = .230"	.200"
16	X = .205" Y = .156"	.110"

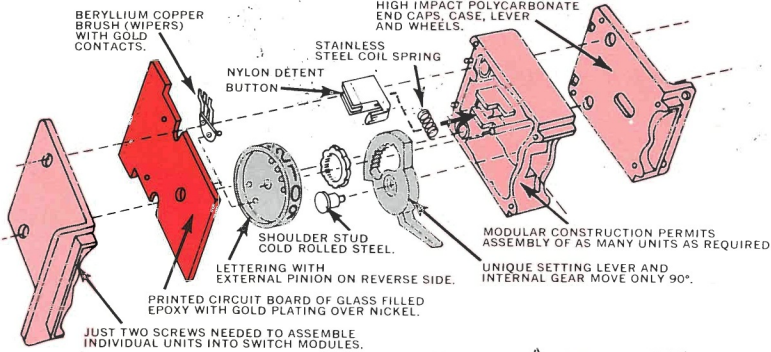


# series L-20 leverwheel

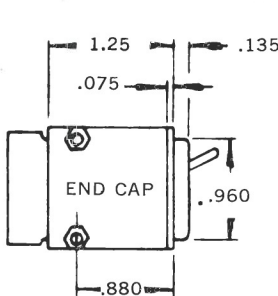
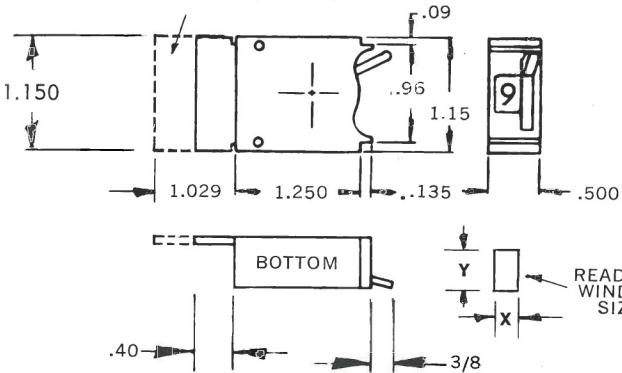
## L-20 BACK MOUNT SUBMINIATURE LEVERWHEEL SWITCHES



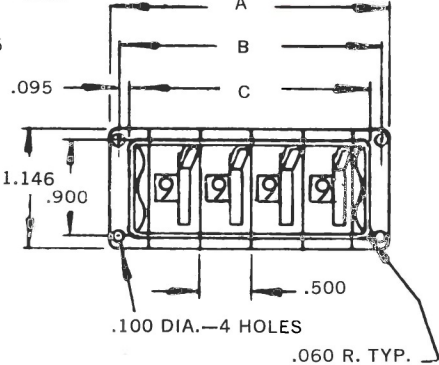
Available in 8, 10 and 12 positions with widest range of output codes. Dial characters are .200" high on 8 and 10 position models and .160" high on 12 position. This type of leverwheel can be furnished with extended printed circuit board to provide mounting of other components. Spacers are available in choice of 1/4" and 1/2" width with legends such as decimal points. Vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation as required.



EXTENDED PANEL (Option available on some codes)



POSITIONS	Readout Window Size	Dial Character Height
8 & 10	X = .205" Y = .230"	.200"
12	X = .205" Y = .205"	.160"



### SERIES T-20 AND SERIES L-20 SPECIFICATIONS

- Inline readout
- Coded electric outputs—including binary with complement and 2 commons in subminiature types
- Modular construction
- Variations in coding, termination, and readout symbols available

#### MATERIALS

##### Case, Levers, End Caps, Wheels—

Polycarbonate for high impact, high strength (standard).

**Printed Circuit Board**—G10 Glass filled epoxy per MIL-P-13949 plated with nickel per QQ-N-290 and 100 millionths gold per MIL-G-45204

**Contacts**—WE Alloy No. 1 (69% gold, 25% silver, 6% platinum)

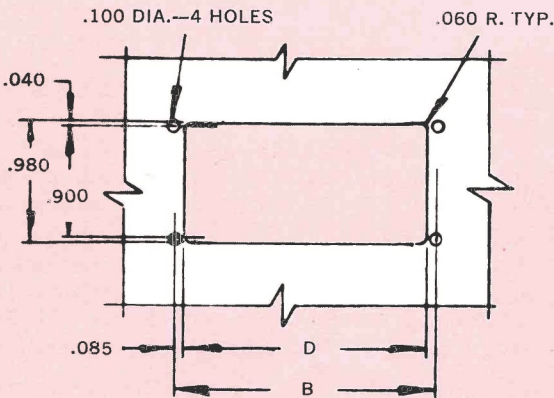
**Wipers**—Beryllium Copper

#### SWITCH CHARACTERISTICS

1. OPERATING FORCE..... 7 to 10 ounces
2. CONTACT RESISTANCE..... 0.1 ohm max.
3. INSULATION RESISTANCE..... 1000 megohms
4. DIELECTRIC STRENGTH..... 1000 volts AC
5. VIBRATION..... 15G's, 10-2000 Hz
6. SHOCK..... 50G's, 11 ms.
7. WEIGHT..... 3/4 oz. per module
8. ELECTRICAL RATING..... 115 volts AC or DC at .125 Amp. Current carrying only 3 amp. AC or DC
9. LIFE..... Min. 1,000,000 detent operations

**NOTE:** Above characteristics and rating apply under test conditions of -65°C to +85°C temperature range with altitude not exceeding 70,000 ft. per MIL-S-22710C.

### T-20 & L-20 RECOMMENDED PANEL CUT-OUT



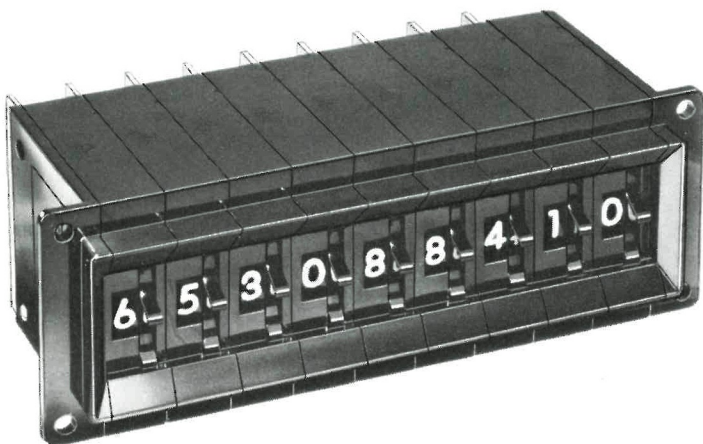
Number of Modules	A	B	C	D
1	1.260	1.090	.900	.920
2	1.760	1.590	1.400	1.420
3	2.260	2.090	1.900	1.920
4	2.760	2.590	2.400	2.420
5	3.260	3.090	2.900	2.920
6	3.760	3.590	3.400	3.420
7	4.260	4.090	3.900	3.920
8	4.760	4.590	4.400	4.420
9	5.260	5.090	4.900	4.920
10	5.760	5.590	5.400	5.420

Positions in assembly are numbered from left to right. For assemblies with more than 10 modules, consult factory.



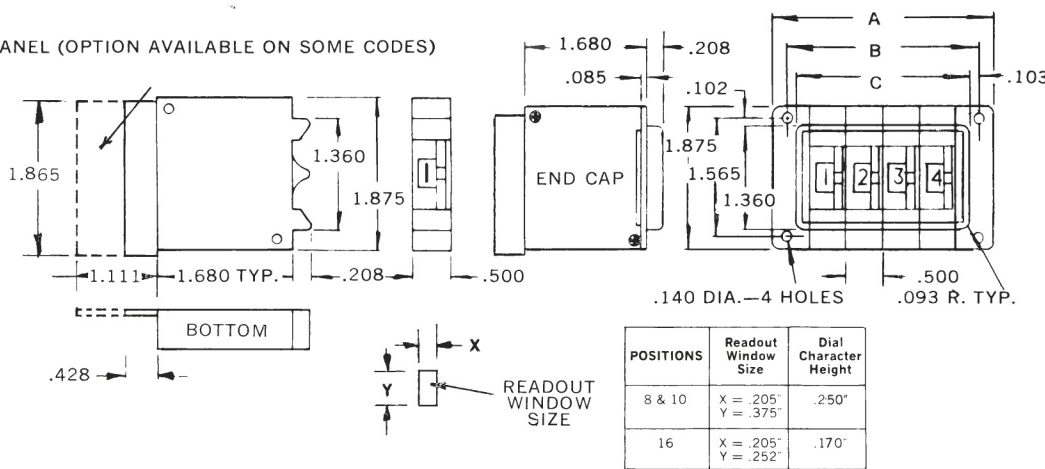
# series T-10 thumbwheel

## T-10 BACK MOUNT MINIATURE THUMBWHEEL SWITCHES



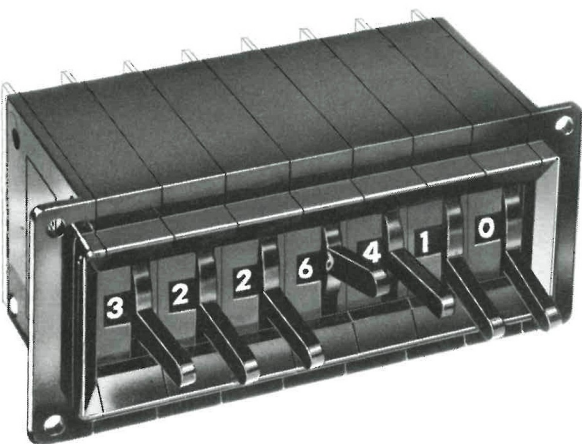
Available in 8, 10 and 16 positions with wide range of output codes. Double width "function" switch available. Dial characters are .250" high on both 8 and 10 position models and .170" high on 16 position units. This type of thumbwheel can be furnished with extended printed circuit board to provide mounting of other components. Spacers are available in choice of 1/4" and 1/2" width with legends such as decimal points, vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation.

