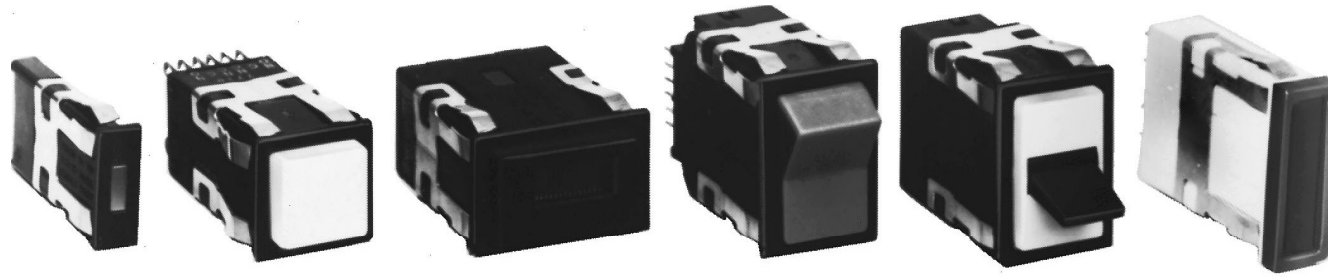


Manual Switches

Advanced Manual Line



IN FRONT OF THE PANEL

Coordinated, attractive appearance. AML features innovations designed by industrial designers to achieve the best balance of human factors and aesthetic appearance. Operator height, bezel size, and the compatibility of square and rectangular shapes blend with other components to harmonize your panel. There's no visual clutter to distract from man/machine communication.

This comprehensive line of lighted and unlighted manual controls features:

- Pushbuttons for high and intermediate frequency functions;
- Rocker and paddle switches, with 2 or 3 positions, for less frequent control functions;
- Plus lighted indicators and annunciators which complement AML's universal appeal.

Various controls can be matched with their functions to accommodate the most natural and efficient habit pattern reflex. Keylock operated switches can be used to assure "authorized personnel only" access.

Display flexibility. AML offers a choice of five legend sizes, four button heights, full or split section display, and illumination by incandescent lamps, LED's or neons. Colors are bright and uniform, providing a strong definition and good visibility. (Non-illuminated devices have the same attractive colors.)

Color display options include:

- Transmitted color — color can be distinguished whether lamp is On or Off.
- Dead front — display appears black, until illumination causes legend and color to appear.
- Projected color — white display is diffused with color when illuminated.

BEHIND THE PANEL

AML's simple, cost effective design provides many behind-panel benefits for the designer and installer/user.

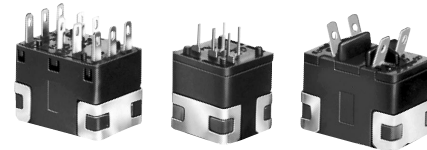
Simple to install. They snap in from the panel front individually or in vertical or horizontal strips; or in subpanel mounted strips and matrices that can be pre-assembled and pre-wired to assure accurate alignment and efficient panel building.

Electrical flexibility. Solid state switches with Hall effect integrated circuits interface directly with microprocessors and other logic level devices. These IC's were first applied in MICRO SWITCH solid state keyboards. Today, many MICRO SWITCH products incorporate the Hall effect technology to meet a wide range of position sensing and manual control needs.

Electronic control switches with gold or silver contacts, and 1, 2, or 4 poles, will handle up to 3 amps. Including an encoded version which generates different binary coded outputs merely by changing cam-keyed buttons.

Power duty switches meet line disconnect application needs with 10-amp push-buttons and 15-amp paddle and rocker switches.

Easy to wire. All AML devices present single level termination. This means faster, easier, neater, and more economical wiring. And there is a choice of solder, quick-connect, push-on, and printed circuit termination.



MATING RECEPTACLES

The .110 x .020 quick-connect/solder terminal (types 2 and 8) is designed for use with receptacles that comply with the UL standard for insertion and withdrawal forces. Maximum insertion force is 12 lbs. max., withdrawal force is 14 lbs. These receptacles are supplied by: AMP Inc., Berg, Augat, Hollingsworth, MALCO, Zierick, and others. Refer to Thomas Register or the Yellow Pages for the location of your local supplier.

