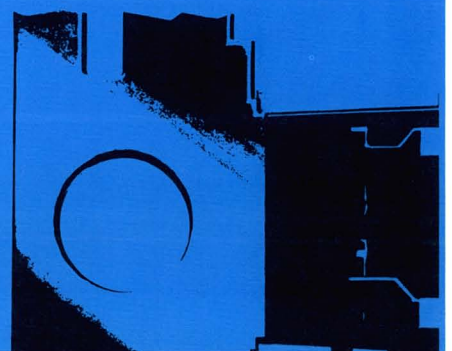
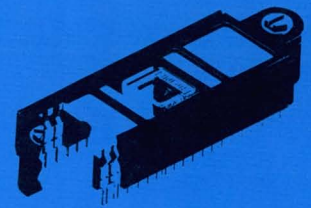
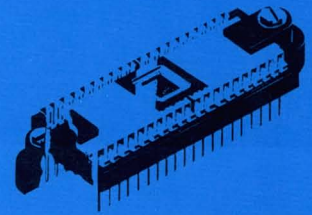


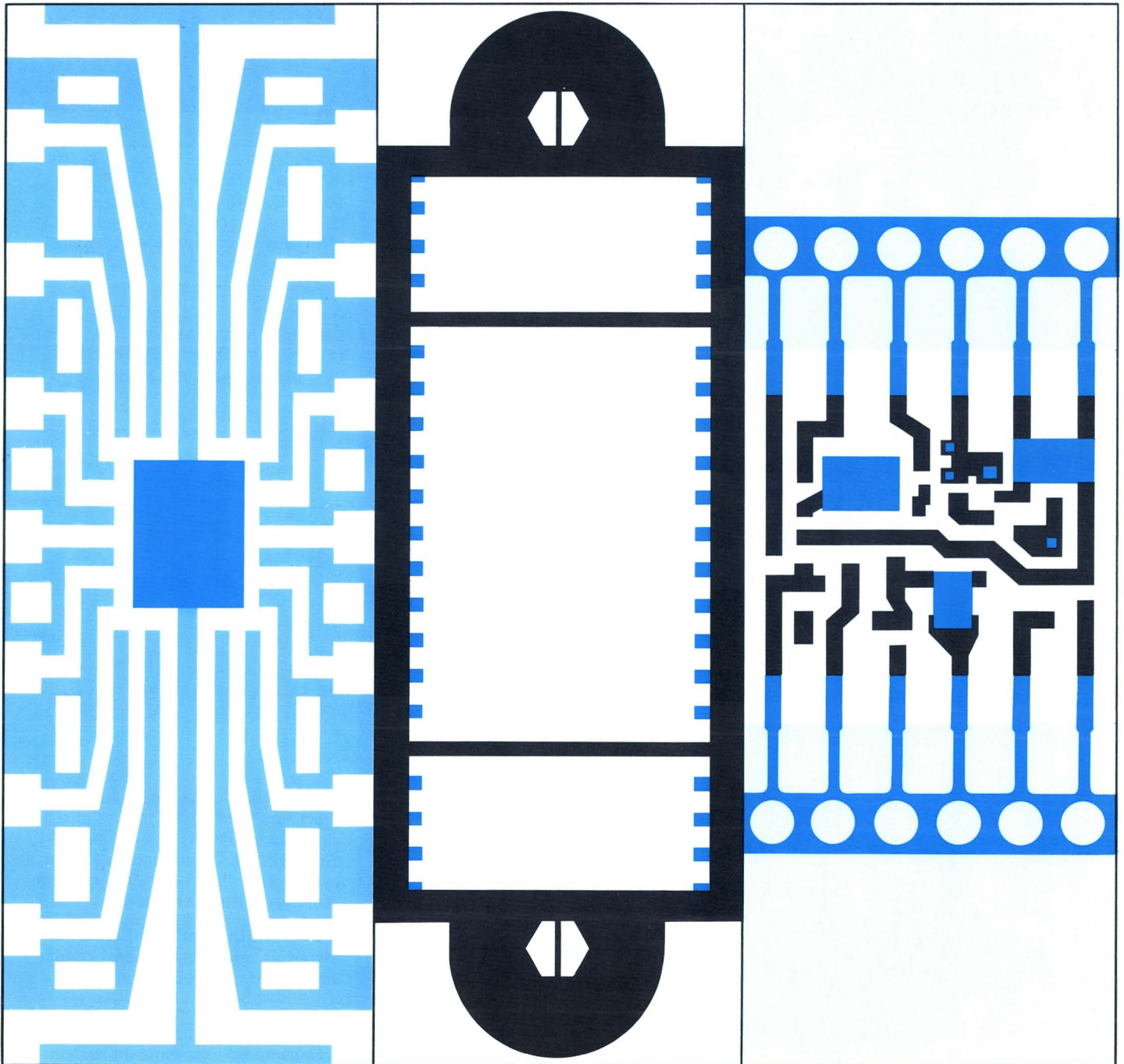
AMP's specialized skills and experience are employed in the design and manufacture of an extensive line of assembly hardware for microelectronic devices and packages. Products include lead frame for discrete semiconductors and integrated circuits, foil frames, and special connectors for use with leadless substrates. Automated application machinery is available to speed assembly operations with AMP products.