EXTENDED PANEL (OPTION AVAILABLE ON SOME CODES)

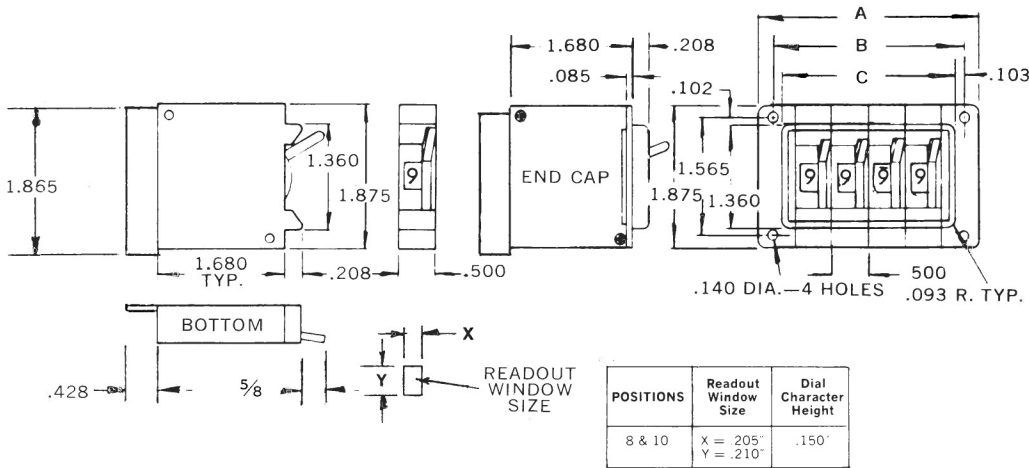


# series L-10 leverwheel

## L-10 BACK MOUNT MINIATURE SWITCHES



Available in 8 and 10 positions. Dial characters are .150" high. Spacers are available in choice of 1/4" and 1/2" width with legends such as decimal points, vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation.



### SERIES T-10 AND SERIES L-10 SPECIFICATIONS

- Inline readout
- Coded electric outputs—including binary with complement and 2 commons in subminiature types
- Modular construction
- Variations in color, coding, termination, mounting, readout symbols and materials available

#### MATERIALS

##### Case, Levers, End Caps, Wheels—

Polycarbonate for high impact, high strength (standard).

**Printed Circuit Board**—G10 Glass filled epoxy per MIL-P-13949 plated with nickel per QQ-N-290 and 100 millionths gold per MIL-G-45204

**Contacts**—WE Alloy No. 1 (69% gold, 25% silver, 6% platinum)

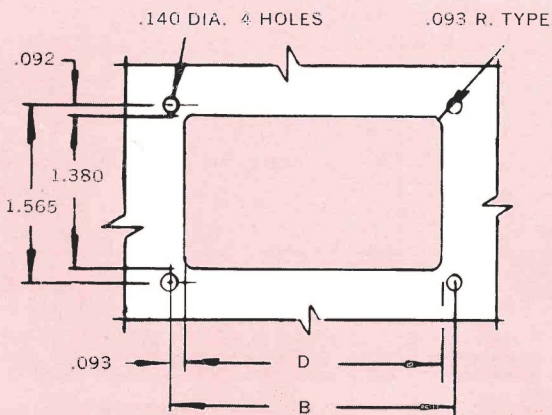
**Wipers**—Beryllium Copper

#### SWITCH CHARACTERISTICS

1. OPERATING FORCE ..... 7 to 10 ounces
2. CONTACT RESISTANCE ..... 0.1 ohm max.
3. INSULATION RESISTANCE ..... 1000 megohms
4. DIELECTRIC STRENGTH ..... 1000 volts AC
5. VIBRATION ..... 15G's, 10-2000 Hz
6. SHOCK ..... 50G's, 11 ms.
7. WEIGHT ..... 3/4 oz. per module
8. ELECTRICAL RATING ..... 115 volts AC or DC at .125 Amp. Current carrying only 3 amp. AC or DC
9. LIFE ..... Min. 1,000,000 detent operations

**NOTE:** Above characteristics and rating apply under test conditions of -65°C to +85°C temperature range with altitude not exceeding 70,000 ft. per MIL-S-22710C.

### T-10 & L-10 RECOMMENDED PANEL CUT-OUT



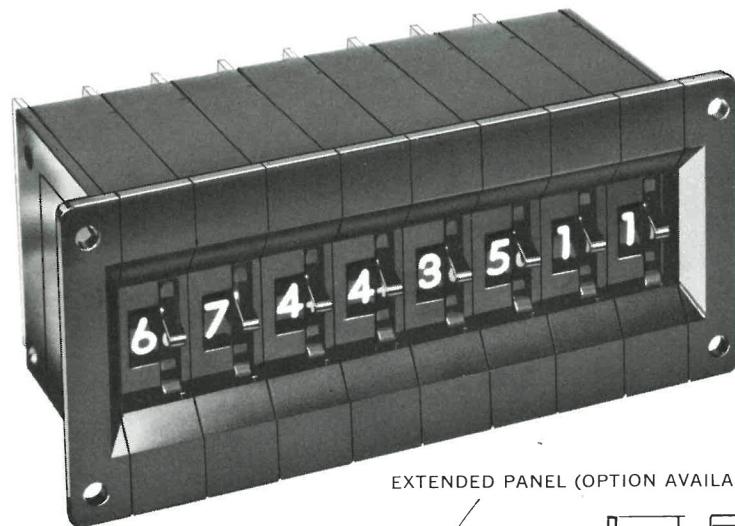
Number of Modules	A	B	C	D
1	1.41	1.075	.870	.890
2	1.91	1.575	1.370	1.390
3	2.41	2.075	1.870	1.890
4	2.91	2.575	2.370	2.390
5	3.41	3.075	2.870	2.890
6	3.91	3.575	3.370	3.390
7	4.41	4.075	3.870	3.890
8	4.91	4.575	4.370	4.390
9	5.41	5.075	4.870	4.890
10	5.91	5.575	5.370	5.390

Positions in assembly are numbered from left to right. For assemblies with more than 10 modules, consult factory.

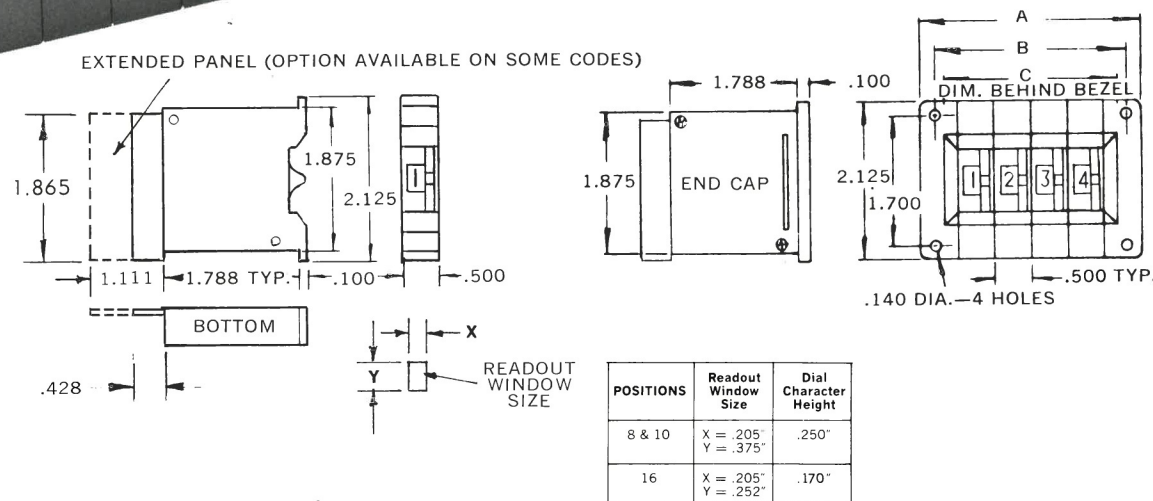


# series T-11 thumbwheel

## T-11 FRONT MOUNT MINIATURE THUMBWHEEL SWITCHES



Available in 8, 10 and 16 positions in many output codes. Dial characters are .250" high on both 8 and 10 position models and .170" high on 16 position units. This type of thumbwheel can be furnished with extended printed circuit board to provide mounting of other components. Spacers are available in 1/2" width with legends such as decimal points, vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation.



POSITIONS	Readout Window Size	Dial Character Height
8 & 10	X = .205" Y = .375"	.250"
16	X = .205" Y = .252"	.170"

## SERIES T-11 AND SERIES L-11 SPECIFICATIONS

- Inline readout
- Coded electric outputs
- Modular construction
- Variations in coding, termination and readout symbols available

## MATERIALS

### Case, Levers, End Caps, Wheels—

Polycarbonate for high impact, high strength (standard).