Manuals

Manual Switches

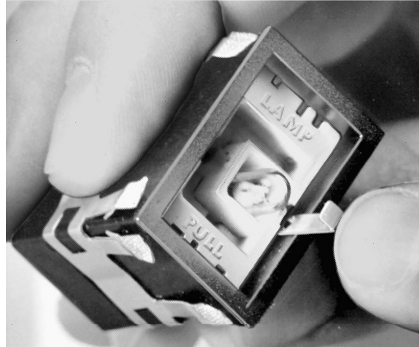
Advanced Manual Line

FEATURES

- Complete selection of pushbutton, rocker and paddle (toggle type) switches accommodates different functions and promotes operator efficiency.
- Solid state, electronic, and power duty control.
- Full or split screen incandescent display switches and indicators provide vivid transmitted color, projected color (for neutral display when unlit), and dead front (hidden color).
- Wide-angle visibility LED and line voltage neon display switches and indicators.
- Annunciators back-lighted by LED's enable high density message display.
- Keylock switches available for controlled access applications.
- All AML terminations at the same shallow depth (1.7 in. /43,1 mm) for convenient wiring or PC board termination.
- Snap-in surface mount or sub-panel (hidden bezel) mount with mounting hardware.
- Pad printed legends with a clear polyurethane overcoat available in a choice of five standard sizes.
- Metric design for worldwide acceptance.
- UL recognized, CSA certification.
- Selected listings are certified by VDE and CE. (For compliance status, contact the 800 number.)

MICRO SWITCH AML Advanced Manual Line combines functional flexibility with electrical versatility to provide a broad range of options to choose from.

EASY TO RELAMP



Relamping of T-1-3/4 incandescent AML91 lamps is accomplished from the front of the panel without tools. (AML92 T-1-3/4 LEDs can be added in the same manner.)

FULL GUARD BEZEL OPTION



As an alternative to standard height bezels (.06 in./1,5 mm), pushbutton switches can be furnished with full guard bezels extending .19 in./5.0 mm from the mounting surface. In the free position, standard buttons are flush with full guard bezels.

The raised bezel guards against accidental operation by someone leaning against or dropping something on a control console.

High Intensity LEDs For Full-face AML Lighted Display AML92 Series



- Full-face illumination for high visibility lighted colors.
- Advanced illumination technology combines high-intensity LED in standard T-1-3/4 wedge base lamp package.
- Easy plug-in installation in AML lighted switches and indicators.
- Low operating temperature permits high density, continuous operation with minimal heat build-up.

AML92 Series LEDs have a quad chip assembled in a T-1-3/4 wedge base lamp package. They provide full-face illumination when used with lighted pushbutton, rocker and paddle switches, or indicators equipped with incandescent lamp sockets. For ordering information, **refer to page 46.**

AML CHARACTERISTICS

	AML 10 Series	AML 20 Series	AML 30 Series	AML 40 Series
Electrical/Mechanical Life*				N/A
Pushbuttons–Momentary	1,000,000	25,000 (silver)/ 100,000 (gold)	25,000	---
Pushbuttons–Alternate	25,000	25,000	25,000	---
Rockers	25,000	25,000	25,000	---
Paddles	25,000	25,000	25,000	---
Agency Ratings (May not apply to every series division)				
UL	File E53576	File E12252	File E12252	File E58932
CSA	File LR4442	File LR4442	File LR4442	File LR4442
VDE	None	File 0630/10.78+	File 0630/10.78+ +	None
CE		Rating 1710 No. 4275.5788	Rating 1710 No. 4275.5788	

*95% Survival
 + Exception: Four-Pole AML's are not included in VDE Approval
 ++ Exception: Only the 2-pole AML33 and AML34 are certified by VDE

AML ELECTRICAL DATA

● AML10 Series

Electrical Characteristics						Absolute Maximum Rating ④			
Integrated Circuit Function	Supply Current (Max.)	Output Voltage (Operated)	Output Leakage Current max. (Released)	Switching Time Max.		Supply Voltage (V _s)	Voltage Externally Applied to Output	Loads to Output	Storage Temperature
				Rise 10% to 90%	Fall 90% to 10%				
4.5-24 VDC Sinking	5 V 7.0 mA (Released) 24 V 9.0 mA (Released) 14.0 mA (Operated-no load)	+4 Volt (Sinking 10 mA)	10 μA	1.5 μ sec (Sinking 10 mA)	0.5 μ sec (Sinking 10 mA)	-30 to +30 VDC	-0.5 Volt min. +24 Volts max. (Off condition)	20 mA (Sinking)	-40–C to +65°C (-40° to +149°F)

① Over temperature range of 0° to +55°C (+32° to +131°F) and supply voltage of 4.5 to 5.5 VDC.
 ② Over temperature range of 0° to +55°C (+32° to +131°F) and supply voltage of 16 VDC.
 ③ At 24°C. (+75°F)
 ④ As with all solid state components, performance can be expected to deteriorate as rating limits are approached; however, they will not be damaged unless the limits are exceeded.