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Substrate clips for thick film hybrid circuits .....	24-10
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Micrometallization .....	24-14

## PRODUCTS FOR MICRO-ELECTRONICS







### Introduction

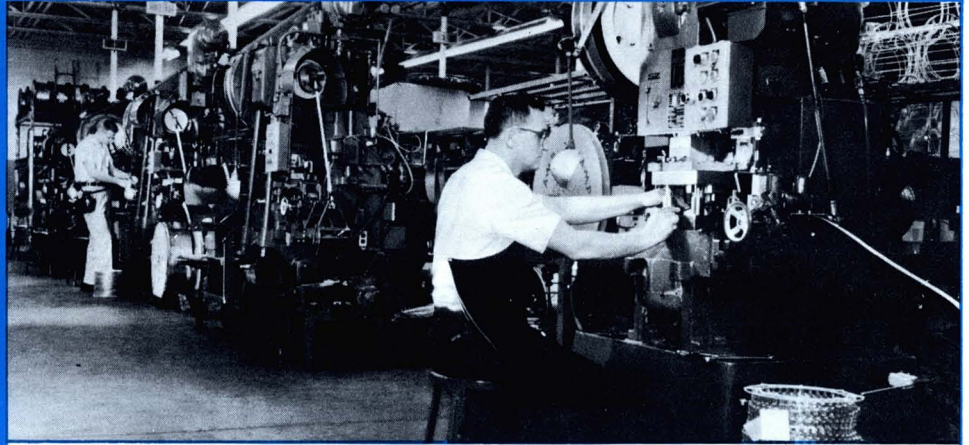
The specialized engineering and manufacturing skills which AMP has developed during several decades as a leading innovator in electrical connectors and terminals are now being applied to creating assembly hardware for manufacturers of microelectronic devices . . . integrated circuits, discrete semiconductors, hybrid packages. From this activity has grown an extensive capability, covering continuous-etched and precision-stamped lead frames, both for discrete semiconductors and for integrated circuits; foil frames and outer frames for automated bonding of connections to integrated circuit chips; and a family of connectors which afford practical pluggability for leadless substrates.

To the semiconductor industry, AMP is becoming the production man's production partner. We're a partner well-experienced in selective plating, continuous etching, electrochemical metal deposition and precision stamping and forming — operations basic to our large-scale manufacturing of connectors and terminals. We're a partner with extensive abilities in designing and building automated application machinery which you can use in your own plant for high-speed assembly of A-MP\* products — such as our machine for applying substrate clips to hybrid substrates.