**Printed Circuit Board**—G10 Glass filled epoxy per MIL-P-13949 plated with nickel per QQ-N-290 and 100 millionths gold per MIL-G-45204

**Contacts**—WE Alloy No. 1 (69% gold, 25% silver, 6% platinum)

### Wipers—Beryllium Copper

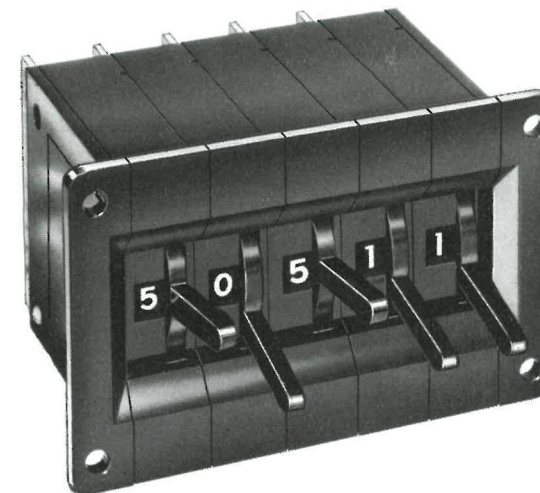
### SWITCH CHARACTERISTICS

- |                                |   |
|--------------------------------|---|
| 1. OPERATING FORCE .....       | 7 to 10 ounces  |
| 2. CONTACT RESISTANCE .....    | 0.1 ohm max.  |
| 3. INSULATION RESISTANCE ..... | 1000 megohms  |
| 4. DIELECTRIC STRENGTH .....   | 1000 volts AC   |
| 5. VIBRATION .....             | 15G's, 10-2000 Hz   |
| 6. SHOCK .....                 | 50G's, 11 ms.   |
| 7. WEIGHT .....                | ¾ oz. per module  |
| 8. ELECTRICAL RATING .....     | 115 volts AC or DC<br>at 125 Amp. Current carrying only 3 amp. AC or DC |
| 9. LIFE .....                  | Min. 1,000,000 detent operations  |

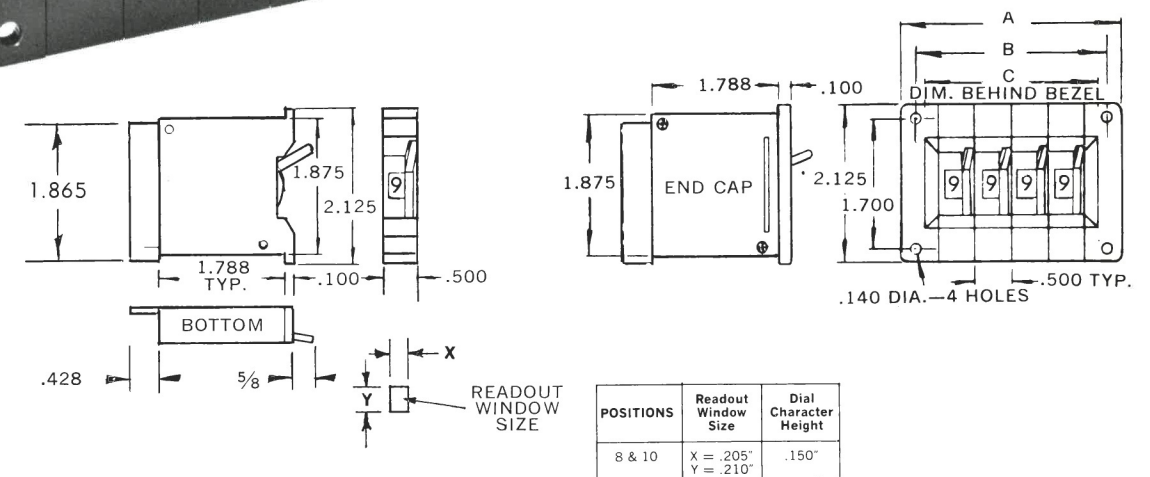
**NOTE:** Above characteristics and rating apply under test conditions of  $-65^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  temperature range with altitude not exceeding 70,000 ft. per MIL-S-22710C.

# series L-11 leverwheel

## L-11 FRONT MOUNT MINIATURE LEVERWHEEL SWITCHES

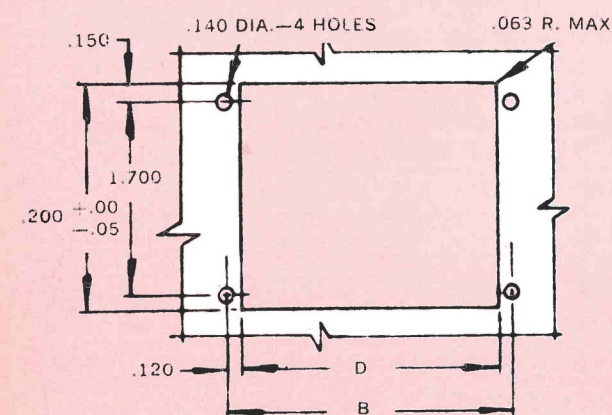


Available in 8 and 10 positions in many output codes. Dial characters are .150" high. Spacers are available in 1/2" width with legends such as decimal points, vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation as required.



POSITIONS	Readout Window Size	Dial Character Height
8 & 10	X = .205" Y = .210"	.150"

### T-11 & L-11 RECOMMENDED PANEL CUT-OUT



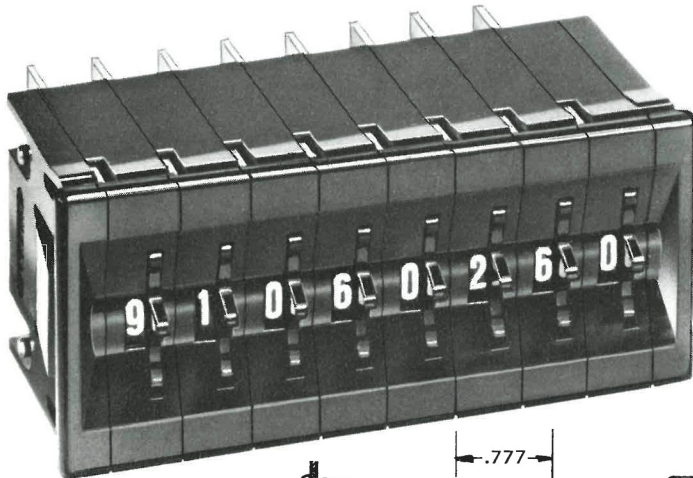
Number of Modules	A	B	C	D
1	1.30	.980	.70	.74
2	1.80	1.480	1.20	1.24
3	2.30	1.980	1.70	1.74
4	2.80	2.480	2.20	2.24
5	3.30	2.980	2.70	2.74
6	3.80	3.480	3.20	3.24
7	4.30	3.980	3.70	3.74
8	4.80	4.480	4.20	4.24
9	5.30	4.980	4.70	4.74
10	5.80	5.480	5.20	5.24

Positions in assembly are numbered from left to right.  
For assemblies with more than 10 modules, consult factory.