● AML20 Series

Contacts	Voltage	Current	Load Type
Silver or Gold-plated Silver	250 VAC 125 VAC 24 VDC	2 Amps 3 Amps 2 Amps	75% Power Factor 75% Power Factor Resistive
Gold	125 VAC/DC	100 mA	Resistive

● AML30 Series

Voltage	Current		Load Type
	Pushbuttons	Rockers or Paddles	
125 VAC	10 amps	15 amps	60% power factor
250 VAC	10 amps	15 amps	60% power factor



Manual Switches

Lighted Indicators

AML41/42 Series

To order lamps see page 46.

FEATURES

- Pushbutton style indicators match display of standard bezel lighted switches. Choice of incandescent or LED illumination.
- Lens style indicators use a special cap-like button which covers the bezel to present a larger display area, without affecting family appearance. Up to 3-lamp split screen capability. Incandescent illumination.



AML41
(Use AML51 push-buttons only. Page 30.)



AML41
(Use AML51-J/-K/-L lens buttons only. Page 30.)

AML41 INCANDESCENT DISPLAY INDICATORS ORDER GUIDE

AML41 C		B	A	2
Housing Type		Bezel Color	Incand. Lamp Type	Terminal Type
Pushbutton Style:	Lens Style:			
AML41 C Square 1 lamp ckt.	AML41 J Rectangular 1 lamp ckt.	B Black	A No lamp installed	2 .110 × .020 (Solder or Quick-Connect)
AML41 D Square 2 lamp ckts.	AML41 K Rectangular 2 lamp ckts.		B 6 V Lamp*	3 .025 × .025 (Printed Circuit or Push-On)
AML41 F Rectangular 1 lamp ckt.	AML41 L Rectangular 3 lamp ckts.		C 14 V Lamp*	
AML41 G Rectangular 2 lamp ckts.			E 28 V Lamp*	

* Lamps will be installed per each lamp circuit specified in the Housing Type.

Examples:

AML41CBA2
Square (pushbutton style) indicator housing with one lamp circuit; black bezel; .110 × .020 termination.

AML41JBA2
Rectangular (lens style) indicator housing with one lamp circuit; black bezel; .110 × .020 termination.



AML42C
(Use AML52-C/-A pushbuttons only. Page 31.)



AML42S

AML42 LED DISPLAY INDICATORS ORDER GUIDE

LEDs are not replaceable.

AML42 S	B	C	2
Housing Type	Bezel Color	LED Color/Voltage	Terminal Type/Diode Protection
AML42 C Square 1 LED	B Black	Red B V* C 5 V D 10 V E 15 V F 24 V	2 .110 × .020 (Solder or Q.C.)
AML42 S Compact 1 LED	Yellow H V* J 5 V K 10 V L 15 V M 24 V	Green R V* S 5 V T 10 V W 15 V X 24 V	3 .025 × .025 (Printed Circuit or Push-On)
			8 .110 × .020 w/diode to protect LED
			9 .025 × .025 w/diode to protect LED

Example: **AML42SBC2**
Compact indicator with black bezel; 5 volt red LED; .110 × .020 termination.



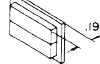


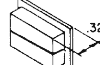





* See LED application data, page 46, for these devices without current-limiting resistor.

Manual Switches

Buttons/Lens for Switches and Indicators

AML51 PUSHBUTTON ORDER GUIDE (All possible color combinations may not be available.)

For Incandescent or non-lighted display switches and pushbutton style indicators.