### Production-Stamped Lead Frames

Where requirements call for high production volume at maximum economy, we are manufacturing a broad range of stamped lead frames — including IC lead frames in a variety of standard and special configurations, lead frames for LED displays, and lead frames in strip form for several different types of power and signal transistors.

We design, build and maintain all our own stamping dies for producing the most intricate configurations, and for working with a broad range of materials, finishes and tempers. Highly durable tungsten carbide dies are used for stamping materials such as Copper Alloy 194, 1010 Steel, Alloy 42 and nickel.

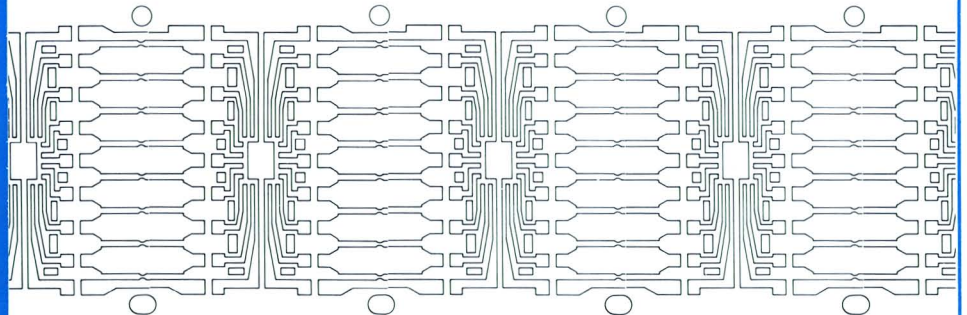


In our stamping facilities, we use high-speed precision presses especially designed to minimize gapping and hold extremely close tolerances. An extensive quality control program provides repeated inspections at every stage of production, to assure customers of high yield and consistent top quality in their own assembly operations.

Frames can be supplied with a broad

range of plated finishes, including selective plating which assures deposit of exactly the desired thickness of gold or other precious metals to those areas where it is needed for bonding.

A standard 16-lead frame is available from immediate production, in Alloy 42 with optional selective gold plating thickness in bonding areas.



### Continuous Photo-Etched Lead Frames

Photochemical machining, in AMP's continuous etching facility, makes it possible to produce custom lead frames to extremely accurate tolerances at exceptionally low cost, without major investment in dies, and at production rates which are high enough to meet all but the largest volume requirements. As opposed to conventional batch etching, which produces parts in

“stick” form, our process turns out precision etched lead frames in one continuous strip, which can be fed directly to our continuous selective plating line, thus achieving optimum economy of total production.

We work with a variety of etchable materials, including copper, copper alloys, and cold rolled steel.

AMP capabilities include design assistance as well as preparation of artwork to your specifications.

