**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 ±0.13 [±.005] and angles have a tolerance of ±2°. Figures and illustrations are for identification only and are not drawn to scale.*

## 1. INTRODUCTION

This specification covers the requirements for application of DIP Programming Switches (7000 and 7100 Series). The 7000 Series switches are designed for a life of 7000 cycles per pole. The 7100 Series switches are recommended for programming applications where the number of cycles is limited to 2000 per pole.

Switches are manually rocker actuated and are designed for wave soldering on printed circuit (pc) boards or insertion into DIP Sockets with in–row centerline spacing of 7.62 mm (.300 in.). The 7000 series switches are black, and are available in 2 through 12 positions, while the 7100 series switches are blue, and are available in 2 through 12 positions. Both series are available with a premium seal, an economy seal, or unsealed in the raised rocker (standard profile) or flush rocker profile (low profile). In addition, the 7000 series switches are available with a side rocker profile (side actuated). Both series are individual single–pole, single–throw (SPST). The 7000 series raised rocker profile switches may have ganged rockers for single–pole, double–throw (SPDT) and double–pole, double–throw (DPDT) make–before–break circuits.

The unsealed switches are designed for socket applications and the sealed switches are designed for soldering directly to the pc board. The sealants prevent flux and other contaminants from entering the switch during soldering and cleaning. The raised rocker and side rocker profiles come unsealed or with an optional economy or premium masking top seal. The flush rocker profile comes unsealed or with an optional economy tape top seal or premium masking top seal. The multi–pole switches come unsealed only. All switches come standard with a bottom seal. Switches are designed for use in logic level switching applications.

When corresponding with Tyco Electronics Personnel, use the terminology provided on this specification to help facilitate your inquiry for information. Basic terms and features of this product line are provided in Figure 1.
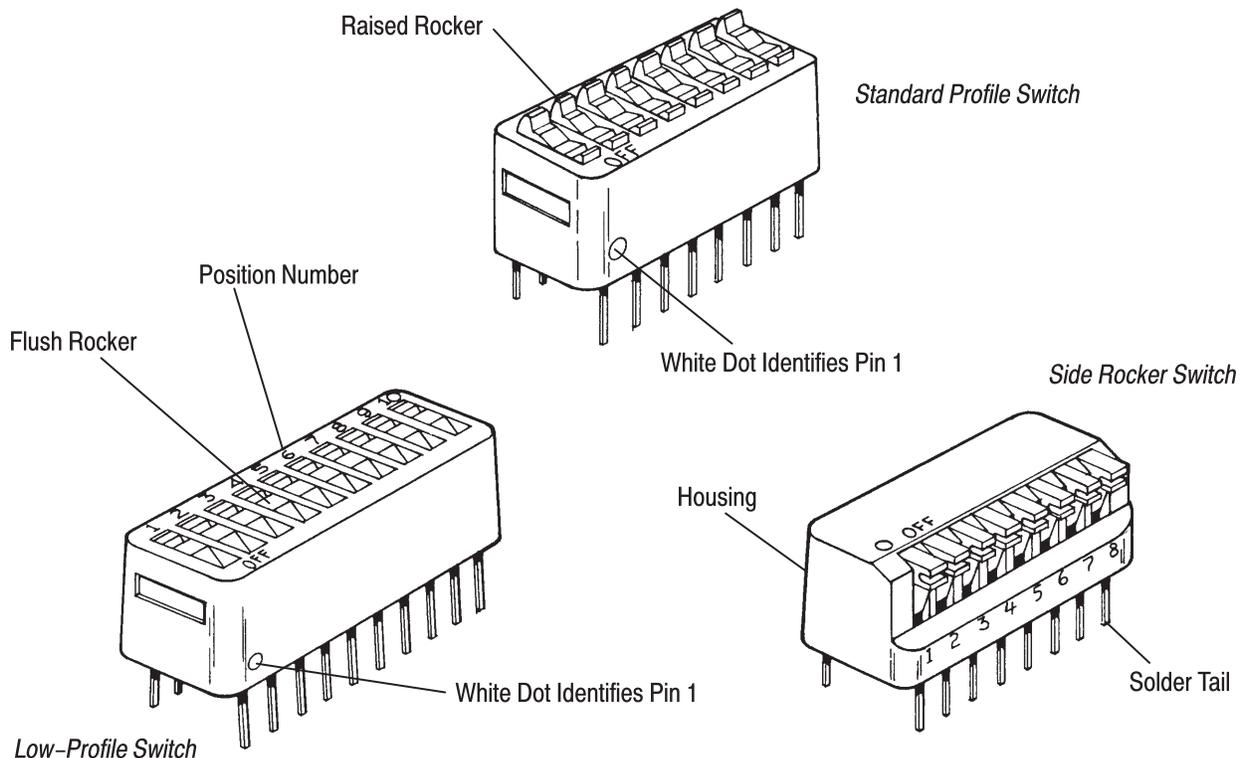


