

**NOTE**

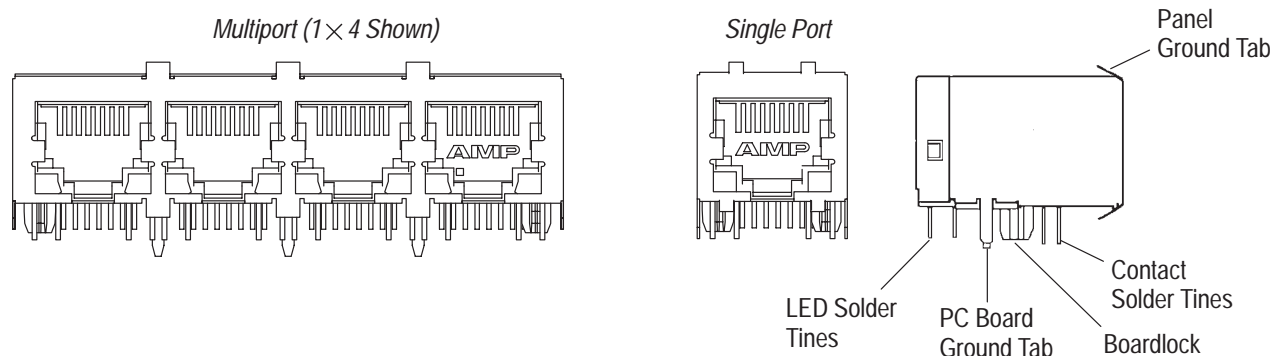
All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of  $\pm 0.13$  [ $\pm .005$ ] and angles have a tolerance of  $\pm 2^\circ$ . Figures and illustrations are for identification only and are not drawn to scale.

## 1. INTRODUCTION

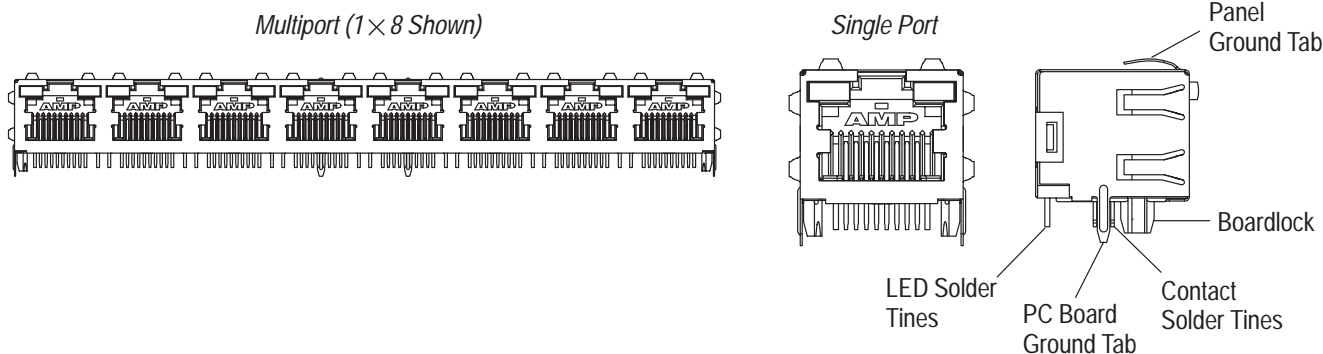
This specification covers the requirements for application of modular jacks with integral LED. The jacks are available in standard, inverted, and light pipe. The jacks are available shielded and unshielded with up to 8 ports. These jacks are designed for mounting onto a printed circuit (pc) board and panel.

When corresponding with personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.