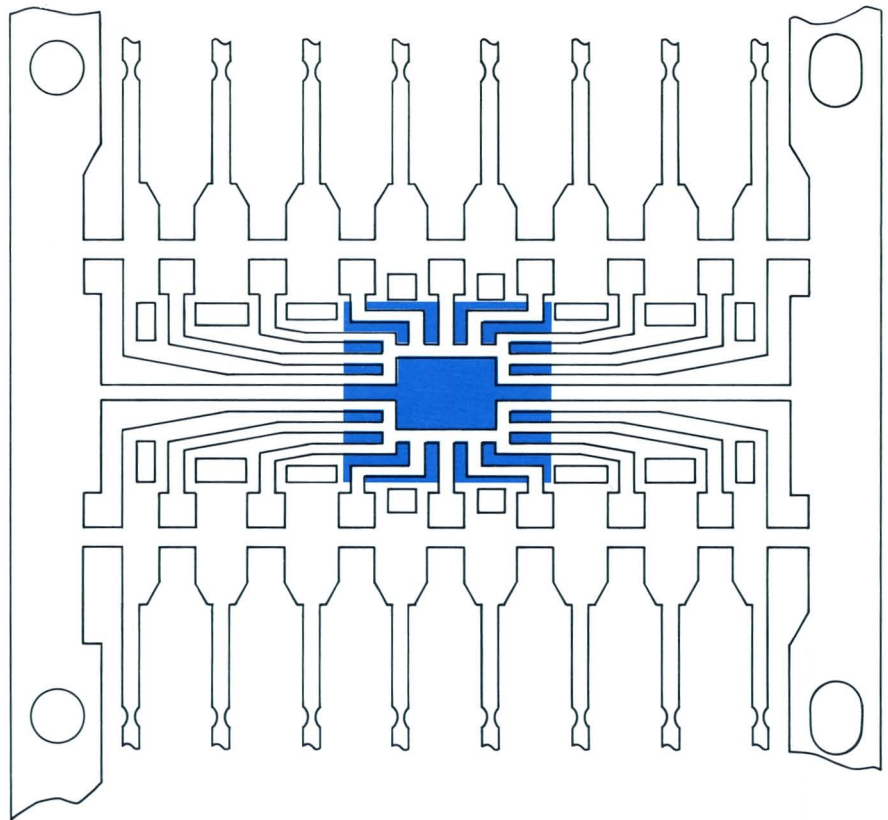
**Plating**

Semiconductor lead frames often require specialized electroplated finishes, sometimes with a continuous plating over the entire part, and sometimes with other materials or other thickness of plating on selected areas.

Plating services available at AMP include both continuous and selective plating of various materials such as gold, nickel, copper, bright tin and many others.

Selective plating has been a special skill at AMP for many years, in the production of terminals and connectors. On semiconductor lead frames, this technique affords significant cost savings without sacrifice of quality, by placing required thickness of gold, for example, only on the contact or bonding areas where it is needed . . . the right thickness, bondable, pure and adherent.

Our plating baths are constantly monitored to assure repetitively uniform finishes and accurate placement of selectively plated deposits.



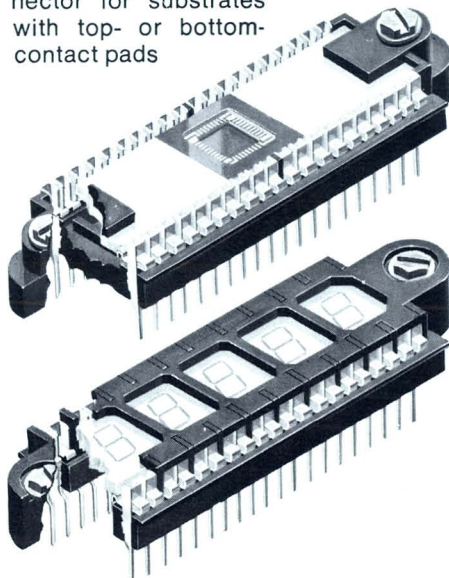
**PACKAGING CONCEPTS**

**Leadless Substrate Connectors**

Wider use of MSI and LSI circuitry has demanded improved, low cost methods for high density packaging. In answer to this, AMP has developed a line of leadless substrate connectors and leadless substrate LED array connectors.

AMP leadless substrate connectors are presently available in the popular 40-position, dual in-line configuration. This connector offers cost savings by eliminating a lead frame and production losses due to damage of lead frames. Connectors are available to accept side metallization, top metallization or bottom metallization. These are zero-force entry connectors with stored energy spring contacts, to assure electrically reliable connections.