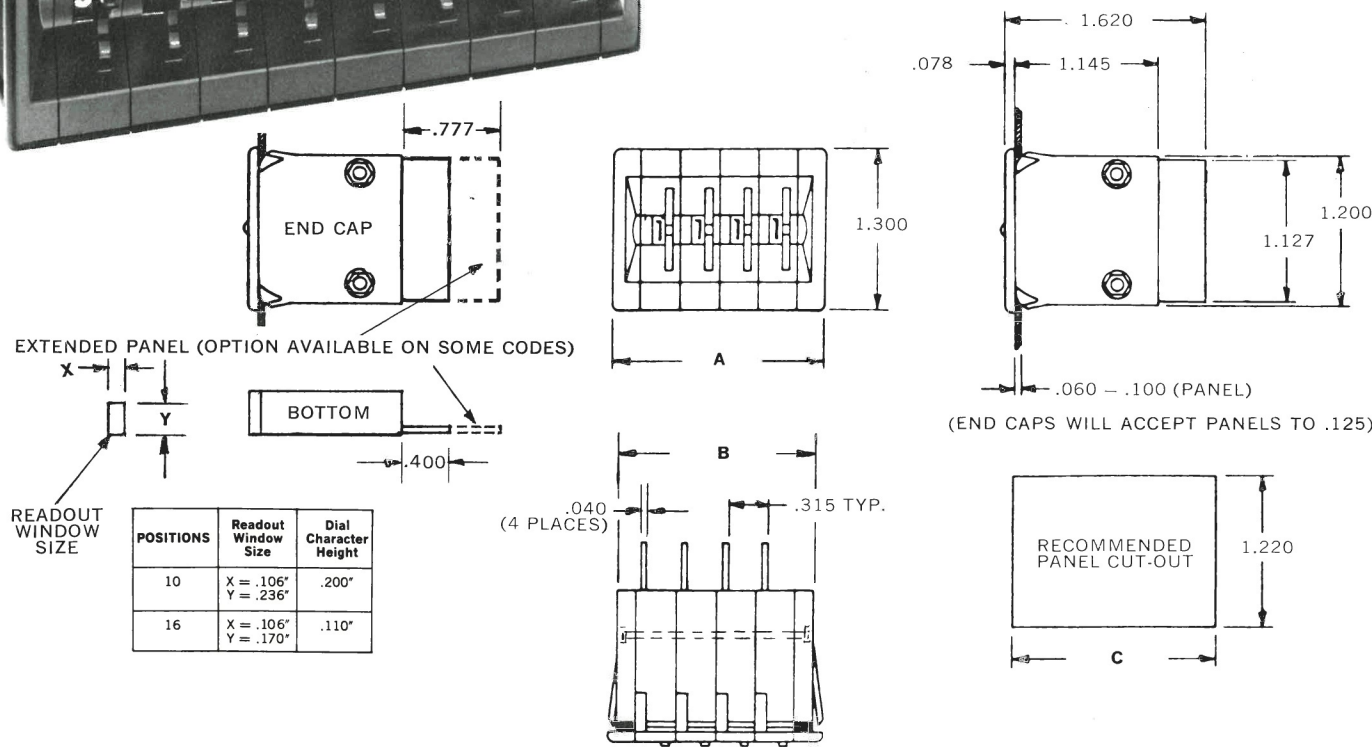


# series T-60 thumbwheel

## T-60 FRONT MOUNT (SNAP-IN) SWITCHES JUST 8MM WIDE

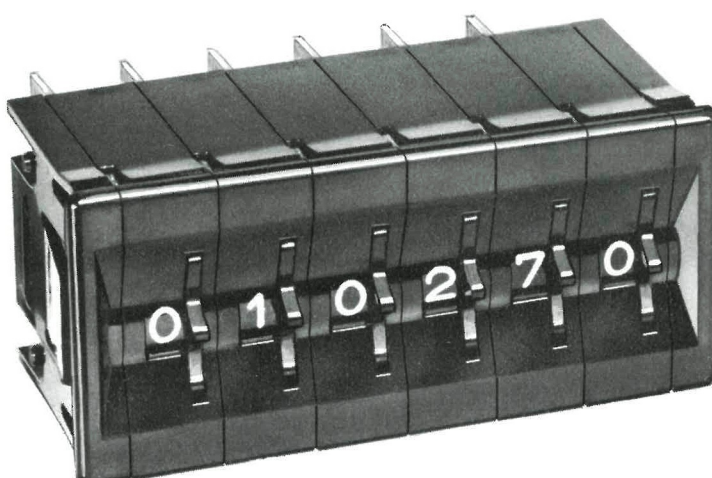


The thinnest Cherry thumbwheel. Available in 10 and 16 positions. Dial characters are .200" high on 10 position models and .110" high on 16 position units. This type of thumbwheel can be furnished with extended printed circuit board to provide mounting of other components. Spacers are available in .315" (8mm) width with legends such as decimal points, vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation as required.



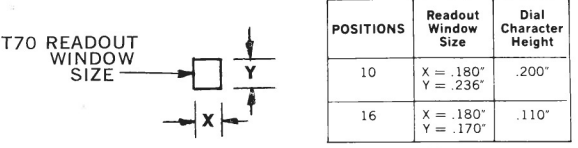
# series T-70 and T-71 thumbwheel

## T-70 FRONT MOUNT (SNAP-IN) SWITCHES JUST 10MM WIDE

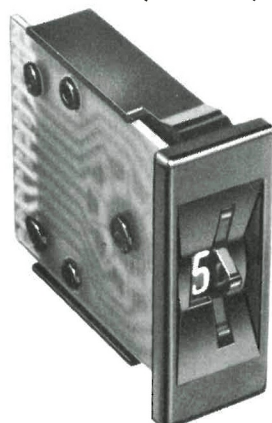


Available in 10 and 16 positions. Dial characters are .200" high on 10 position models and .110" high on 16 position units. This type of thumbwheel can be furnished with extended printed circuit board to provide mounting of other components. Spacers are available in .394" (10mm) width with legends such as decimal points, vertical lines and other symbols hot stamped on spacers. Standard finish is either black gloss or matte. Other colors available on special order. Stops may be inserted to control dial rotation as required.

NOTE: Series T-70 dimensions and recommended panel cut-out are the same as Series T-60 shown on opposite page except for switch width which is .394" (10MM) and readout window sizes which are shown below.

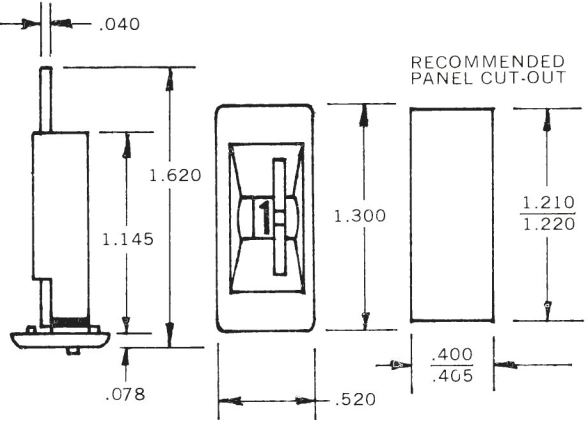


## T-71 FRONT MOUNT (SNAP-IN) SWITCHES



### T-71 INTEGRAL BEZEL FRONT MOUNT DECIMAL POINT SET SWITCH FOR CALCULATORS.

Specifications, dimensions and description similar to Series T-60 on opposite page. Standard code is 10 position decimal (Truth Table No. 2 on page 64). Also available on special order in T-60 and T-70 standard codes listed on page 63.



## SPECIFICATIONS FOR SERIES T-60, T-70, AND T-71

- Quick, easy installation—either as individual modules or as an assembly.
- No additional holes or screws required for mounting.
- When installed as individual modules, a single module can be removed randomly.
- Inline readout.
- Coded electric outputs.
- Variations in coding, termination and readout symbols available.

**MATERIALS**  
**Case, Levers, End Caps, Wheels—** Polycarbonate for high impact, high strength (standard).  
**Printed Circuit Board—** G10 Glass filled epoxy per MIL-P-13949 plated with nickel per QQ-N-290 and 100 millionths gold per MIL-G-45204.  
**Contacts—** W/E Alloy No. 1 (69% gold, 25% silver, 6% platinum)  
**Wipers—** Beryllium Copper

SWITCH CHARACTERISTICS	
1. OPERATING FORCE	7 to 10 ounces
2. CONTACT RESISTANCE	0.1 ohm max.
3. INSULATION RESISTANCE	1000 megohms
4. DIELECTRIC STRENGTH	1000 volts AC
5. VIBRATION	15G's, 10-2000 Hz
6. SHOCK	50G's, 11 ms.
7. WEIGHT	3/4 oz. per module
8. ELECTRICAL RATING	115 volts AC or DC at .125 Amp. Current carrying only 3 amp. AC or DC
9. LIFE	1,000,000 detent operations

NOTE: Above characteristics and rating apply under test conditions of -65°C to +85°C temperature range with altitude not exceeding 70,000 ft. per MIL-S-22710C.

## T-60

Number of Modules	A	B	C
1	.748	.627	.670
2	1.063	.942	.985
3	1.378	1.257	1.300
4	1.693	1.572	1.615
5	2.008	1.887	1.930
6	2.323	2.202	2.245
7	2.638	2.517	2.560
8	2.953	2.832	2.875
9	3.268	3.147	3.190
10	3.583	3.462	3.505

## T-70

Number of Modules	A	B	C
1	.827	.706	.749
2	1.221	1.100	1.143
3	1.615	1.494	1.537
4	2.009	1.888	1.931
5	2.403	2.282	2.325
6	2.797	2.676	2.719
7	3.191	3.070	3.113
8	3.585	3.464	3.507
9	3.979	3.858	3.901
10	4.373	4.252	4.295

Positions in assembly are numbered from left to right on T-60 and T-70. For assemblies with more than 10 modules, consult factory.



# thumbwheel / leverwheel

## • KELVIN VARLEY VOLTAGE DIVIDER

(See Truth Table No. 23 on page 65).

The Kelvin Varley Voltage Divider subdivides voltages by using resistors in a cascade arrangement. Circuit diagrams for the subminiature series voltage divider are shown for both an individual switch and for a three switch assembly.

Separate commons A and B in each switch are mechanically coupled although electrically isolated to allow step-by-step selection of resistive segments. In the three decade voltage divider schematic, it can be seen that voltage output of the most significant decade is, in fact, the input to the next decade and so on thru the circuit. The schematic shows a three decade divider. However, as many decades as required may be used to arrive at the desired voltage division.

Each decade or switch has provisions for eleven resistors. In the three switch circuit shown, the most significant switch has 11 ea. 10,000 ohm resistors mounted on it. Two resistors which total 20,000 ohms are shunted with the next decade which has a total resistance of 20,000 ohms. This in effect reduces the shunted resistance to 10,000 ohms which is 10% of the total resistance (100,000 ohms) in the first decade (9 x 10,000 plus the shunted 10,000 ohm resistance).