AML51-C	10	R	—
For AML11, 21, 31 switches and AML41 indicators: Pushbutton Style	Display Legend/Type	Full Color or 1st Color Split	2nd Color Split
 AML51-C  AML51-F  AML51-G  AML51-A  AML51-H  AML51-N*  AML51-B*  AML51-E*  AML51-M*  AML51-R*	Transmitted Color 10 No legend 20 With legend on cap. Transmitted Color (Clear cap and color insert) 11 No legend 21 With legend on insert Dead Front (Smoky gray cap and color insert) 30 No legend 40 With legend on insert ****Projected Color (White cap and color insert) 50 No legend 60 With legend on cap	R Red Y Yellow G Green B Blue W**** White K*** Black L*** Gray A** Amber	R Red Y Yellow G Green B Blue W**** White K*** Black L*** Gray A** Amber
For AML41D indicators only:  AML51-D			




Example: **AML51-C10R**
 Square full color button; with transmitted color, no legend; red.

** Available with transmitted color and dead front only.
 *** Black and gray not recommended for lighted display.
 † AML51-N buttons not available with Display/Legend Types 10 and 20.
 Note: Dimensions include the .060 in bezel.

* Available with transmitted color (10 or 20) only.
 **** Insert is clear for projected color when "W" is used.

AML51 LENS ORDER GUIDE

(All possible color combinations may not be available.)
 For incandescent display AML41J, K, and L lens style indicators only.

AML51-J	10	R		
Lens style	Display/Legend Type	Full Color or 1st Color Split	2nd Color Split	3rd Color Split
 AML51-J  AML51-K  AML51-L	Transmitted Color 10 No legend 20 With legend Transmitted Color (Clear cap and color insert) 11 No legend 21 With legend Dead Front (Smoky gray cap and color insert) 30 No legend 40 With legend ****Projected Color (White cap and color insert) 50 No legend 60 With legend	R Red Y Yellow G Green B Blue W**** White A** Amber	R Red Y Yellow G Green B Blue W**** White A** Amber	R Red Y Yellow G Green B Blue W**** White A** Amber

AML51 lens buttons provide added display area by snapping onto and covering the bezel of AML41J, K, and L indicators. They do not fit other indicators or switches.

Example: **AML51-J10R**
 Rectangular lens type button; full color; transmitted color, no legend; red.

HOW TO ORDER BUTTON LEGENDS

When specifying legended buttons, submit a legend order sheet to cover each listing. To insure proper legend orientation, AML housings (when viewed from the panel front) should have the "MICRO SWITCH" identification facing UP on square devices and UP or to the LEFT on rectangular.

Button legend order sheets are shown on the following pages. Reproduce them on your office copier.

Legend Sheet	Form No.
AML51 Pushbuttons	FO-63394
AML51 Lens buttons	FO-63395
AML52 Pushbuttons	FO-63504
AML53 Paddle switch covers	FO-63567
AML55 Paddle switch covers	FO-63565
AML54 Rockers	FO-63566
AML56 Rockers	FO-63564

** Not available with projected color.
 **** Insert is clear for projected color when "W" is used.

Manual Switches

Lamps, Soldering Recommendations, Receptacles

AML91 LAMP ORDER GUIDE

Lamp Type	Industry Lamp No.	Voltage	Catalog Listing
Incandescent T-1-3/4 wedge base	86	6.3	AML91LA86
	73	14.0	AML91LA73
	85	28.0	AML91LA85

LAMP DATA

The following data was compiled from manufacturer's specifications, for reference only.

INCANDESCENT LAMPS

Industry Lamp No.	Volts	Amps	Watts	MSCP	Life A/C Volts
86	6.3	.200	1.25	.49	20,000 hours
	5.5	.185	1.12	.246	106,200 hours
	5.0	.177	.89	.185	290,000 hours
73	14.0	.080	1.12	.30	15,000 hours
	12.0	.077	1.00	.23	36,450 hours
85	28.0	.04	1.12	.30	7,000 hours
	24.0	.037	.89	.177	41,860 hours

Neon Lamps

25,000 hours (half life)

INTEGRAL LEDs

LEDs Furnished Permanently Installed in These Products	V _f	I _f	V _{PD}	Peak Inverse Voltage	
				w/o Diode Protection	w/Diode Protection
AML12, 15, 16, 22, 25, 26, 42	2.4 V	20 mA	.7 V	5 V	34 V
AML45	2.4 V	20 mA	.7 V	4 V	33 V

100,000 hours (half life).

AML92 SERIES LEDs



For use with these AML switches and indicators equipped with lamp sockets:
Pushbutton switches: AML11 (Square Only)*, AML21 (rectangular and square), and AML31.