*Figure 1*

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## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

- Updated document to corporate requirements
- General update to document
- Deleted premium seal information

### 2.2. Customer Assistance

Reference Base Product Part Number 435802 and Product Code 4546 identify the DIP Programming Switches (7000 and 7100 series). 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 Tyco Electronics Representative or, after purchase, by calling the Tooling Assistance Center or the Product Information Center number at the bottom of page 1.

### 2.3. Drawings

Customer drawings for specific products are available from the service network. The information contained in the customer drawings takes priority if there is a conflict with this specification or with any other technical documentation supplied by Tyco Electronics. Contact the Product Information Center number at the bottom of page 1 if such a conflict is encountered.

### 2.4. Specifications

Product Specifications 108–7519 (7000 series), and 108–7532 (7100 series) provide performance requirements for DIP Programming Switches. Qualification Test Report 501–135 (7000 series), and 501–128 (7100 series) provides an independent corporate test report to show the switch conforms to the above mentioned Product Specifications.

### 2.5. Instructional Material

Instruction Sheet 408–7779 provides installation information and procedures on DIP Programming Switches (7000 and 7100 Series).

### 2.6. 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.

## 3. REQUIREMENTS

### 3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

### 3.2. Limitations

The switches are designed to operate within a temperature range of –55° to 105°C [–67° to 221°F].

### 3.3. Storage

#### A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition of components used in the switches.

#### B. Shelf Life

The switches should remain in the shipping containers until ready for use to prevent damage. These products should be used on a first in, first out basis to avoid storage contamination.

#### C. Chemical Exposure

Do not store switches near any chemicals listed below, as they may cause stress corrosion cracking in the components.

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

**NOTE**    *Where the above environmental conditions exist, phosphor–bronze contacts are recommended if available.*

### 3.4. Printed Circuit (PC) Board Requirements

#### A. Material and Thickness

The pc board material must be glass epoxy (FR–4 or G–10). The pc board thickness shall be 2.36 mm [.093 in.].

**NOTE**    *Contact the Product Information Center at the number listed at the bottom of page 1 for suitability of other board materials and thicknesses.*

#### B. Tolerance

Maximum allowable bow of the pc board must be 0.08 mm [.003 in.] over each 25.4 mm [1.000 in.] of length.

#### C. PC Board Layout

The solder tail contact holes in the pc board must be precisely located to ensure proper placement and optimum performance of the switch. The pc board layout dimensions and tolerances shown in Figure 2 <u>must</u> be observed when preparing pc boards for the various switches. The layout shows the top (component) side of the board.
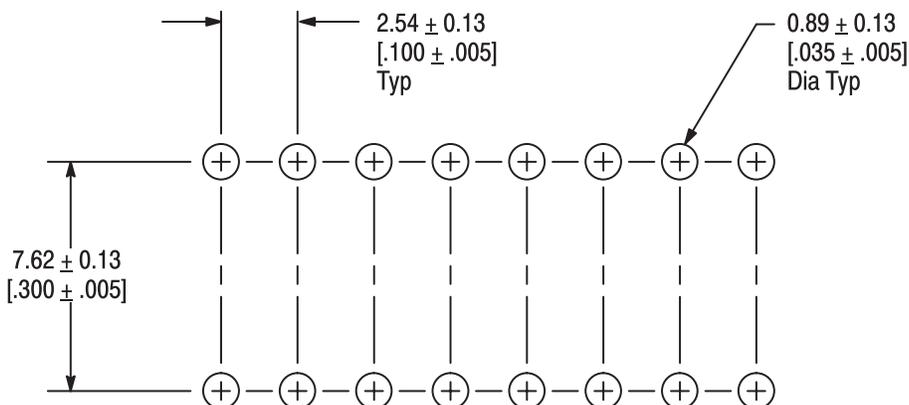