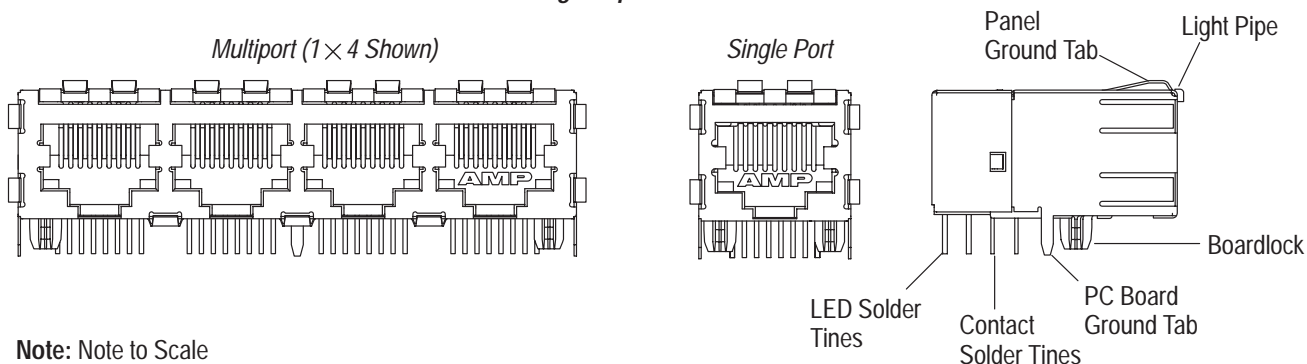
### Standard Modular Jack



### Inverted Modular Jack



### Light Pipe Modular Jack



**Note:** Note to Scale

Figure 1

Shielded modular jacks feature tin–lead plated brass shells which provide continuity for electromagnetic compatibility (EMC).

When mated with corresponding shielded modular plugs, shielding and grounding continuity are achieved. When the shield solder tines are soldered to the pc board, they provide electrical continuity to any ground path on the pc board and, if applicable, panel ground tabs on the shield provide electrical continuity to any ground path through the equipment panel.

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Revisions to this application specification per EC 0990–1178–03 include:

- Updated document to corporate requirements
- Added titles to Figures 2 and 3
- Added finished hole diameter for standard modular jack LED solder tine to Figure 4
- Removed NOTE from Paragraph 3.5.B
- Replaced temperature and exposure time in Paragraph 3.5.B with Figure 6
- Added standard modular jack to Figure 10

### 2.2. Customer Assistance

Reference Product Base Part Number 406549 and Product Code 1977 are representative of modular jacks with integral LED. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local Representative (Field Service Engineer, Field Applications Engineer, etc.) or, after purchase, by calling PRODUCT INFO at the number at the bottom of page 1.

### 2.3. Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, call PRODUCT INFO at the number at the bottom of page 1.

### 2.4. Manuals

Manual 402–40 can be used as a guide to soldering. This manual provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

### 2.5. Specifications

Product Specifications 108–1163–3 (light pipe modular jacks) and 108–1163–4 (inverted modular jacks) provide product performance and test information.

### 2.6. Instructional Material

Instruction Sheets (408–series) provide product assembly instructions or tooling setup and operation procedures and Customer Manuals (409–series) provide machine setup and operation procedures. There are no documents that pertain to this product.

## 3. REQUIREMENTS

### 3.1. Storage

#### A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the modular jack housings.

#### B. Shelf Life

The modular jacks should remain in the shipping containers until ready for use to prevent damage. The modular jacks should be used on a first in, first out basis to avoid storage contamination that could adversely affect signal transmissions.

### C. Chemical Exposure

Do not store modular jacks near any chemicals listed below as they may cause stress corrosion cracking in the contacts.

Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites		Tartrates

### 3.2. LED Operating Requirements

The LED operating requirements for these modular jacks are given in Figures 2 and 3.

STANDARD AND INVERTED MODULAR JACKS				
DESCRIPTION	ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ \text{C}$ [ $77^\circ \text{F}$ ])			
	GREEN	YELLOW	ORANGE	UNIT
Wavelength At Peak Emission $I_F = 20 \text{ mA}$	565	590	610	nm
Lens Type	Diffused	Diffused	Diffused	—
Luminous Intensity—Minimum ( $I_F = 10 \text{ mA}$ )	5	3.2	5	mcd
Luminous Intensity—Maximum	20	12.5	20	mcd
Forward Voltage (Typ) $I_F = 20 \text{ mA}$	2.2	2.1	2.0	V
Forward Voltage (Max) $I_F = 20 \text{ mA}$	2.5	2.5	2.6	V
Reverse Voltage ( $V_R$ )	5	5	5	V
Forward Current ( $I_F$ ) (1/10 Duty Cycle, 0.1 ms Pulse Width)	25	30	30	mA
Forward Current (Peak)	150	150	150	mA
Reverse Current $V_R = 5 \text{ V}$	10	10	10	$\mu\text{A}$
Power Dissipation	105	105	105	mW
Low Current Application:				
Forward Voltage (Typ) $I_F = 2 \text{ mA}$	1.9	1.8	1.7	V
Forward Voltage (Max) $I_F = 2 \text{ mA}$	2.2	2.1	2.0	V
Forward Current ( $I_F$ ) (1/10 Duty Cycle, 0.1 ms Pulse Width)	7	7	7	mA
Forward Current (Peak)	150	150	150	mA
Power Dissipation	24	25	26	mW