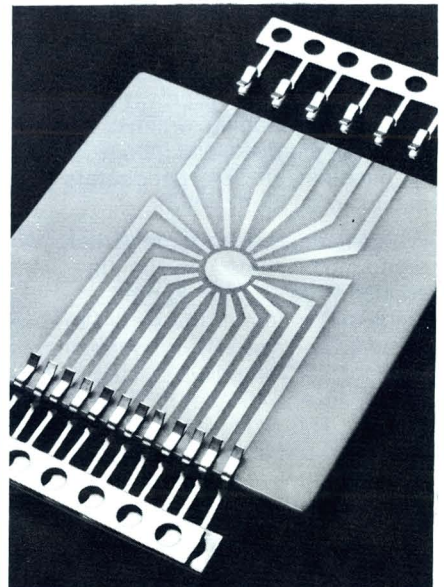
AMP pluggable connector for substrates with top- or bottom-contact pads

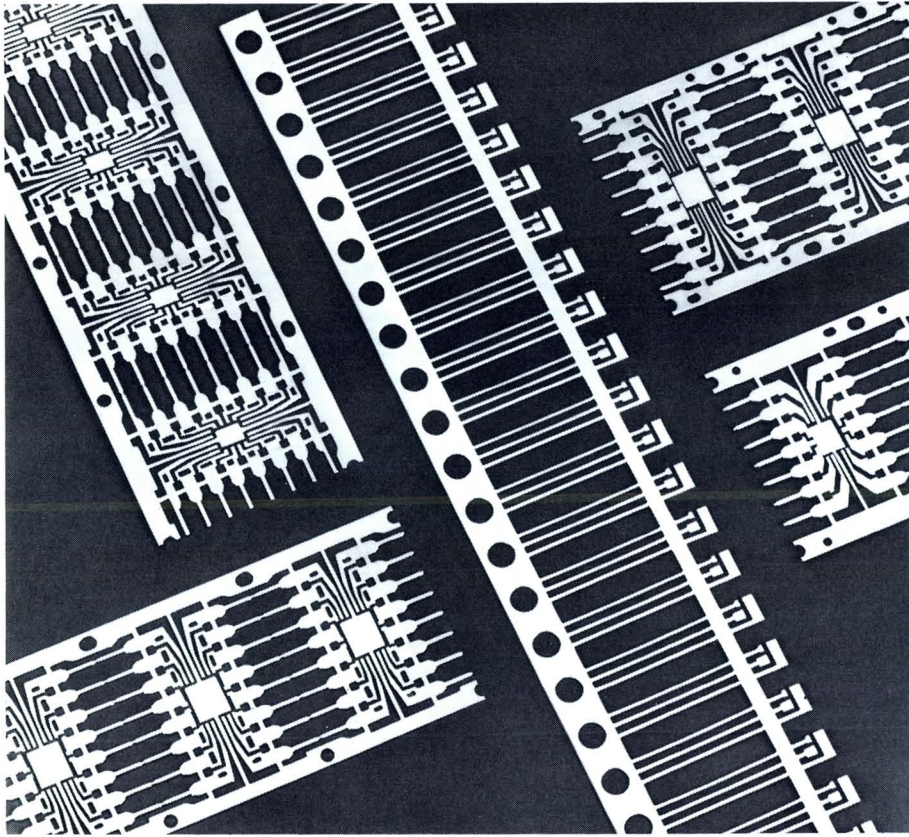


We also have a new version of this leadless connector that is designed to accept modular LED seven-segment displays. We can modify length and width to accommodate your complete LED display unit.

**AMP Substrate Clips**

Input/Output contacts for ceramic substrates used for thick film hybrid circuits can be automated by means of new AMP substrate clips. Supplied in strip form, they are attached by a special AMP machine.





## AMP Lead Frames

A leading innovator of electrical/electronic products for many years, AMP has developed highly specialized engineering and manufacturing skills. Today, these skills are being applied to the creation of assembly hardware for manufacturers of microelectronic devices ... integrated circuits, discrete semi-conductors, hybrid packages. From this activity has grown a production capability which covers precision-stamped lead frames, both for discrete semi-conductors and for integrated circuits.

Where requirements demand high production volume at maximum economy, AMP offers a broad range of lead frames in a variety of standard and special configurations. Available for immediate production are 14-, 16- and 18-lead DIP frames in Alloy 42. This product line offers many options in pad size, grounding configurations and plating

combinations, including selectively gold finished bonding areas.