*Figure 2*

### 3.5. PC Board Solder Tail Holes

The holes in the pc board for the solder tails must be drilled and plated through to specific dimensions. See Figure 3.
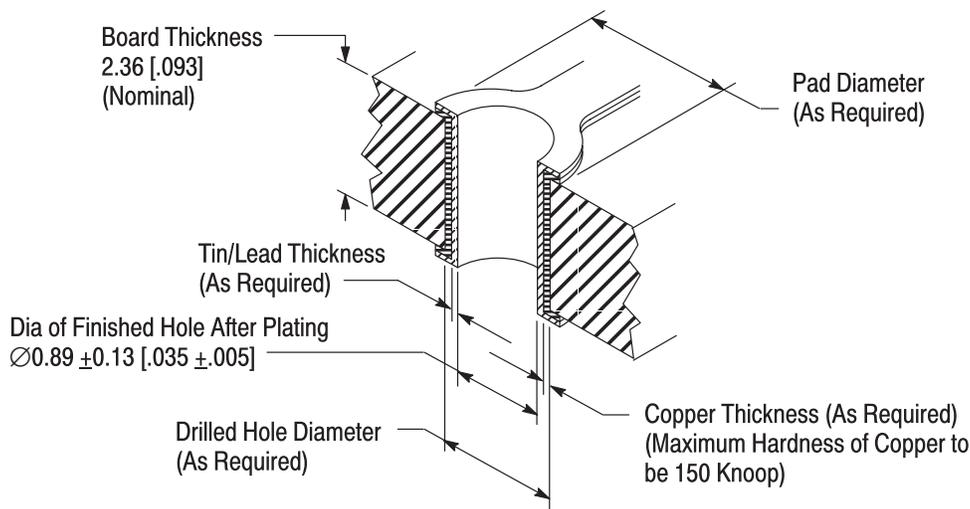


*Figure 3*

### 3.6. Mounting Requirements

Determine whether the switch will be soldered directly to the pc board (a sealed switch will be required), or whether the switch is to be installed in a socket (an unsealed switch can be used).

#### A. DIP Socket Installation

1. Secure DIP socket to pc board according to instructions packaged with socket.

2. Start one row of contact leads into one row of contact cavities in socket, then rotate switch until it is parallel with socket.

3. Gripping ends of switch push switch into socket until it is bottomed.

4. Determine which of the circuits are to be closed, then depress the applicable rockers to the ON position.

5. If installing a protective dust cover, check to be sure there are no obstructions on the switch rockers or in the protective cover, then slide the cover over the top of the housing.

#### B. PC Board Installation

1. Make a layout on pc board according to dimensions shown in Figure 2.

2. Hold switch at a slight angle and start one row of contact leads into pc board holes. Do NOT over–insert. Switch should be rotated until second row of contact leads are aligned with opposite row of contact holes.

3. Make certain all contact leads have started entry into holes. Grip sides of switch and push switch into pc board until it is bottomed.

4. To hold switch in place during wave soldering, the four outside leads may be clinched inward at 45°. See Figure 4.
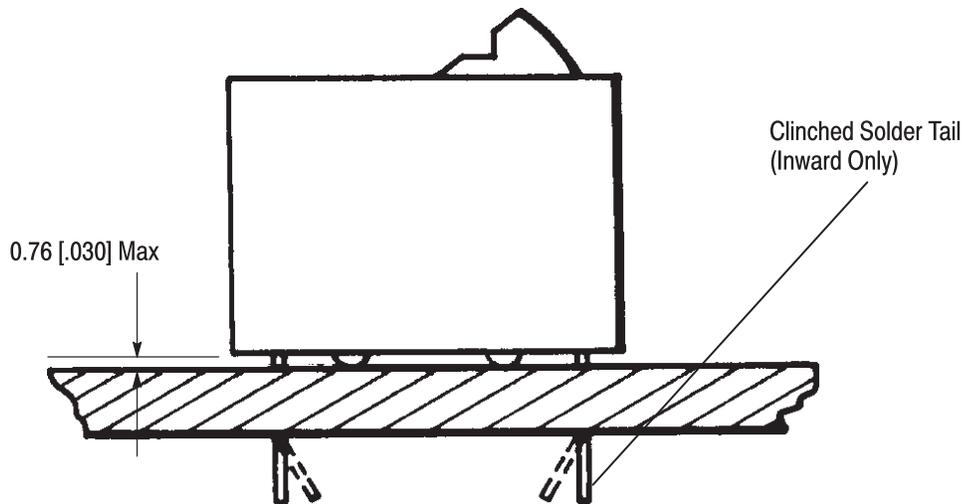