Figure 2

LIGHT PIPE MODULAR JACK			
DESCRIPTION	ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ \text{C}$ [ $77^\circ \text{F}$ ])		
	GREEN	YELLOW	UNIT
Wavelength At Peak Emission $I_F = 20 \text{ mA}$	565	585	nm
Lens Type	Clear Tint	Clear Tint	—
Luminous Intensity—Minimum ( $I_F = 10 \text{ mA}$ )	2.5	2.5	mcd
Luminous Intensity—Maximum	10	10	mcd
Forward Voltage (Typ) $I_F = 20 \text{ mA}$	2.1	2.0	V
Forward Voltage (Max.) $I_F = 20 \text{ mA}$	2.8	2.8	V
Reverse Voltage ( $V_R$ )	5	5	V
Forward Current ( $I_F$ ) (1/10 Duty Cycle, $f = 1.0 \text{ KHz}$ )	30	30	mA
Forward Current (Peak)	160	160	mA
Reverse Current $V_R = 5 \text{ V}$	10	10	$\mu\text{A}$
Power Dissipation	100	85	mW

Figure 3

### 3.3. PC Board

#### A. Material and Thickness

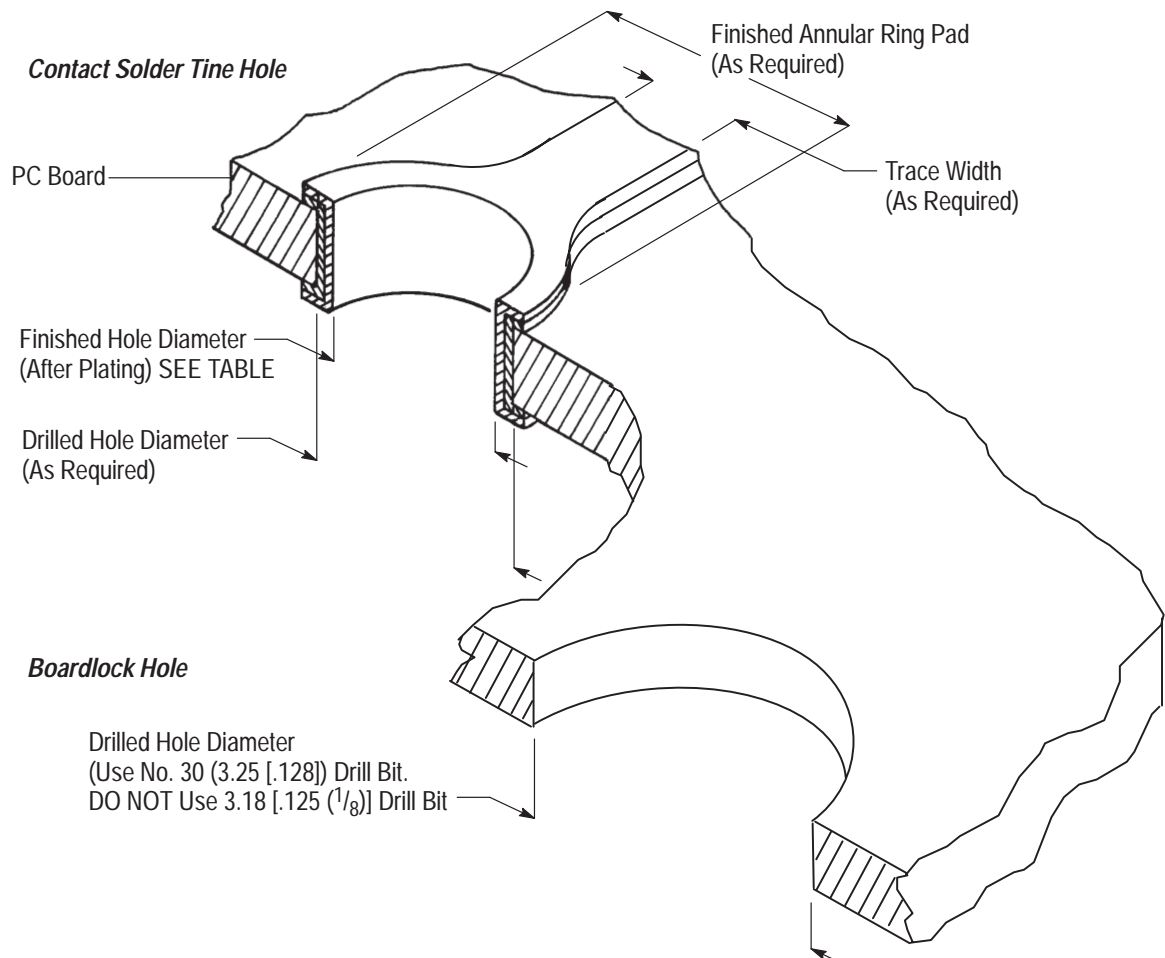
The pc board material shall be glass epoxy (FR-4 or G-10). The pc board thickness shall be 1.57 [.062].

