

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 [$\pm .005$] 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 AMP* 7410 Series machine insertable DIP switches for pc (printed circuit) board application. The switches are used to manually program electronic equipment. The switch consists of a housing preloaded with solder type contacts (with precision formed solder tines) in a DIP configuration with top-actuated rockers. The rockers connect individual circuits on the pc board. The switches are available in low-profile or standard versions: low-profile switches offer rockers flush with the surface of the housing, and standard-profile switches offer rockers above the surface of the housing. The switches are available in 2, 4, 6, 7, and 8 positions with standard pitch and contact spacing on 2.54 [.100] centerlines. Each contact position is marked on the housing. Contact position 1 can be used as a make-first, break-last ground.

The 7410 Series switches have individual SPST (single-pole, single-throw) switching and are bottom sealed to prevent contaminants from entering the switch. In addition, the switches are available sealed or unsealed. The strippable seal prevents contaminants from entering the switch during the soldering process. Some switches are available with chamfered corners for easy removal of the strippable seal. The housing features a standoff to allow easy pc board cleaning after soldering. The switches are supplied in a tube for manual or high-speed automatic machine placement.

When corresponding with AMP 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.

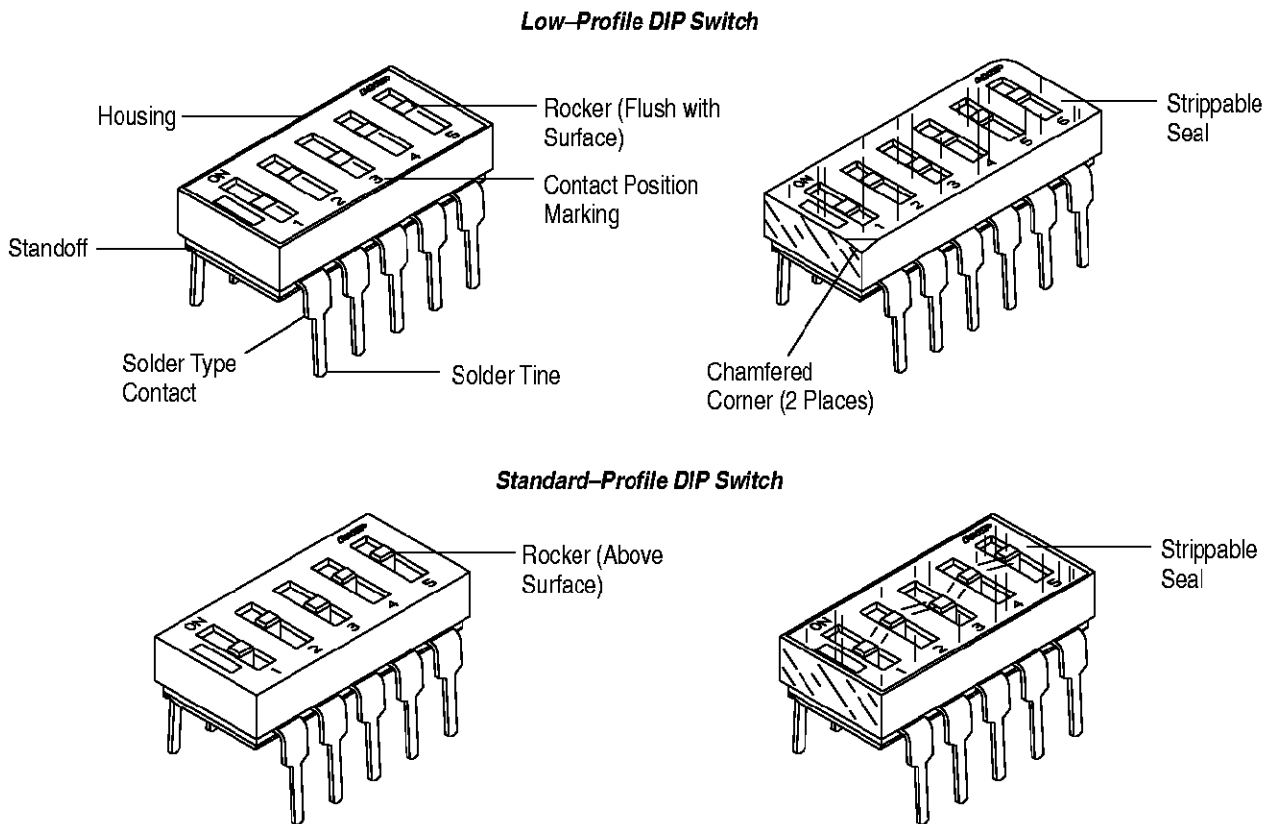


Figure 1

2. REFERENCE MATERIAL**2.1. Revision Summary**

Per EC 0990-0594-99:

- Initial release of application specification

2.2. Customer Assistance

Product Part Number 390228 and Product Code A336 are representative of AMP 7410 Series machine insertable DIP switch. Use of these numbers will identify the product line and expedite your inquiries through an AMP service network established to help you obtain product and tooling information. Such information can be obtained through a local AMP Representative (Field Service Engineer, Field Applications Engineer, etc.) or, after purchase, by calling the Product Information Center at the number at the bottom of this page.

2.3. Drawings

AMP 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 by AMP, call product information at the number at the bottom of page 1.

2.4. Manuals

AMP Manual 402-40 is available upon request and 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

AMP Product Specification 108-1850 provides product performance and test information.

2.6. Instructional Material

AMP Application Specifications (114-series) provide product description and application requirements, Instruction Sheets (408-series) provide assembly instructions, and Customer Manuals (409-series) provide machine setup and operation procedures. Documents available which pertain to this product are:

408-6927 Design Recommendations for PC Board Support Fixture

3. REQUIREMENTS**3.1. Safety**

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

3.2. Material

The switch housing and rockers are made of thermoplastic. The contacts are made of copper alloy plated with gold over nickel; contact area (solder tine) is plated with tin-lead.

3.3. Storage**A. Ultraviolet Light**

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the switch material.

B. Shelf Life

The switches should remain in the shipping containers until ready for use to prevent deformation to the contacts. The switches should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

3.4. Chemical Exposure

Do not store switches near any chemical 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

3.5. PC Board

A. Material and Thickness

The pc board material must be glass epoxy (FR-4 or G-10). The minimum pc board thickness must be 2.36 [.093] nominal.

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 0.13 [.005] over the length of the switch.

C. Hole Dimensions

The pc board holes for the switch contact solder tines must be plated through. The drilled hole size, plating types, and plating thickness will depend on application requirements. The finished hole size must be as stated to provide unrestricted insertion and ensure adequate application of solder to the solder tines. See Figure 2.

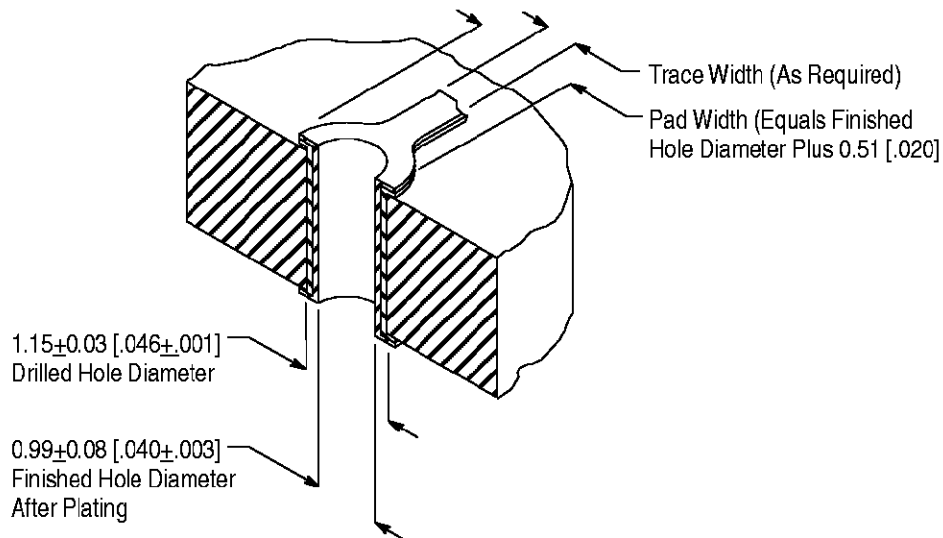


Figure 2

D. Layout

The holes in the pc board must be precisely located to ensure proper placement and optimum performance of the switch. Design the pc board using the dimensions provided in Figure 3.