Clinched Solder Tail (Inward Only)

0.76 [.030] Max

*Figure 4*

### 3.7. Soldering

#### A. Flux Selection

Solder tails 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 the PRODUCT INFORMATION number at the bottom of page 1 for consideration of other types of flux. Flux types that are compatible with these switches are provided in Figure 5.

| CLEANING FLUX | | | |
|---|---|---|---|
| PROCESS STEPS | ORGANIC | RA (Active) ROSIN | RMA (Mildly Active) ROSIN |
| 1 | Heat | Heat | Extra pre–clean |
| 2 | Solder | Solder | Heat |
| 3 | Wash in tap water or saponifier● | Wash with saponifier● | Solder |
| 4 | Rinse in tap or de–ionized water | Rinse in tap or de–ionized water | Wash in saponifier● |
| 5 | Dry in ambient air or radiant heater | Dry in ambient or radiant heater | Rinse in tap or de–ionized water |
| 6 | ––– | ––– | Dry in ambient air or radiant heater |

●Reduces residue to soap

*Figure 5*

## B. Solder ing Process

Refer to Paragraph 2.5 for instructional material that is available for establishing soldering guidelines. The switches can be soldered using wave soldering or equivalent soldering techniques. It is recommended using SN60 or SN62 solder for these switches. The maximum solder profile temperature should be 245° ±10°C [473° ±10°F]. These switches are not recommended for reflow process.

## C. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Automatic in–line cleaning is recommended for the sealed switch. Installation in a socket is recommended for the unsealed switch. 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 switches for the time and temperature specified. See Figure 6.

**NOTE**   *Vapor cleaning (with the pc board on edge) is preferred over submersion in a liquid cleaner. Unsealed switches should not be submerged due to contaminants in the cleaning bath.*

**CAUTION**   *Do NOT ultrasonically clean switches sealed with tape or masking material.*

| CLEANER | | TIME (Minutes) | TEMPERATURE (Maximum) |
|---|---|---|---|
| NAME | TYPE | | |
| ALPHA 2110 | Aqueous | 1 | 100°C [212°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 6*

**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 INFORMATION at the number at the bottom of page 1.*

### D. Drying

When drying cleaned unsealed assemblies and pc boards, make certain that the housing temperature does not exceed 130°C [270°F]. Excessive temperatures may cause housing degradation. When processing the economy sealant, make certain that the sealant temperature does not exceed 100°C [212°F] for 1 minute. This is a hot melt sealant and will reflow.

### 3.8. Checking Installed Switches

The solder tail must be through its intended hole in the pc board. Solder fillet must be evenly formed around each solder tail. The housing of the switch must be seated on the pc board not exceeding the dimension given in Figure 4.

### 3.9. Removal and Repair

Damaged or defective switches must NOT be used and should be replaced. The switches must be removed from the pc board by standard de–soldering methods.

**CAUTION**    *When removing or replacing switches, care must be taken not to damage other pc board components during the de–soldering process.*

## 4. QUALIFICATIONS

DIP Programming Switches are not required to be agency approved.