#### B. Hole Dimensions

Plated through holes must be used for contact and LED solder tines and, for shielded modular jacks, shield solder tines. The drilled hole size, plating types, and plating thickness are dependent on the application requirements. The finished hole size must be as stated to provide unrestricted insertion, proper retention in the pc board, and to ensure adequate application of solder to the tines. See Figure 4.

#### C. Layout

The holes in the pc board must be precisely located to ensure proper placement and optimum performance of the modular jack. The pc board layout must be designed using the dimensions provided on the customer drawing for the specific modular jack.



FINISHED HOLE DIAMETER (After Plating)				
CONTACT SOLDER TINE	SHIELD SOLDER TINE	LED SOLDER TINE		
		Standard Modular Jacks	Light Pipe Modular Jack	Inverted Modular Jack
0.89 [.035]	1.57 [.062]	1.19 [.047]	1.22 [.048]	0.89 [.035]

Figure 4

### 3.4. Placement

#### CAUTION

*The modular jacks should be handled only by the housing to avoid deformation, contamination, or damage to the solder tines.*

#### A. Alignment

The modular jack number one position must be aligned with the number one position board hole. When placing modular jacks on the pc board, the solder tines and boardlocks must be aligned with matching holes before placing the jack onto the pc board. All solder tines and boardlocks must be started into the holes, then gently pressed downward.

#### B. Seating

The modular jack shall be flush and evenly seated on the pc board.

### 3.5. Soldering

#### NOTE

*A hold-down may be used to hold the modular jack in place during the soldering process.*

#### A. Flux Selection

Solder tines must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other components mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements. Call PRODUCT INFO at the number at the bottom of page 1 for consideration of other types of flux. Flux that is compatible with these connectors are provided in Figure 5.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER	ALPHA
RMA	Mild	Noncorrosive	186	611

Figure 5

#### B. Process

The modular jacks can be soldered using wave soldering or equivalent soldering techniques. It is recommended using SN60 or SN62 solder for these modular jacks. The temperature and exposure time must be as specified in Figure 6.