Recommended PC Board Layout

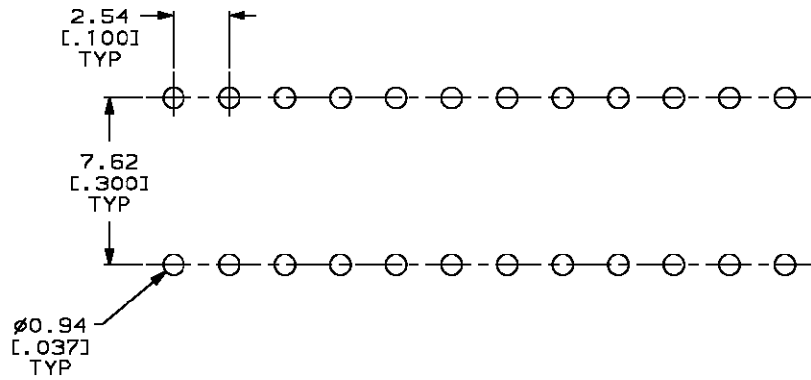


Figure 3

3.6. Soldering

Observe guidelines and procedures when soldering contacts. All solder joints should conform to those specified in AMP Workmanship Specification 101–21 and all other requirements specified in this document.

A. Flux Selection

Contact solder tines must be fluxed prior to soldering. Flux must be compatible with the wave solder line, manufacturing, safety, and health guidelines. Flux that is compatible with these connectors are provided in Figure 4.

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

☞ Product of Kester Solder Co.

☐ Product of Alphametals Inc.

Figure 4

B. Process

The switches should be soldered using wave, non-focused infrared (IR) reflow, or equivalent soldering technique. The reflow temperature and time to which the housing is subjected is specified in Figure 5.

SOLDERING PROCESS	TEMPERATURE (Max)	TIME
Wave	260°C [500°F]	6 Seconds

Figure 5

NOTE Due to the many variables involved with reflow processes (component density, location, orientation, etc.), it is recommended that the user conduct trial runs under actual manufacturing conditions to ensure product/process compatibility. Call AMP Engineering for baseline reflow parameters.

C. Cleaning

After soldering, removal of fluxes, residues, and activators is mandatory. Cleaners must be free of dissolved flux and other contaminants. It is recommended to clean with the pc board on its edge. Cleaning procedures and solvents depend on the type of flux used. Recommended cleaners are listed in Figure 6.

DANGER Consideration must be given to toxicity and other safety and health requirements as recommended in the Material Safety Data Sheet supplied by the solder cleaning solvent manufacturer. If you have a particular solvent that is not listed, consult an AMP representative before using it on these connectors.

CAUTION Even when using “no clean” solder paste, it is imperative that the contact interface be kept clean of flux and residue, since it acts as an insulator. In addition, flux may migrate under certain conditions with elevated temperatures.

CLEANER		TIME (Minutes)	TEMPERATURES (Maximum)	
NAME	TYPE		CELSIUS	FAHRENHEIT
Alpha 2110■	Aqueous	1	132	270
Bioact EC-7◆	Solvent	5	100	212
Butyl Carbitol●	Solvent	1	Room Ambience	
Isopropyl Alcohol	Solvent	5	100	212
Kester 5778⚡	Aqueous	5	100	212
Kester 5779⚡	Aqueous	5	100	212
Loncoterge 520●	Aqueous	5	100	212
Loncoterge 530●	Aqueous	5	100	212
Terpene Solvent	Solvent	5	100	212

■ Product of Fry's Metals, Inc. ◆ Product of Petroferm, Inc. ● Product of Union Carbide Corp. ⚡ Product of Litton Systems, Inc.

Figure 6

NOTE When using an aqueous cleaner, standard equipment such as a soak-tank or automatic in-line machine should be used.