A TO-92 lead frame for low power semi-conductor devices is also produced in copper alloy.

All AMP lead frames are stamped with dies that are precision-engineered for producing the most intricate configurations and for working with a broad range of materials, finishes and tempers. AMP's production facilities also employ high-speed presses which are specifically designed to minimize gapping and hold extremely close tolerances. In addition, every production stage is repeatedly inspected through the use of an extensive quality-control program, thus assuring customers of high yield and consistent top quality in their own assembly operations.

### Features

- Available in a variety of standard and special configurations — 14-, 16- and 18-lead frames for dual in-line packages; TO-92 frame for low power semiconductor devices
- Frames supplied in "sticks" or continuous strips
- Production capabilities include the intricate configurations
- All production stages repeatedly inspected through extensive quality-control program
- Precision stamping dies and high-speed presses assure economy, high yield and consistent top quality for customer assembly operations

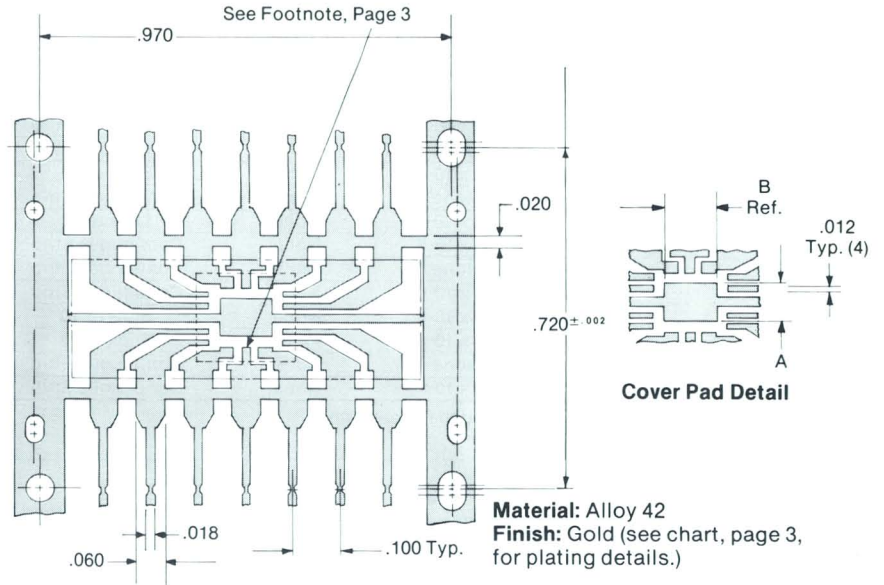
### Dimensioning:

All dimensions in inches.

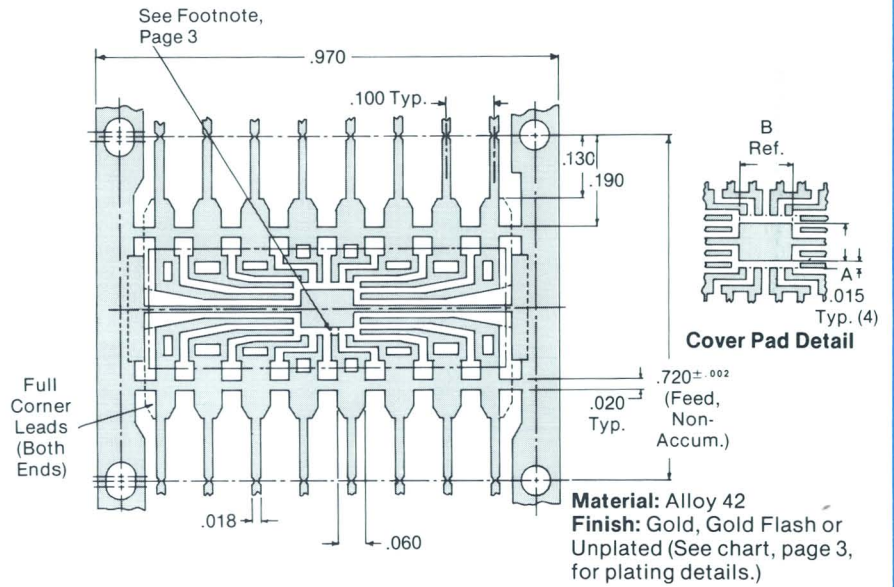
**Specifications subject to change.**  
Consult AMP Incorporated for latest design specifications.