Reflow Soldering Process Cycle

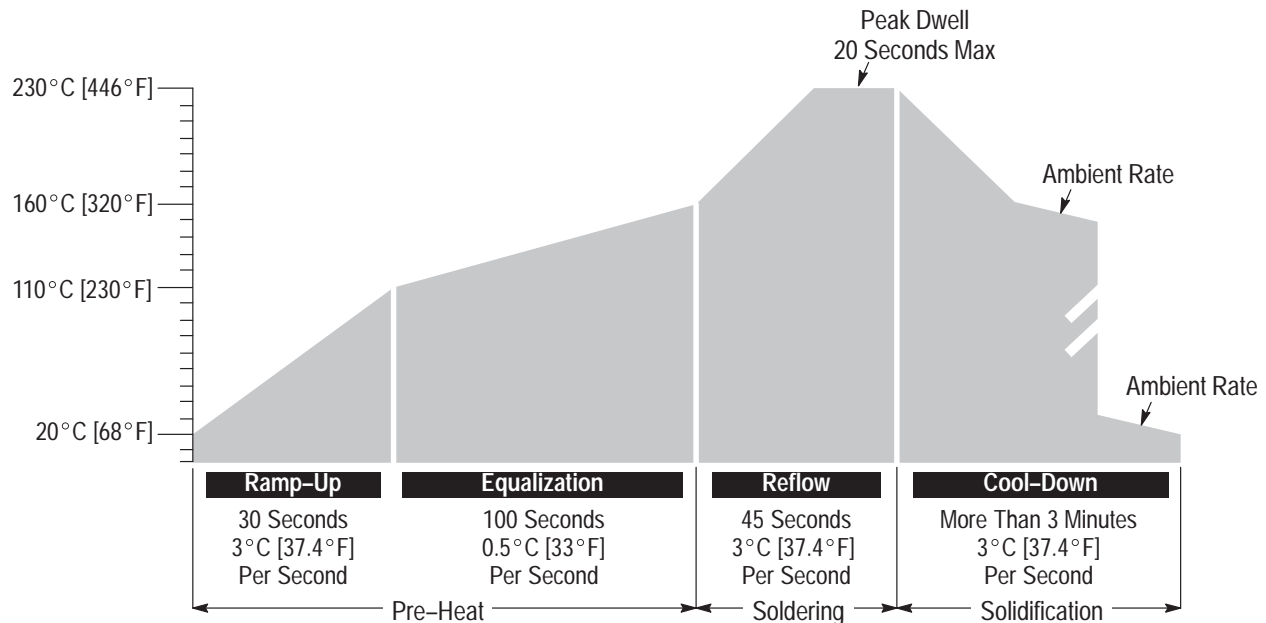


Figure 6

### C. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Cleaners must be free of dissolved flux and other contaminants. It is recommended cleaning with the pc board on its edge. If using an aqueous cleaner, standard equipment such as a soak-tank or an automatic in-line machine should be used. The following is a list of common cleaning solvents that will not affect the connectors for the time and temperature specified. See Figure 7.

CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
BIOACT EC-7	Solvent	5	100°C [212°F]
Butyl CARBITOL	Solvent	1	Ambient Room
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous	5	100°C [212°F]
KESTER 5779	Aqueous	5	100°C [212°F]
LONCOTERGE 520	Aqueous	5	100°C [212°F]
LONCOTERGE 530	Aqueous	5	100°C [212°F]
Terpene Solvent	Solvent	5	100°C [212°F]

Figure 7

#### **DANGER**

Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the manufacturer's Material Safety Data Sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and Methylene Chloride is not recommended because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).

#### **NOTE**

If you have a particular solvent that is not listed, contact PRODUCT INFO at the number at the bottom of page 1.

### D. Drying

When drying cleaned assemblies and pc boards, make certain that temperature limitations are not exceeded: -40° to 70°C [-40° to 158°F]. Excessive temperatures may cause housing degradation.

### 3.6. Checking Installed Jack

The shoulder of each boardlock must be through its intended hole in the pc board. Solder fillet must be evenly formed around each solder tine. The housing of the modular jack must be seated on the pc board not exceeding the dimension given in Figure 8.