Paddle switches: AML31/23/33

Rocker switches: AML14/24/34

Indicators: AML41

* Rectangular solid state with one or two lamp circuits cannot be used with LED catalog listings ending in "L".

AML92 ORDER GUIDE

LED Color	Quad Chip	Six Chip
Red	AML92ERY	AML92ERL
Green	AML92EGY	AML92EGL
Yellow	AML92EYY	AML92EYL
White	—	AML92EWL**

** For use with white or yellow buttons.

OPERATING CHARACTERISTICS

Type	V _f Fwd. Voltage (typ.)				I _f Fwd. Current	V _R Rev. Voltage
	Yellow	Green	Red	White		
Quad Chip	8.6	8.6	7.8	—	15 mA	16 V
Six Chip	4 V	4 V	4 V	4 V	50 mA	5.6 V

TEMPERATURE RANGE

(Quad Chip or Six Chip)

Operating: -20 to 60°C (-4 to 140°F)

Storage: -30 to 100°C (-22 to 212°F)

SOLDERING RECOMMENDATIONS

All terminals are solder plated. Proper soldering and cleaning procedures must be followed to maintain the reliability of AML products during installation. An instruction sheet which outlines these procedures is included with AML shipments. You may also obtain a copy from your MICRO SWITCH Sales Office. Request PK 8518.

As a general guide, the following information may be used:

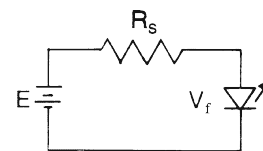
Use a 280°C (538°F) solder iron tip, up to 6 seconds duration, with a 60-40 rosin core solder. This allows the terminal to heat quickly on the exterior of the housing only, and greatly reduces the chance of flux migrating inside the housing.

LED APPLICATION INFORMATION

For those devices without internal current limiting resistors, suitable external control of the LED current must be provided. It is recommended that a minimum of 5 VDC open circuit voltage with an appropriate series resistance be used to drive LED devices. This minimizes the effect of temperature (current variation) on forward voltage of the LED.

Resistor values can be determined by supply voltage or current for LED:

$$R_s = \frac{E - V_f}{I_f}$$



WHERE: R_s = Series Resistance

E = Supply Voltage

V_f = Forward Voltage of LED

I_f = Circuit Current

If a diode is added in series for reverse polarity protection then:

$$R_s = \frac{E - V_f - V_{PD}}{I_f}$$

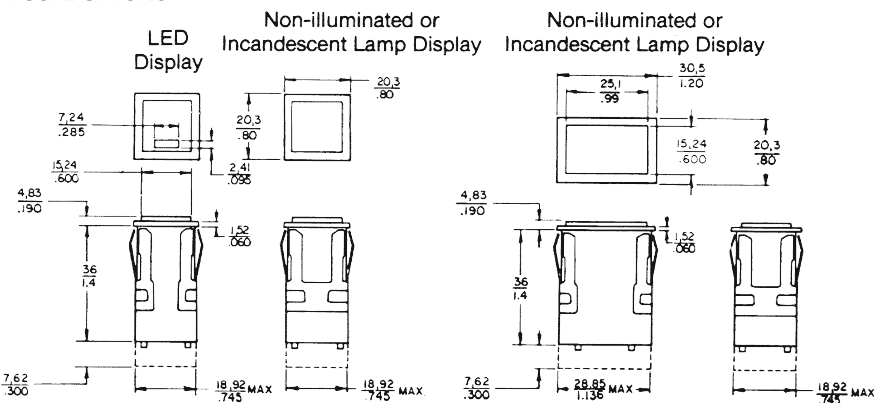
WHERE: V_{PD} Forward Voltage of Protection Diode

Mounting Dimensions (For Reference Only)

AML11/12 and 21/22 SWITCHES AML41C/D and AML42C INDICATORS

Note: Top of full guard bezel housing
.19/5,0 from panel.

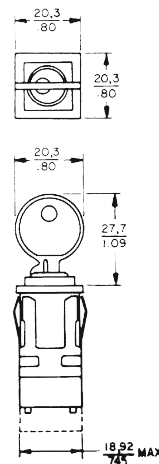
PUSHBUTTONS



For terminal locations, see page 49.