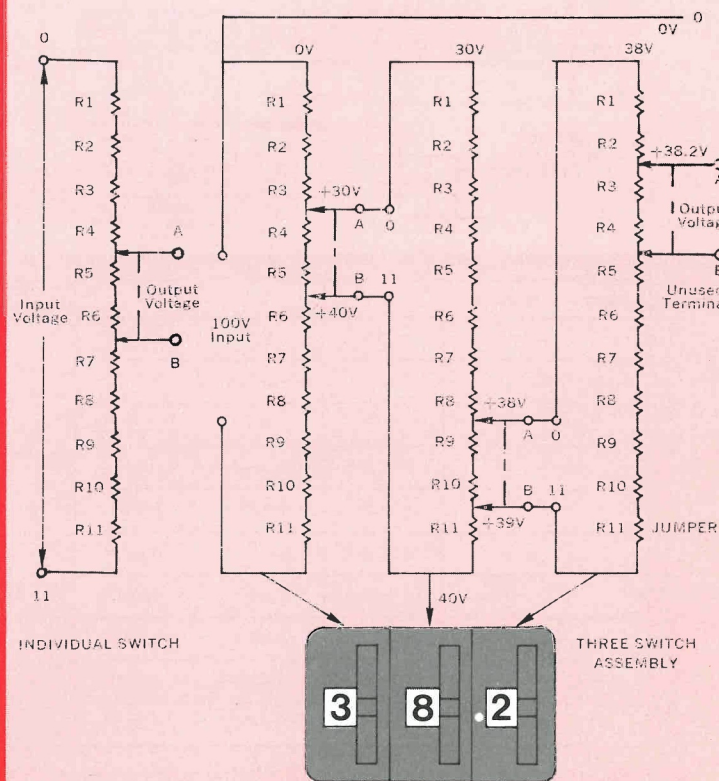
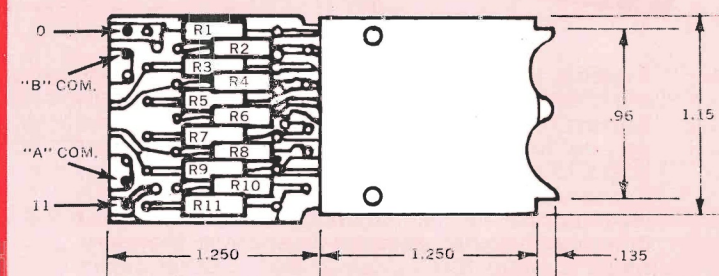
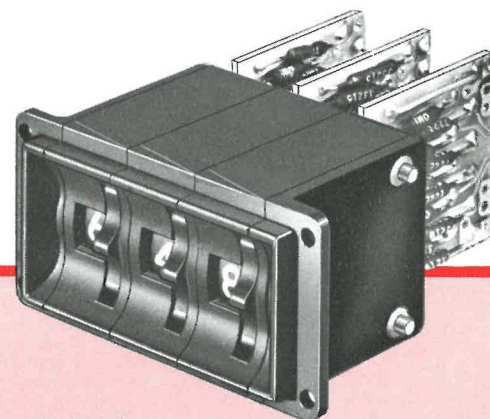
The 20,000 ohm decade consists of 11 ea. 2,000 ohm resistors. However, two are shunted by the 4,000 ohm total resistance of the least significant decade. (Total decade resistance is 9 x 2,000 plus the shunted resistance which is effectively 2,000 ohms for a total of 20,000 ohms.)

In the least significant decade, 10 ea. 400 ohm resistors make up the 4,000 ohm total resistance. Note that a jumper is used in place of the eleventh resistor on this switch.

In the Kelvin Varley circuit, a 100 volt input is divided into 10 volt increments in the first decade. The second divides its 10 volt input into 1 volt increments and the third decade divides its 1 volt input into 0.1 volt increments. If an additional decade were added, it would divide the 0.1 volts into 0.01 volt increments and so on.

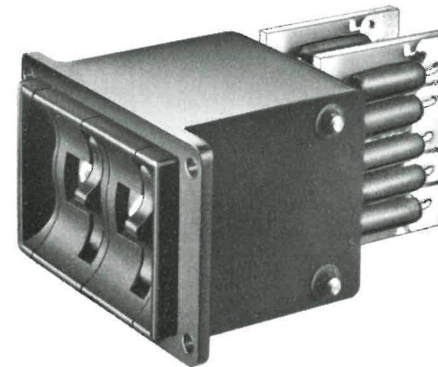
The output voltage is measured across the terminal "O" on the most significant switch and "A" on the least significant switch ("B" on the least significant switch is not used).

Accuracy of a Kelvin Varley Voltage Divider is based primarily on linearity and not solely on resistive tolerance. This is the prime advantage of this circuit. To achieve a linearity of  $\pm .01\%$  resistive, tolerance need not be  $\pm .01\%$  but may be somewhat less as long as resistors are matched in value. The most critical resistors are those used in the most significant decade. In the second most significant decade, resistors are one-tenth as critical. The same is true as one proceeds thru to the least significant decade which could have resistors with a 1% tolerance without affecting linearity.



- KELVIN VARLEY VOLTAGE DIVIDER
- WIDE WINDOW FUNCTION SWITCH

## • 1-2-2-2-2 RESISTANCE DECADE



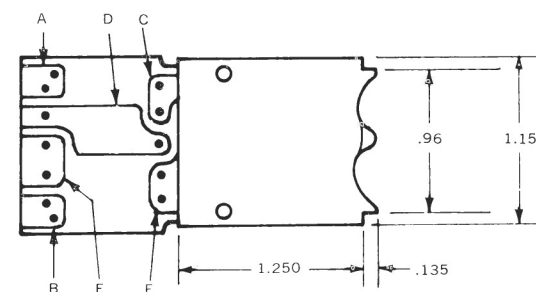
(See Truth Table No. 22 on page 65.)

Each switch has 5 resistors mounted in series on its printed circuit board and permits the selection of a short circuit through nine incremental resistive values. The selected resistance depends only upon resistor values which may be varied with each application.

The table below shows actual switch circuitry in each readout position. As noted in the table, R2, R3, R4 and R5 equal 2 x R1.

For example: If a decade is to select zero through 9,000 ohms in 1,000 ohm increments, R1 would be 1,000 ohms and R2, R3, R4 and R5 would be 2,000 ohms. For a range of zero through 9,999 ohms in one ohm increments, four decade switches would be ganged together. Switches in the assembly (left to right) would have resistor values in the thousands, hundreds, tens and units range respectively.

**Switch characteristics:** Same as Standard T-20 Thumbwheel except Contact Resistance is 0.025 ohm. max. (See page 52.)

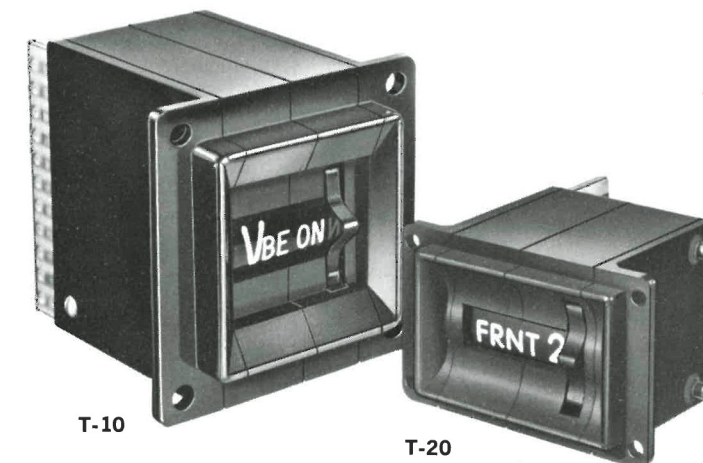


R1 = 1 x Resistance; R2 = R3 = R4 = R5 = 2 x Resistance

Dial Position	Read-out	Total Res.	Switch Circuit by position
			B (R1) F (R2) E (R3) D (R4) C (R5) A
0	0	0	
1	1	1R	
2	2	2R	
3	3	3R	
4	4	4R	
5	5	5R	
6	6	6R	
7	7	7R	
8	8	8R	
9	9	9R	

- 1-2-2-2-2 RESISTANCE DECADE
- CIRCUIT BOARD MOUNT THUMBWHEEL

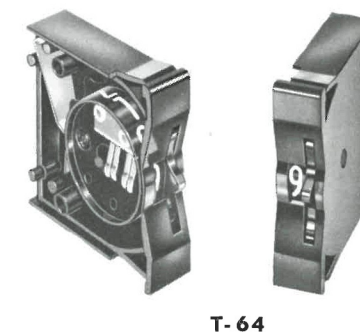
## • WIDE WINDOW FUNCTION SWITCH



A double-width, 1 inch wide thumbwheel switch providing three times the normal legend area. By combining two standard width ( $\frac{1}{2}$  inch) thumbwheel units having special readout windows, Cherry makes it possible to imprint various messages or switching functions.

This switch is available in models compatible with the T-20 Series (10 position), the T-10 Series (10 position and 16 position) and can be used to eliminate the use of lighted pushbutton switches.

## • CIRCUIT BOARD MOUNT THUMBWHEEL



The Cherry T64 Series thumbwheel is specifically designed for applications where a thumbwheel switch is mounted to a printed circuit board. Typically, the circuit board plugs into a chassis and the thumbwheel switch is mounted to permit the presetting of circuit functions.

The wheel and detent spring of the T64 are mounted in a case so as to elevate the contact wiper set. This permits direct mounting on the PC board without modifying the board to recess into the switch housing. The T64 is available in the T60 codes listed on page 63. Contact factory for further details.