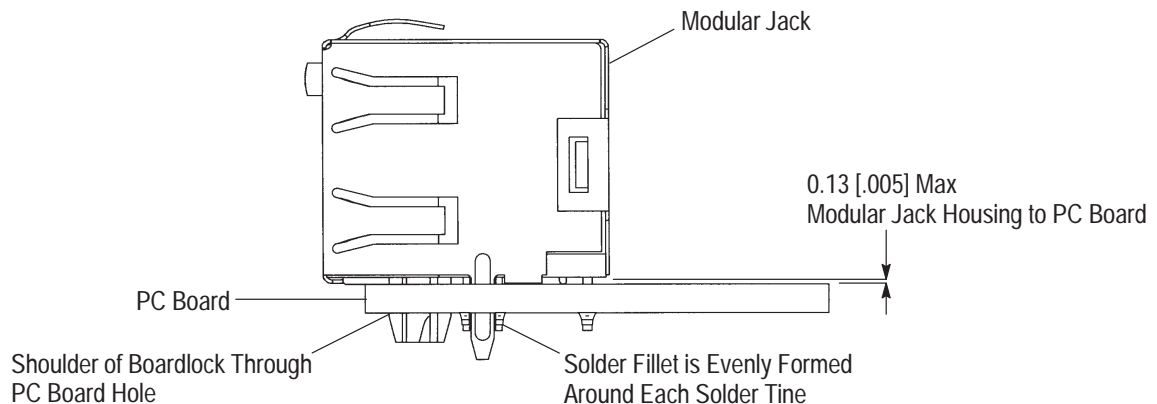


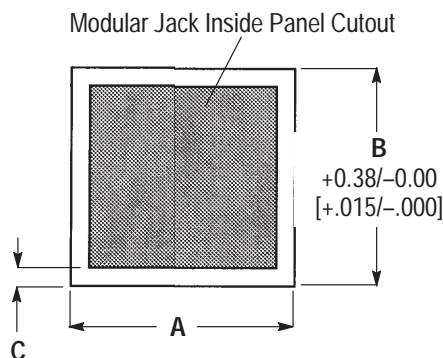
Figure 8

### 3.7. Panel

#### A. Cutout

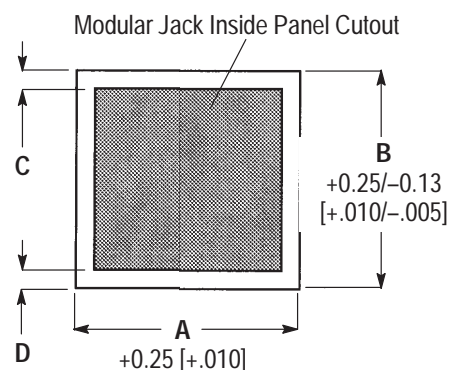
The panel must be cut using the dimensions provided on the customer drawing for the specific modular jack. A reference *sample* of a recommended panel cutout for these modular jacks is shown in Figure 9.

#### Standard Modular Jack



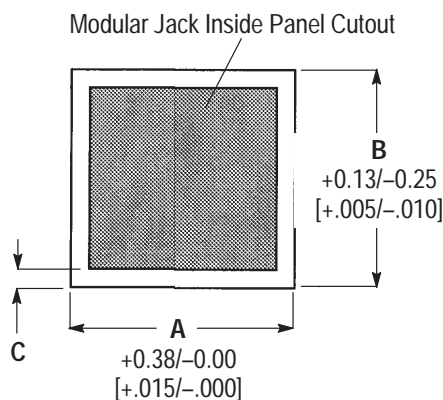
SIZE	SHIELDED	DIMENSION		
		A	B	C
1×1	Y	16.51 [.650]	14.48 [.570]	0.25 [.010]
1×4	Y	59.70 [2.350]		
1×6	Y	87.70 [3.450]		
1×8	Y	115.60 [4.550]		

#### Inverted Modular Jack



SIZE	SHIELDED	DIMENSION			
		A	B	C	D
1×1	Y	17.27 [.680]	13.97 [.550]	0.51 [.020]	—
	N	16.51 [.650]	13.59 [.535]	—	0.39 [.015]
1×2	N	32.26 [1.270]	13.59 [.535]	—	0.39 [.015]
1×4	Y	64.77 [2.550]	13.97 [.550]	0.51 [.020]	—
	N	63.75 [2.510]	13.59 [.535]	—	0.39 [.015]
1×6	Y	96.27 [3.790]	13.97 [.550]	0.51 [.020]	—
	N	95.25 [3.750]	13.59 [.535]	—	0.39 [.015]
1×8	Y	127.76 [5.030]	13.97 [.550]	0.51 [.020]	—
	N	126.75 [4.990]	13.59 [.535]	—	0.39 [.015]

#### Light Pipe Modular Jack



SIZE	SHIELDED	DIMENSION		
		A	B	C
1×1	Y	16.51 [.650]	14.48 [.570]	0.38 [.015]
	N	15.62 [.615]		0 [0]
1×2	Y	31.75 [1.250]	14.48 [.570]	0.38 [.015]
	N	30.99 [1.220]		0 [0]
1×4	Y	59.69 [2.350]	14.48 [.570]	0.38 [.015]
	N	58.93 [2.320]		0 [0]

Figure 9

## B. Mounting

The modular jack should protrude through the panel cutout to the dimension given in Figure 10.