D. Drying

When drying cleaned connectors, make certain that the recommended temperature limitation of 130°C [270°F] is not exceeded. Excessive temperatures may cause housing degradation.

3.7. Switch Placement

A. Seating

When placing switches on the pc board, make sure that the contact solder tines are aligned and started into the matching holes before seating the switch onto the pc board. Avoid applying in-line force which could cause irreparable damage to the solder tines. The switch must be parallel to the full length seated on the pc board. The force required to seat the switch is minimal. Apply only that force necessary to seat the contact solder tines into the pc board holes. The switch housing standoffs must be seated on the pc board not exceeding the dimension shown in Figure 7.

CAUTION Switches should be handled only by the housing to avoid deformation, contamination, or damage to the contact solder tines.

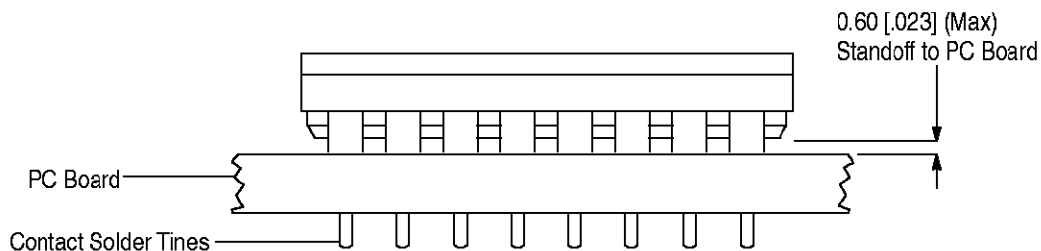


Figure 7

B. Spacing

Care must be used to avoid interference between adjacent switches and other components. There is no required spacing between switches, however spacing may be dependent on other components used.

NOTE The information provided is for manual placement of switches. If robotic equipment is used, other space allowances will be required for the grippers.

3.8. Checking Installed Switch

All solder joints should conform to those specified in AMP Workmanship Specification 101-21 and all other requirements specified in this document.

1. The switch must have solder fillets evenly formed around each contact solder tine as shown in Figure 8.
2. The switch must be firmly attached to the pc board; there shall be no evidence of switch movement.
3. The switch housing must not be damaged as a result of application tooling.

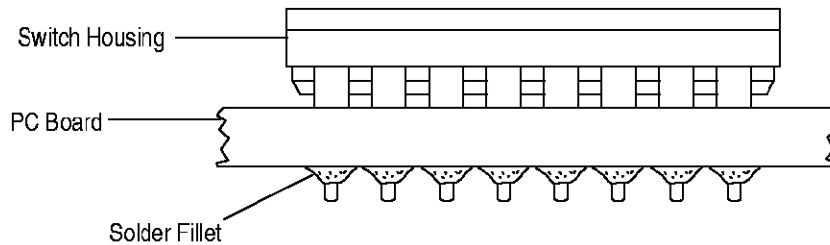


Figure 8

3.9. Repair

The switch may be removed from the pc board by standard de-soldering methods and replaced with a new switch.

4. QUALIFICATION

AMP 7410 Series machine insertable DIP switches are not required to be recognized by Underwriters Laboratories Inc. (UL) or certified by Canadian Standards Association (CSA) at the time of publication.

5. TOOLING

No tooling is required for manual placement of the switches. For machine placement, a pc board support must be used to prevent bowing of the pc board during placement of the switches. It should have a flat surface with holes or a channel large enough and deep enough to receive the switch contact solder tines. The robotic equipment must have a true position accuracy tolerance to properly locate the switch. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the switch datum surfaces detailed on the customer drawing to ensure reliable placement. See Figure 9.

NOTE

Modified designs and additional tooling concepts may be available to meet other application requirements. For additional information, contact one of the service groups at the bottom of page 1.