# thumbwheel/leverwheel complete product listing

## T-20 and L-20 BACK MOUNT SUBMINIATURE

See pages 52-53 for dimensions and specifications

CATALOG NUMBER	CATALOG NUMBER	NUMBER OF POSITIONS	DESCRIPTION	PC TERMINATION**		READOUT	TRUTH TABLE NO.
				.156" Centers	.100" Centers		
T20-94A	L20-94A	2	Single pole repeating	•		(-, +)	4
T20-95A	L20-95A	2	Single pole repeating	•		(0, 1)	4
T20-96A	L20-96A	2	Single pole repeating	•		(0, 5)	4
T20-07A	L20-07A†	8	Binary Coded Octal	•		(0-7)	7
T20-47A†*	L20-47A†*	8	BCO with separate common to not true bits	•		(0-7)	13
T20-17A†*	L20-17A†*	8	Decimal		•	(0-7)	16
T20-57A†*	L20-57A†*	8	BCO with diode provision	•		(0-7)	7
T20-77A†*	L20-77A†*	8	BCO complement only	•		(0-7)	15
T20-01A	L20-01A	10	Decimal		•	(0-9)	2
T20-11A	L20-11A	10	Double pole decimal		•	(0-9)	3
T20-69A*	L20-69A*	10	Decimal, make before break		•	(0-9)	2
—	L20-20A	12	Decimal		•	(0-11)	17
T20-02A	L20-02A	10	Binary Coded Decimal	•		(0-9)	1
T20-04A	L20-04A	10	BCD plus complement, 1 common		•	(0-9)	8
T20-06A	L20-06A	10	BCD plus odd parity	•		(0-9)	12
T20-10A	L20-10A	10	BCD plus even parity	•		(0-9)	10
T20-12A	L20-12A	10	BCD complement only	•		(0-9)	11
T20-15A	L20-15A	10	BCD with separate common to not true bits	•		(0-9)	14
T20-14A*	L20-14A*	10	9's complement of BCD plus complement		•	(0-9)	20
T20-52A	L20-52A	10	BCD with diode provision	•		(0-9)	1
T20-54A	L20-54A	10	BCD plus complement, 1 common with diode provision		•	(0-9)	8
T20-68A*	L20-68A*	10	Two out of five code with diode provision (1-2-4-7 with even bit parity)	•		(0-9)	18
T20-72A*	L20-72A*	10	Complement of 9's complement with diode provision	•		(0-9)	19
T20-65A*	L20-65A*	10	Kelvin-Varley voltage divider				23
T20-67A*	L20-67A*	10	1-2-2-2-2 resistive decade				22
T20-03A	—	16	Hexadecimal	•		(0-15)	5
T20-08A	—	16	Hexadecimal plus complement, 1 common		•	(0-15)	9
T20-09A	—	16	Hexadecimal plus complement, 2 commons		•	(0-15)	6
T20-13A	—	16	Hexadecimal	•		(0-9, A-F)	5
T20-53A	—	16	Hexadecimal with diode provision	•		(0-15)	5
T20-63A*	—	16	Hexadecimal with diode provision	•		(0-9, A-F)	5
T20-88A*	—	16	Hexadecimal plus complement, 1 common		•	(0-9, A-F)	9
T20-89A*	—	16	Hexadecimal plus complement, 2 commons		•	(0-9, A-F)	6

†With stops. \*Available but not carried in stock \*\*Printed Circuit termination for solder or card edge connector.

## T-10 and T-11 BACK AND FRONT MOUNT MINIATURE THUMBWHEELS

See pages 54 thru 57 for dimensions and specifications. PC termination: All circuits on .156" centers for solder or card edge connector.

CATALOG NUMBER	CATALOG NUMBER	NUMBER OF POSITIONS	DESCRIPTION	READOUT	TRUTH TABLE NO.
T10-94A	T11-94A	2	Single pole repeating	(-, +)	4
T10-95A	T11-95A	2	Single pole repeating	(0, 1)	4
T10-96A	T11-96A	2	Single pole repeating	(0, 5)	4
T10-07A	T11-07A	8	Binary Coded Octal	(0-7)	7
T10-01A	T11-01A	10	Decimal	(0-9)	2
T10-11A	T11-11A	10	Double pole decimal	(0-9)	3
T10-02A	T11-02A	10	Binary Coded Decimal	(0-9)	1
T10-04A	T11-04A	10	BCD plus complement, 1 common	(0-9)	8
T10-52A	T11-52A	10	BCD with diode provision	(0-9)	1
T10-54A	T11-54A	10	BCD plus complement, 1 common with diode provision	(0-9)	8
T10-03A	T11-03A	16	Hexadecimal	(0-15)	5
T10-08A	T11-08A	16	Hexadecimal plus complement, 1 common	(0-15)	9
T10-09A	T11-09A	16	Hexadecimal plus complement, 2 commons	(0-15)	6
T10-13A	T11-13A	16	Hexadecimal	(0-9, A-F)	5
T10-19A	T11-19A	16	Hexadecimal plus complement, 2 commons	(0-9, A-F)	6

## L-10 and L-11 BACK AND FRONT MOUNT MINIATURE LEVERWHEELS

See pages 54 thru 57 for dimensions and specifications. PC termination: All circuits on .156" centers for solder or card edge connector.

L10-94A	L11-94A	2	Single pole repeating	(-, +)	4
L10-95A	L11-95A	2	Single pole repeating	(0, 1)	4
L10-96A	L11-96A	2	Single pole repeating	(0, 5)	4
L10-07A	L11-07A	8	Binary Coded Octal	(0-7)	7
L10-01A	L11-01A	10	Decimal	(0-9)	2
L10-11A	L11-11A	10	Double pole decimal	(0-9)	3
L10-02A	L11-02A	10	Binary Coded Decimal	(0-9)	1
L10-04A	L11-04A	10	BCD plus complement, 1 common	(0-9)	8
L10-10A	L11-10A	10	BCD plus even parity	(0-9)	10
L10-05A	L11-05A	10	BCD plus complement, 2 commons	(0-9)	21

## T-60 and T-70 FRONT MOUNT (SNAP-IN) THUMBWHEELS

See pages 58-59 for dimensions and specifications. PC termination: Consult factory.

T60-94A	T70-94A	2	Single pole repeating	(-, +)	4
T60-95A*	T70-95A*	2	Single pole repeating	(0, 1)	4
T60-96A*	T70-96A*	2	Single pole repeating	(0, 5)	4
T60-11A*	T70-11A*	2	Double pole repeating	(-, +)	28
T60-07A	T70-07A	8	Binary Coded Octal	(0-7)	7
T60-55A*	T70-55A*	8	BCO complement only	(0-7)	15
T60-01A	T70-01A	10	Decimal	(0-9)	2
T60-02A	T70-02A	10	Binary Coded Decimal (Make-before-break)	(0-9)	1
T60-04A	T70-04A	10	BCD plus complement, 1 common	(0-9)	8
T60-06A*	T70-06A*	10	BCD plus odd parity	(0-9)	12
T60-10A*	T70-10A*	10	BCD plus even parity	(0-9)	10
T60-12A	T70-12A	10	BCD complement only	(0-9)	11
T60-52A	T70-52A	10	BCD with diode provision	(0-9)	1
T60-50A*	T70-50A*	10	Excess 3 gray code positive	(0-9)	26
T60-49A*	T70-49A*	10	Excess 3 gray code negative	(0-9)	27
T60-70A*	T70-70A*	10	Aiken code 1-2-4-2	(0-9)	24
T60-71A*	T70-71A*	10	Aiken code modern 1-2-4-2	(0-9)	25
T60-03A	T70-03A*	16	Hexadecimal	(0-15)	5

\*Available but not carried in stock



truth tables

TABLE 1. Code: BCD (Binary coded decimal)

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8
0					
1	●				
2		●			
3	●	●			
4			●		
5	●		●		
6		●	●		
7	●	●	●		
8				●	
9	●				●

TABLE 2. Code: 10 Position Decimal

Readout Symbol	Common C Connected to Terminals = ●	0	1	2	3	4	5	6	7	8	9
0	●										
1		●									
2			●								
3				●							
4					●						
5						●					
6							●				
7								●			
8									●		
9										●	

TABLE 3. Code: Double Pole, Ten Position

Readout Symbol	Common C Connected to Terminals = ●	Common C Connected to Terminals = ○	0	1	2	3	4	5	6	7	8	9
0	●											
1		○	●									
2			●	○								
3				●	○							
4					●	○						
5						●	○					
6							●	○				
7								●	○			
8									●	○		
9										●	○	

TABLE 4. Code: Single Pole two position (repeated without dial stops)

Dial Position	Readout Symbol	Common Connected to	1	2
0	—	●		
1	+			●

Readout symbol can also be furnished (0) (1) or (0) (5).

TABLE 5. Code: Hexadecimal

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8
0					
1	●				
2		●			
3	●	●			
4			●		
5	●		●		
6		●	●		
7	●	●	●		
8				●	
9	●			●	
10(A)		●		●	
11(B)	●	●		●	
12(C)			●	●	
13(D)	●		●	●	
14(E)		●	●	●	
15(F)	●	●	●	●	

TABLE 6. Code: Hexadecimal plus complement plus 2 commons

Readout Symbol	Common X Connected to Terminals = ●	Common Y Connected to Terminals = ○	1	2	4	8
0		○	○	○	○	○
1	●		○	○	○	○
2		○	○	○	○	○
3	●	○	○	○	○	○
4		○	○	○	○	○
5	●	○	○	○	○	○
6		○	○	○	○	○
7	●	○	○	○	○	○
8		○	○	○	○	○
9	●	○	○	○	○	○
10(A)		○	○	○	○	○
11(B)	●	○	○	○	○	○
12(C)		○	○	○	○	○
13(D)	●	○	○	○	○	○
14(E)		○	○	○	○	○
15(F)	●	○	○	○	○	○

TABLE 7. Code: Binary Coded Octal

Readout Symbol	Common C Connected to Terminals = ●	1	2	4
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	

TABLE 16. Code: 8 position decimal

Readout Symbol	Common C Connected to Terminals = ●	0	1	2	3	4	5	6	7
0	●								
1		●							
2			●						
3				●					
4					●				
5						●			
6							●		
7								●	

TABLE 17. Code: 12 position decimal

Readout Symbol	Common C Connected to Terminals = ●	0	1	2	3	4	5	6	7	8	9	10	11	12
0	●													
1		●												
2			●											
3				●										
4					●									
5						●								
6							●							
7								●						
8									●					
9										●				
10											●			
11												●		
12													●	

TABLE 18. Code: Two out of five (1-2-4-7 with even bit parity)