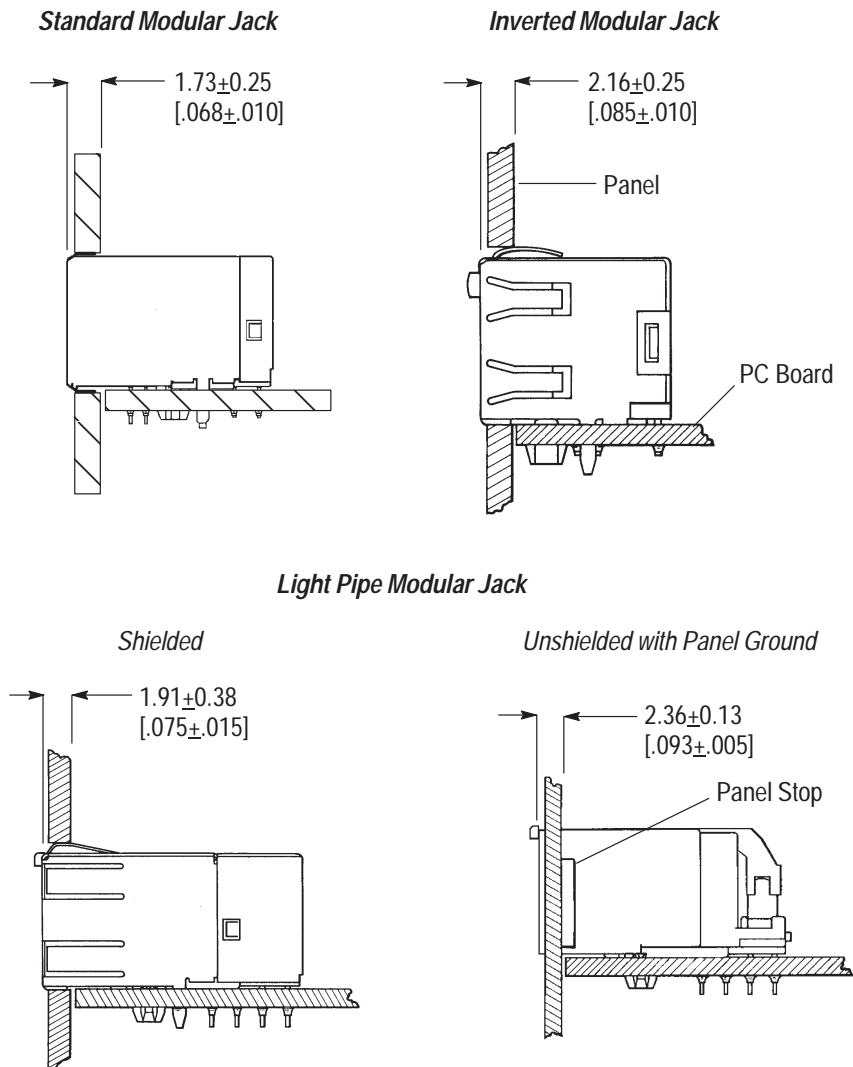


Figure 10

## 3.8. Removal and Repair

The modular jacks must be removed from the pc board by standard de-soldering methods.

Damaged or defective modular jacks must NOT be used. Damaged modular jacks must be replaced.

### CAUTION

*When repairing or replacing a modular jack, care must be taken not to damage other pc board components during the de-soldering process.*

## 4. QUALIFICATIONS

Modular jacks with integral LED are recognized by Underwriters Laboratories Inc. (UL) under File E 81956 and certified by CSA International under File LR 7189.