AML27 SWITCHES

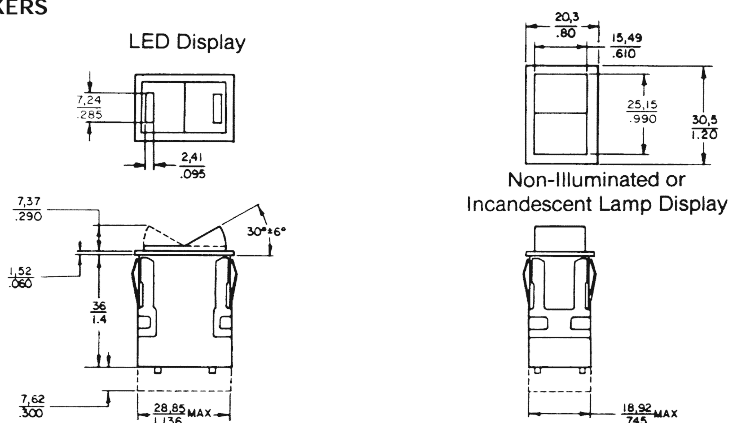
KEYLOCK



For terminal locations, see page 50.

AML14/16 and AML24/26 SWITCHES

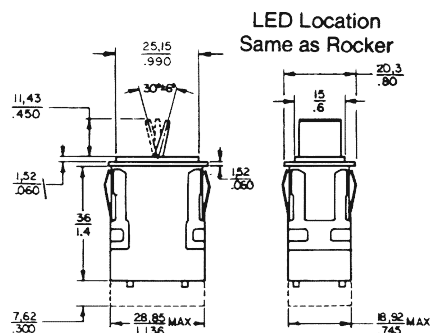
ROCKERS



For terminal locations, see page 49/50.

AML13/15 and 23/25 SWITCHES

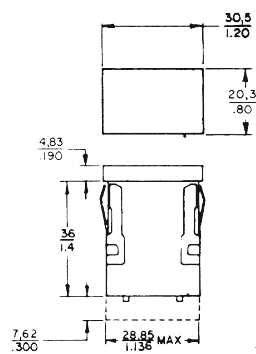
PADDLES



For terminal locations, see page 49/50.

AML41 INDICATOR

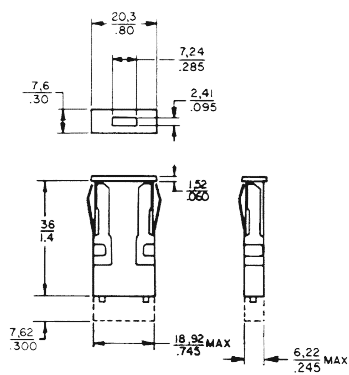
LENS STYLE



For terminal locations, see page 50.

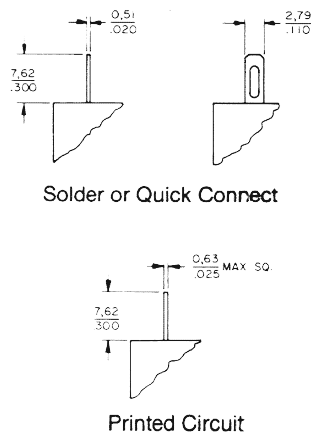
AML42 INDICATOR

MINIATURE



NOTE
1 Dimensions are mm or mm/IN

TERMINAL TYPES



Solder Hole will accept two #22 AWG
Stranded Conductor (per NEMA publication
DC-2 1976)

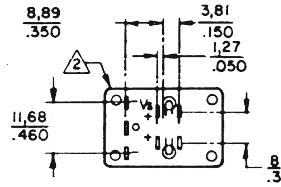
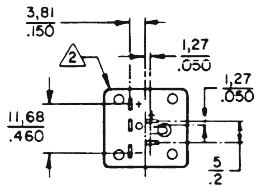
Manuals

Mounting Dimensions (For Reference Only)

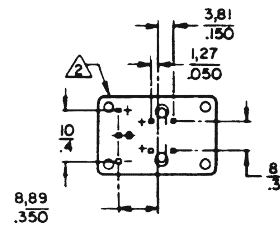
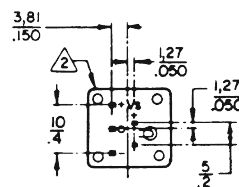
TERMINAL LOCATIONS FOR AML10 SWITCHES