Readout Symbol	Common C Connected to Terminals = ●	0	1	2	4	7
0				●	●	
1	●	●				
2	●		●			
3		●	●			
4	●			●		
5		●			●	
6			●	●		
7	●					●
8		●				●
9			●			●

TABLE 19. Code: Complement of 9's complement

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8
0		●	●		
1	●	●	●		
2				●	
3	●				●
4		●			●
5	●	●			●
6			●		●
7	●		●		●
8		●	●		●
9	●	●	●		●

TABLE 8. Code: BCD plus complement

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8	1	2	4	8
0						●	●	●	●
1	●					●	●	●	●
2		●				●	●	●	●
3	●	●				●	●	●	●
4			●			●	●	●	●
5	●		●			●	●	●	●
6		●	●			●	●	●	●
7	●	●	●			●	●	●	●
8				●		●	●	●	●
9	●				●	●	●	●	●

TABLE 9. Code: Hexadecimal plus complement

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8	1	2	4	8
0						●	●	●	●
1	●					●	●	●	●
2		●				●	●	●	●
3	●	●				●	●	●	●
4			●			●	●	●	●
5	●		●			●	●	●	●
6		●	●			●	●	●	●
7	●	●	●			●	●	●	●
8				●		●	●	●	●
9	●				●	●	●	●	●
10(A)		●			●	●	●	●	●
11(B)	●	●			●	●	●	●	●
12(C)			●		●	●	●	●	●
13(D)	●		●		●	●	●	●	●
14(E)		●	●		●	●	●	●	●
15(F)	●	●	●		●	●	●	●	●

TABLE 10. Code: BCD plus even parity

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8	P
0						
1	●					●
2		●				●
3	●	●				●
4			●			●
5	●		●			●
6		●	●			●
7	●	●	●			●
8				●		●
9	●			●		●
10(A)		●		●		●
11(B)	●	●		●		●
12(C)			●	●		●
13(D)	●		●	●		●
14(E)		●	●	●		●
15(F)	●	●	●	●		●

TABLE 11. Code: BCD complement only

Readout Symbol	Common Connected to Complement of Binary Bit Output Numbers	1	2	4	8
0		●	●	●	●
1		●	●	●	●
2		●	●	●	●
3		●	●	●	●
4		●	●	●	●
5		●	●	●	●
6		●	●	●	●
7		●	●	●	●
8		●	●	●	●
9		●	●	●	●

TABLE 12. Code: BCD plus odd parity

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8	P
0						●
1	●					
2		●				
3	●	●				●
4			●			
5	●		●			●
6		●	●			●
7	●	●	●			●
8				●		
9	●			●		●

TABLE 13. Code: BCD with separate common to not true bits

Readout Symbol	Com. X Connected to Term. = ●	Com. Y Connected to Term. = ○	1	2	4	8
0	○	○	○	○	○	○
1	●	○	○	○	○	○
2	○	●	○	○	○	○
3	●	●	○	○	○	○
4	○	○	●	○	○	○
5	●	○	●	○	○	○
6	○	●	●	○	○	○
7	●	●	●	○	○	○

TABLE 14. Code: BCD with separate common to not true bits

Readout Symbol	Com. X Connected to Term. = ●	Com. Y Connected to Term. = ○	1	2	4	8
0	○	○	○	○	○	○
1	●	○	○	○	○	○
2	○	●	○	○	○	○
3	●	●	○	○	○	○
4	○	○	●	○	○	○
5	●	○	●	○	○	○
6	○	●	●	○	○	○
7	●	●	●	○	○	○

TABLE 15. Code: BCD complement only

Readout Symbol	Com. Connected to Complement of Binary Bit Output Numbers = ●	1	2	4
0	●	●	●	●
1		●	●	●
2	●		●	●
3		●	●	●
4	●	●		●
5		●	●	●
6	●		●	●
7		●	●	●
8	●	●	●	
9		●	●	●

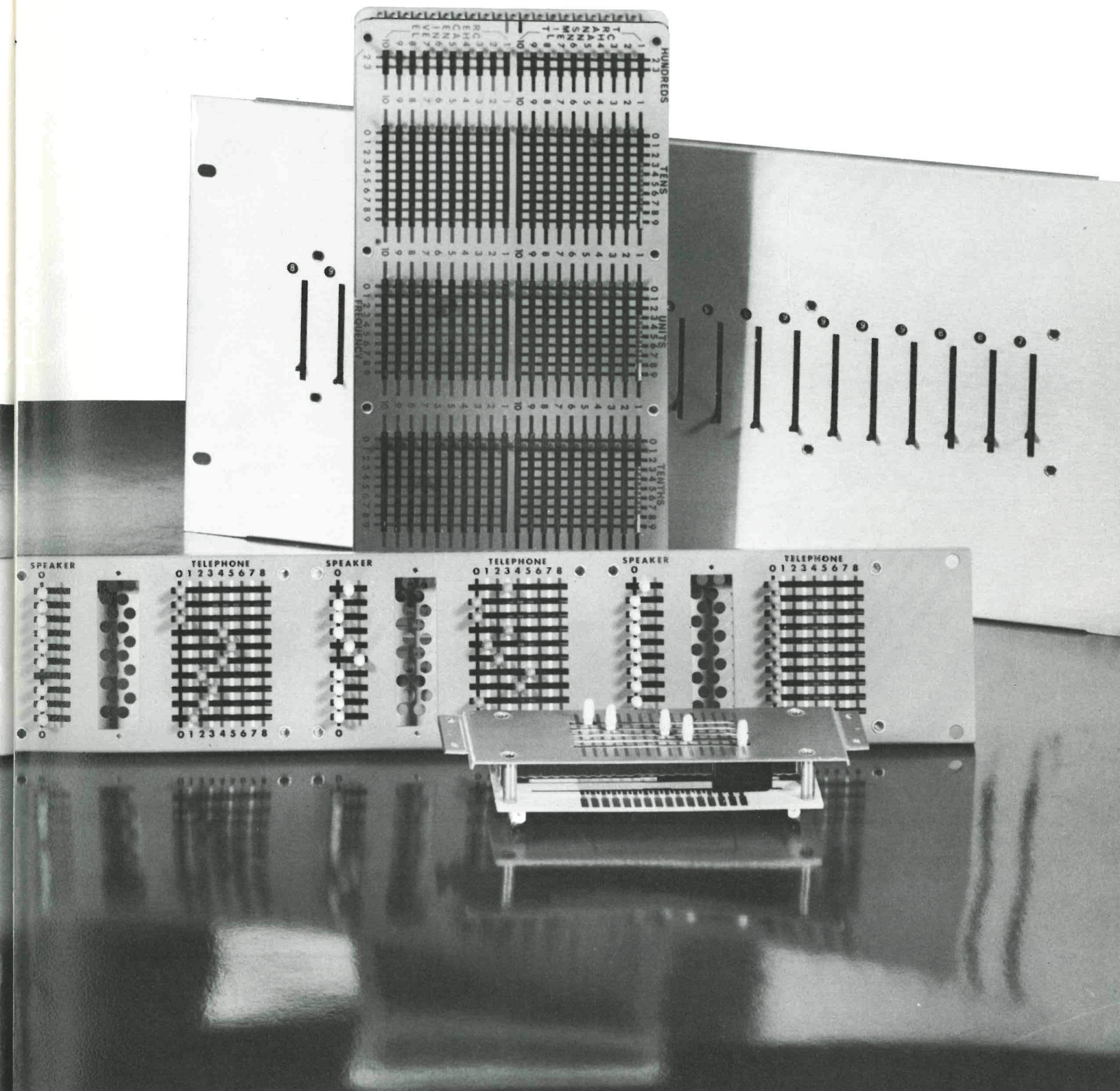
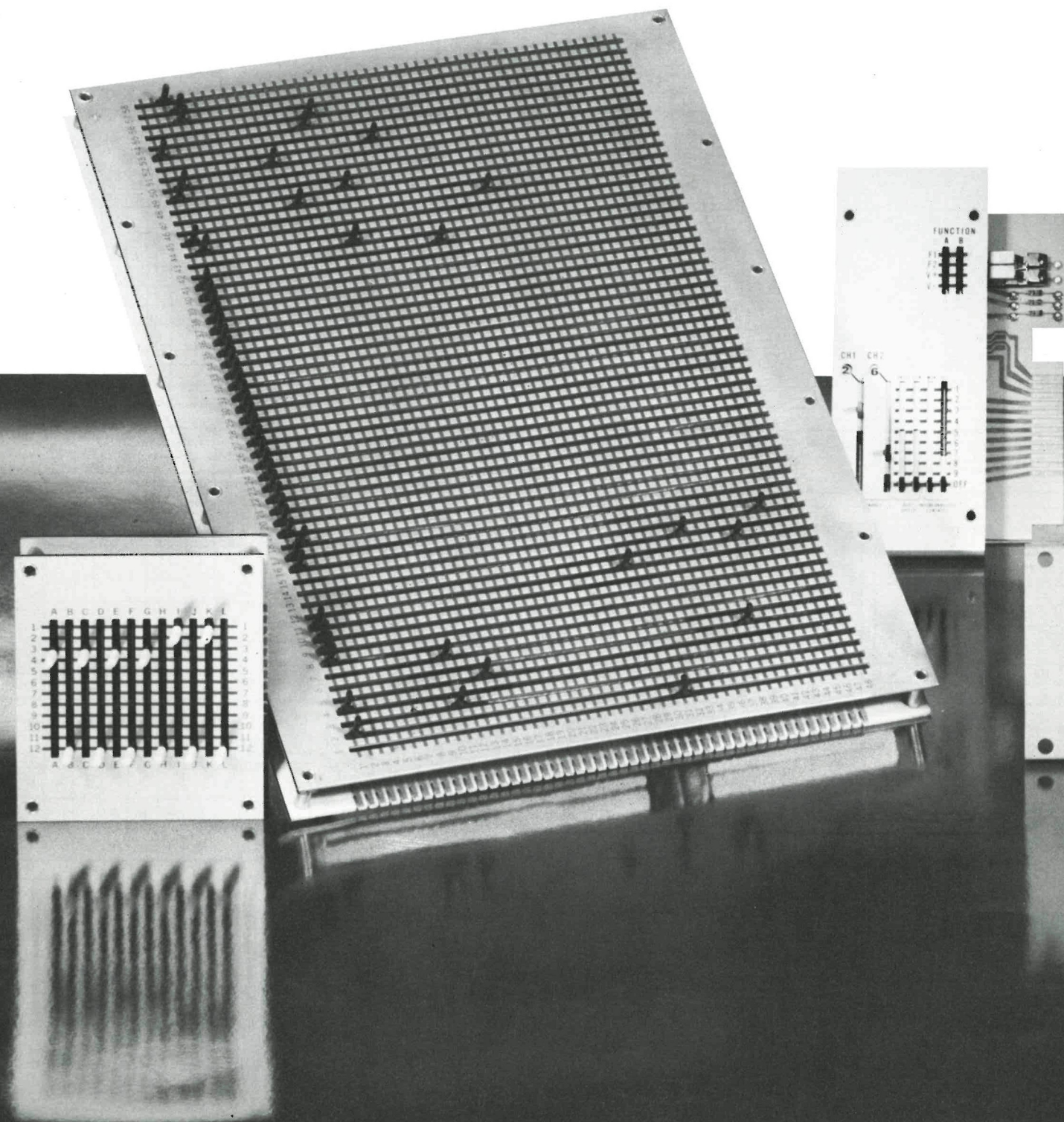
TABLE 20. Code: 9's complement of BCD plus complement