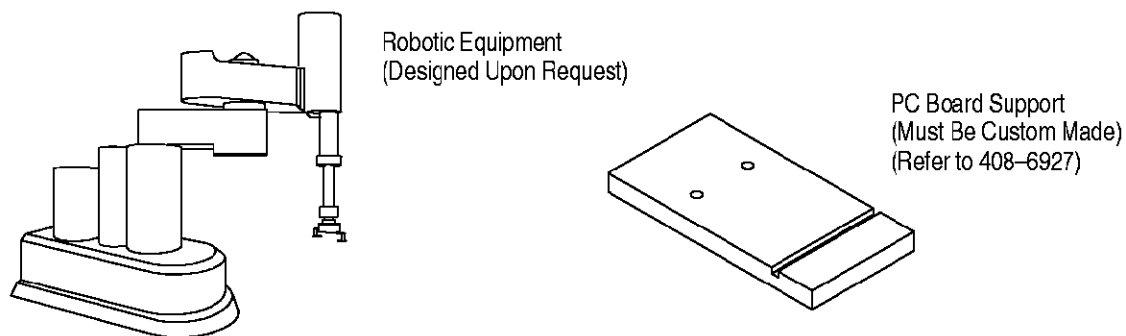


Figure 9

6. VISUAL AID

The illustration below shows a typical application of AMP 7410 Series machine insertable DIP 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.

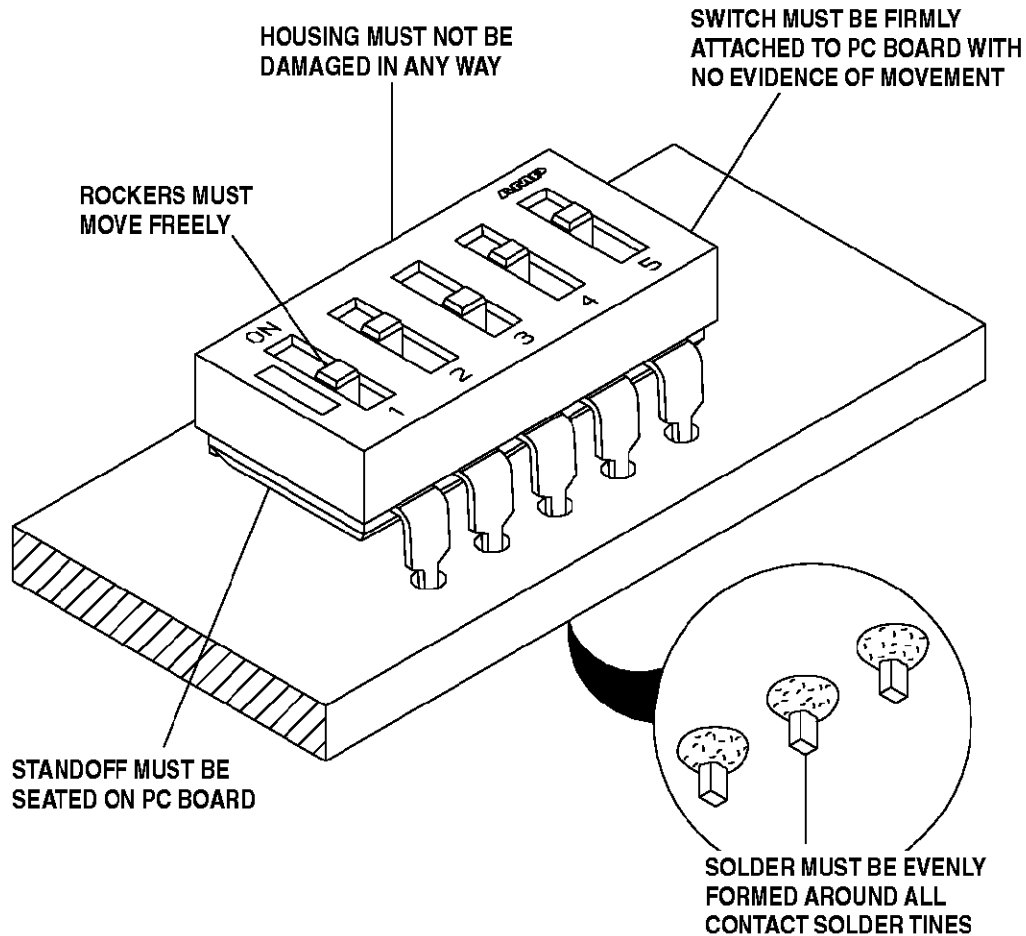


FIGURE 10. VISUAL AID