Specifications for  
Dual In-Line Package  
Lead Frames

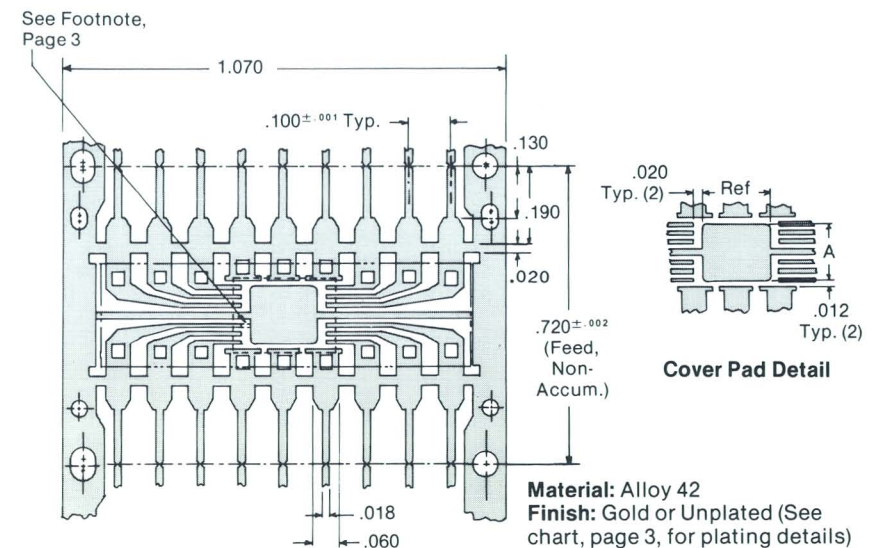
14-Lead  
DIP Frames



16-Lead  
DIP Frames



18-Lead  
DIP Frames



## Specifications for Dual In-Line Package Lead Frames (Cont'd)

No. of Leads	Pad Size		Plating Thickness		Packaging Method	Ground Lead*	Corner Leads	Part Number
	A	B	Bonding Area	Remainder				
14	.080	.110	50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485185-2
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485185-5
			None	None	Continuous Strip	None	Full	1-485185-0
14†	.080	.110	50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485185-3
			None	None	Continuous Strip	None	Full	485185-4
14	.080	.110	40 x 10 <sup>-6</sup>	None	Stick of 10	Pin 14	Full	485185-6
			None	None	Continuous Strip	Pin 14	Full	485185-7
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485186-1
14†	.110	.140	50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485186-3
			None	None	Continuous Strip	None	Full	1-485186-0
			50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485186-2
14	.110	.140	50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485186-5
			50 x 10 <sup>-6</sup>	10 x 10 <sup>-6</sup>	Stick of 10	None	Full	485186-6
			None	None	Continuous Strip	None	Full	485186-7
			50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485243-3

\*Provisions can be made for grounding any lead to the center pad.

†Pad depressed.