Readout Symbol	Common C Connected to Terminals = ●	1	2	4	8	1	2	4	8
0	●					○	○	○	○
1		●				○	○	○	○
2			●			○	○	○	○
3				●		○	○	○	○
4					●	○	○	○	○
5						○	○	○	○
6						○	○	○	○
7						○	○	○	○
8						○	○	○	○
9						○	○	○	○

TABLE 21.		Code: BCD plus complement, 2 commons							
Readout Symbol	Com. C Connected to Term. = ● Com. C Connected to Term. = ○								
	1	2	4	8	1	2	4	8	
0					○	○	○	○	
1	●					○	○		
2		●			○		○	○	
3	●	●					○	○	
4			●		○	○		○	
5	●		●			○	○		
6		●	●		○			○	
7	●	●	●	●				○	
8				●	○	○	○		
9	●			●		○	○		



# MATRIX SELECTOR SWITCHES . . . rapid circuit selection and programming



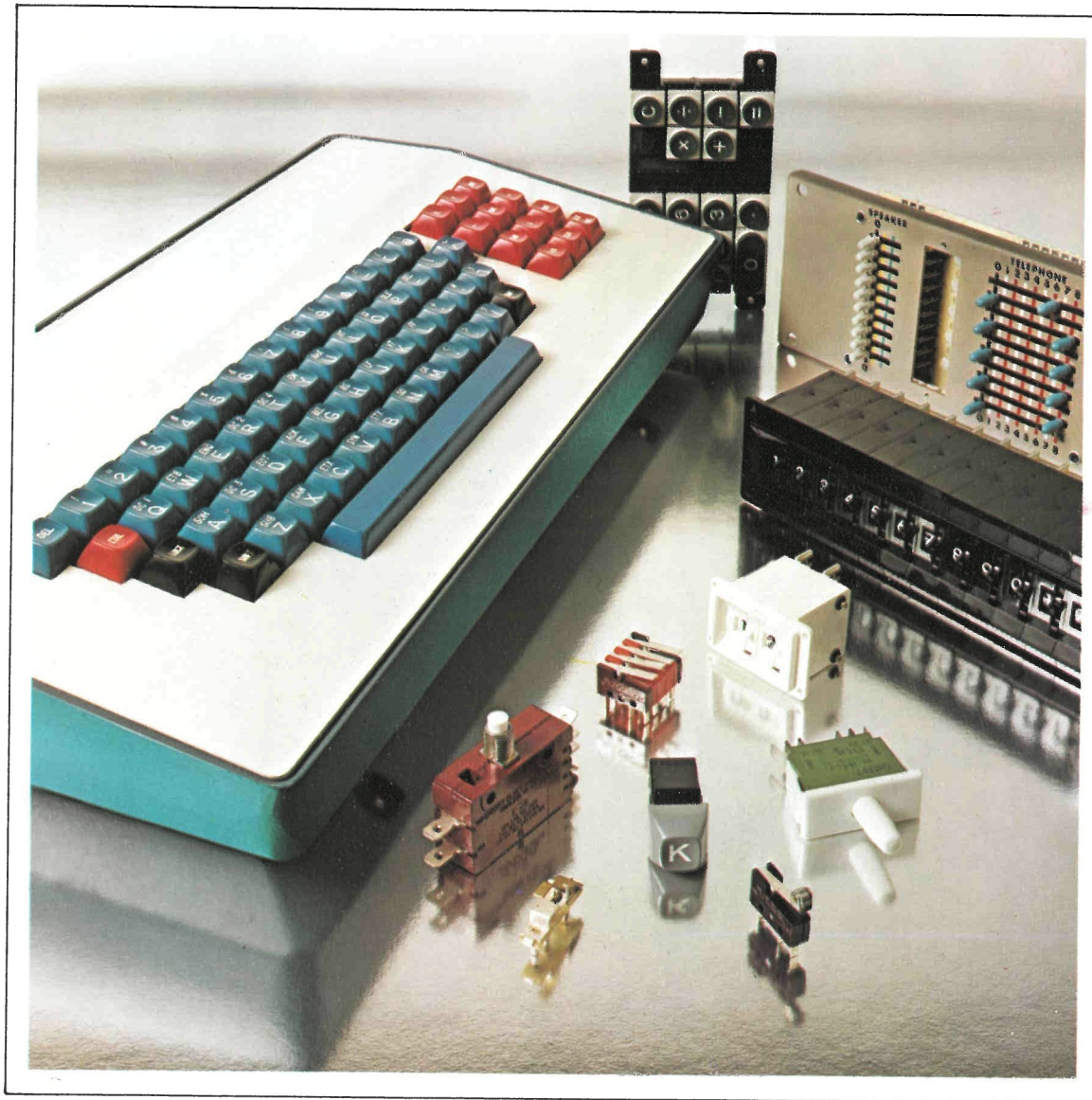






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P.O. Box 403  
800 Midland Ave., Thomasville 27360  
(919) 476-6727

### OREGON

Jas. J. Backer Co.  
Sylvan Bldg., Room 207  
2035 S.W. 58th St., Portland 97221  
(503) 297-3776

### TEXAS

William Reese Associates  
3131 Stemmons Exp. 75247  
P.O. Box 24410, Dallas 75224  
(214) 638-6575  
William Reese Associates  
P.O. Box 26247 77032  
2400 W. Loop South (Suite 216)  
Houston 77027  
(713) 621-3134

### UTAH

Arrowhead Sales Corporation  
P.O. Box 15709  
Salt Lake City 84115  
(801) 487-3444 / 483-3362

### WASHINGTON

Jas. J. Backer Co.  
221 West Galer Street 98119  
P.O. Box 9327, Seattle 98109  
(206) 285-1300

### WISCONSIN

Don Herrick Company  
220 Sussex St., (Box 61)  
Pewaukee 53072  
(414) 691-2770



### ISRAEL

Astragal Ltd.  
107, Hachashmonaim Street  
P.O. Box 7082  
Tel-Aviv

### ITALY

Silverstar Ltd. SpA.  
20, Via dei Gracchi  
I 20146 Milano

### JAPAN

Hirose Electric Co. Ltd.  
No. 5-23, 5 Chome  
Osaki, Shinagawa-Ku  
Tokyo

### MEXICO

Instrumentacion Industrial, S.A.  
Cervantes Saavedra 151  
P.O. Box 53-155  
Mexico 17, D.F.  
Apartado Postal 6-621  
Mexico 6, D.F.

### NETHERLANDS

Electro Ingenieursbureau  
Daniel N. V.  
Leidsegracht 90  
Amsterdam-C

### NORWAY

Skandinavisk Elektronikk A/S  
Ebbellsgt. 1-Postboks 129  
Oslo

### SOUTH AFRICA

Fairmont Electronics (Pty.) Ltd.  
214 Hyde Square  
Jan Smuts Avenue, Hyde Park  
Johannesburg

### SPAIN

Ismea Iberica  
Avenida de la Catedral, 14  
Barcelona

### SWEDEN

Skandinaviska Telekompaniet AB  
Veddestavagen 14  
S-17023 Barkarby

### SWITZERLAND

Messrs. Modal-Technik AG  
Auf Dem Wolf 10  
CH 4000 Basel 28

### UNITED KINGDOM (Cherry U.K. Subsidiary)

Cherry Electrical Products (U.K.) Ltd.  
Lattimore Road  
St. Albans, Herts, England

### VENEZUELA

J. Gomis Duch, S.A.  
Apartado 2423  
Caracas



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