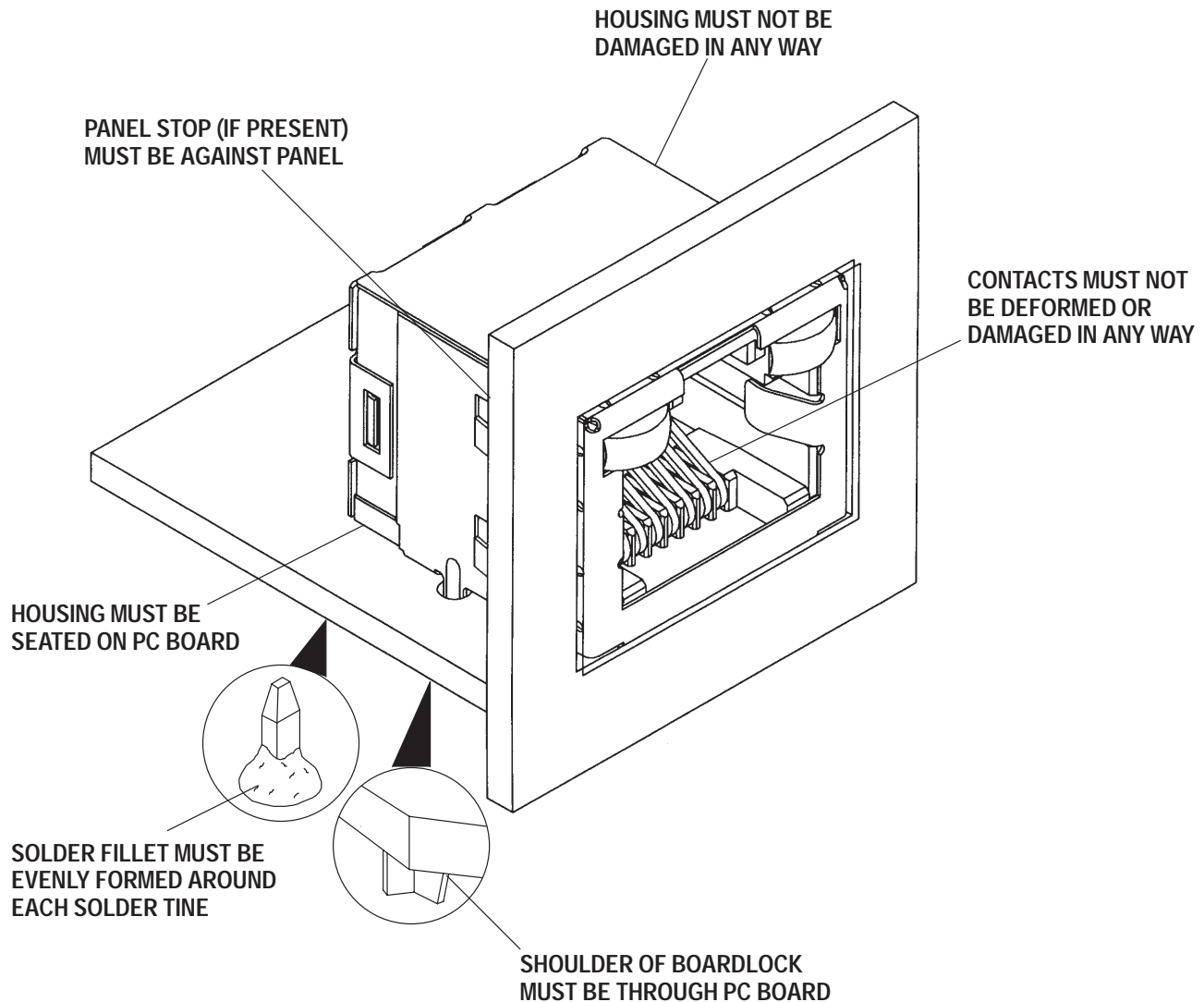
## 5. TOOLING

No tooling is required for manual placement of modular jacks; however, a pc board support that provides relief for protruding components must be used to prevent deformation of contact and LED solder tines and, if applicable, shield solder tines. The pc board support must be custom made (refer to 408-6927).



## 6. VISUAL AID

The illustration below shows a typical application of modular jacks with integral LED. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.



**FIGURE 11. VISUAL AID**