PUSHBUTTONS

Solder and Quick-Connect



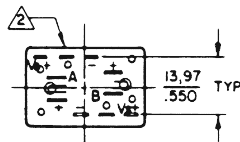
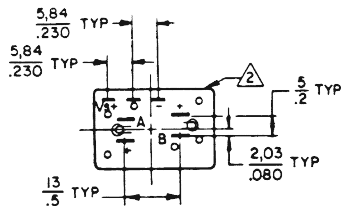
Printed Circuit



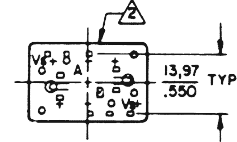
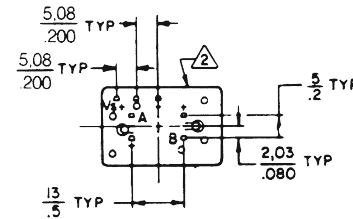
Illuminated devices shown (non-illuminated devices do not have lamp terminals).

ROCKERS AND PADDLES

Solder and Quick-Connect



Printed Circuit



One Integrated Circuit

Two Integrated Circuits

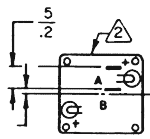
One Integrated Circuit

Two Integrated Circuits

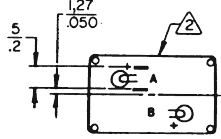
Illuminated devices shown (non-illuminated devices do not have lamp terminals)

TERMINAL LOCATIONS FOR AML41 INDICATORS

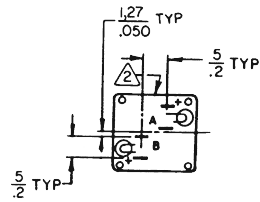
Solder and Quick-Connect



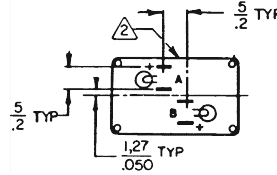
1 Incandescent Lamp Circuit



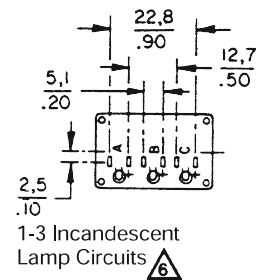
1 Incandescent Lamp Circuit



2 Incandescent Lamp Circuits

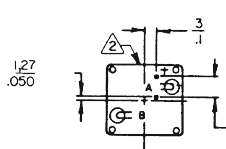


2 Incandescent Lamp Circuits

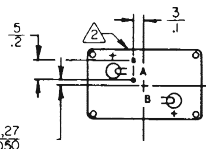


1-3 Incandescent Lamp Circuits **6**

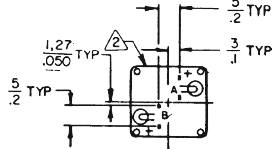
Printed Circuit



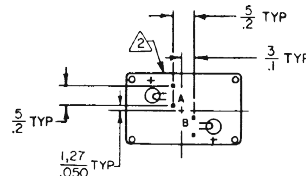
1 Incandescent Lamp Circuit



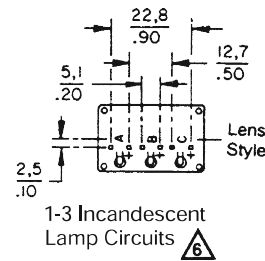
1 Incandescent Lamp Circuit



2 Incandescent Lamp Circuits



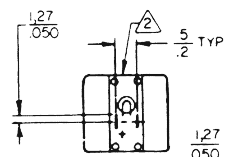
2 Incandescent Lamp Circuits



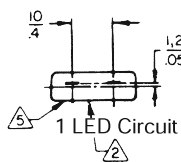
1-3 Incandescent Lamp Circuits **6**

TERMINAL LOCATIONS FOR AML42 INDICATORS

Solder and Quick-Connect

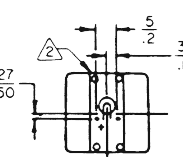


1 LED Circuit

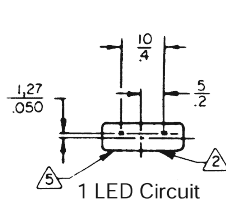


1 LED Circuit

Printed Circuit



1 LED Circuit



1 LED Circuit

NOTE

1 Dimensions are MM or MM/IN

2 Manufacturer's logo on this side of housing

4 - Lamp terminals are not provided for non-illuminated devices

5 positive terminal ident. (+) marked this side of housing

6 1 - lamp termination identified by "B".
2 - lamp termination identified by "A" and "C".