## 5. TOOLING

No tooling is required for manual placement of these switches; however, a pc board support that provides relief for protruding components must be used to prevent deformation of contact tails. The pc board support must be custom made. See Figure 7.
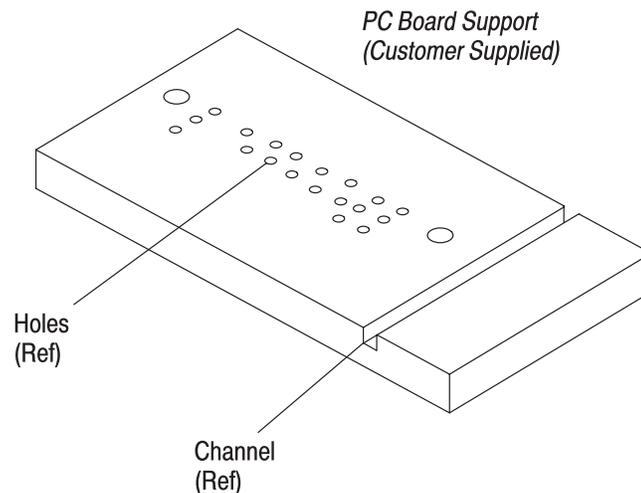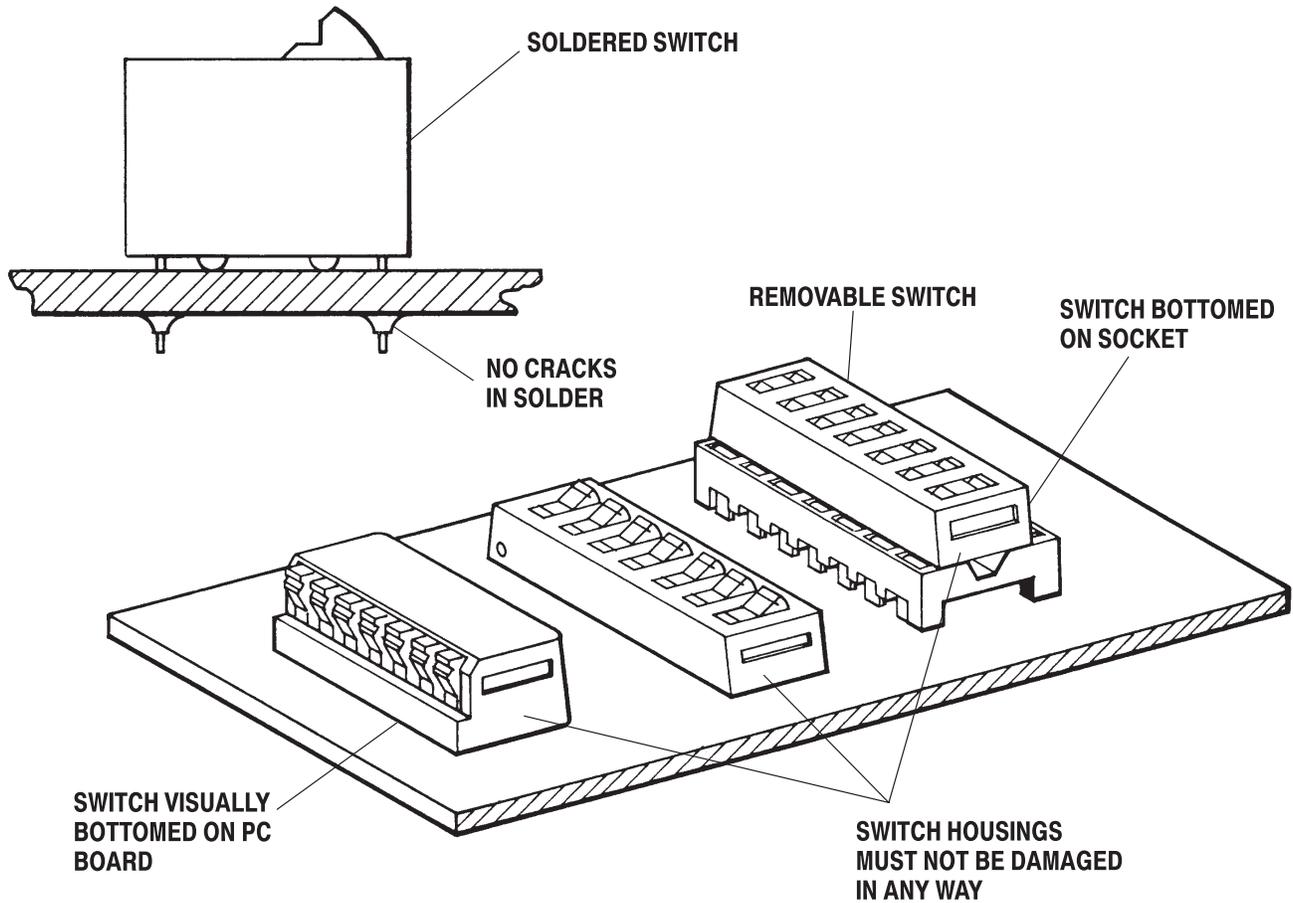


*Figure 7*

## 6. VISUAL AID

Figure 8 shows a typical application of DIP Programming Switches. 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.



SOLDERED SWITCH

NO CRACKS IN SOLDER

REMOVABLE SWITCH

SWITCH BOTTOMED ON SOCKET

SWITCH VISUALLY BOTTOMED ON PC BOARD

SWITCH HOUSINGS MUST NOT BE DAMAGED IN ANY WAY

*FIGURE 8.    VISUAL AID*