No. of Leads	Pad Size		Plating Thickness		Packaging Method	Ground Lead*	Corner Leads	Part Number
	A	B	Bonding Area	Remainder				
16	.080	.110	50 x 10 <sup>-6</sup>	15 x 10 <sup>-6</sup>	Stick of 10	None	Half	485086-1
			50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Half	485086-2
			30 x 10 <sup>-6</sup>	15 x 10 <sup>-6</sup>	Continuous Strip	None	Half	485086-3
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Half	485086-5
			40 x 10 <sup>-6</sup>	None	Stick of 10	Pin 16	Half	485086-6
			None	None	Continuous Strip	Pin 16	Half	485086-8
			None	None	Continuous Strip	None	Half	1-485086-0
			None	None	Stick of 10	None	Half	1-485086-1
16†	.080	.110	50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Half	485086-7
			None	None	Continuous Strip	None	Half	485086-9
16	.080	.110	65 x 10 <sup>-6</sup>	15 x 10 <sup>-6</sup>	Continuous Strip	None	Full	485143-1
			50 x 10 <sup>-6</sup>	10 x 10 <sup>-6</sup>	Stick of 10	None	Full	485143-2
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485143-5
			None	None	Continuous Strip	None	Full	1-485143-0
16	.110	.140	50 x 10 <sup>-6</sup>	10 x 10 <sup>-6</sup>	Stick of 10	None	Half	485096-4
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Half	485096-5
			None	None	Continuous Strip	None	Half	1-485096-0
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485113-5
16†	.110	.140	None	None	Continuous Strip	None	Full	1-485113-0
			50 x 10 <sup>-6</sup>	None	Stick of 12	None	Half	485136-1
			50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Half	485136-2
			None	None	Continuous Strip	None	Half	1-485136-0
16	.140	.170	50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Half	485097-2
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Half	485097-5
			None	None	Continuous Strip	None	Half	1-485097-0
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485170-5‡
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485170-6
			None	None	Continuous Strip	None	Full	485170-7
			None	None	Continuous Strip	None	Full	1-485170-0‡

\*Provisions can be made for grounding any lead to the center pad.

†Depressed pad.

‡Additional center locking slots.

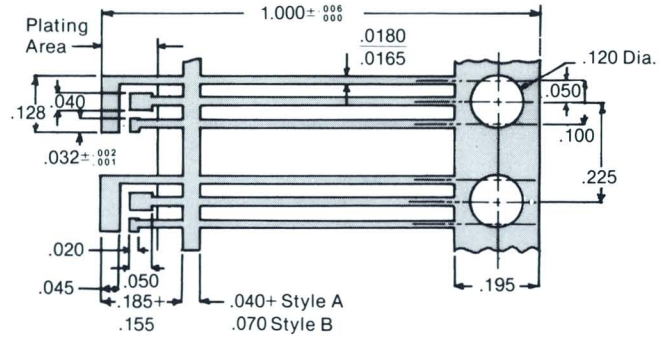
No. of Leads	Pad Size		Plating Thickness		Packaging Method	Ground Lead*	Corner Leads	Part Number
	A	B	Bonding Area	Remainder				
18	.080	.120	50 x 10 <sup>-6</sup>	15 x 10 <sup>-6</sup>	Stick of 10	None	Full	485219-1
			None	None	Stick of 10	None	Full	485219-2
			50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485219-4
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485219-5
			None	None	Continuous Strip	None	Full	1-485219-0
18	.140	.160	50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485106-3
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485106-5
			None	None	Continuous Strip	None	Full	1-485106-0
			50 x 10 <sup>-6</sup>	None	Stick of 10	Pin 10	Full	485152-5
18	.140	.180	None	None	Continuous Strip	Pin 10	Full	1-485152-0
			50 x 10 <sup>-6</sup>	None	Continuous Strip	None	Full	485108-2
			50 x 10 <sup>-6</sup>	None	Stick of 10	None	Full	485108-5
			None	None	Continuous Strip	None	Full	1-485108-0
			50 x 10 <sup>-6</sup>	15 x 10 <sup>-6</sup>	Stick of 10	Pin 10	Full	485133-1
			50 x 10 <sup>-6</sup>	None	Stick of 10	Pin 10	Full	485133-5

\*Provisions can be made for grounding any lead to center pad.

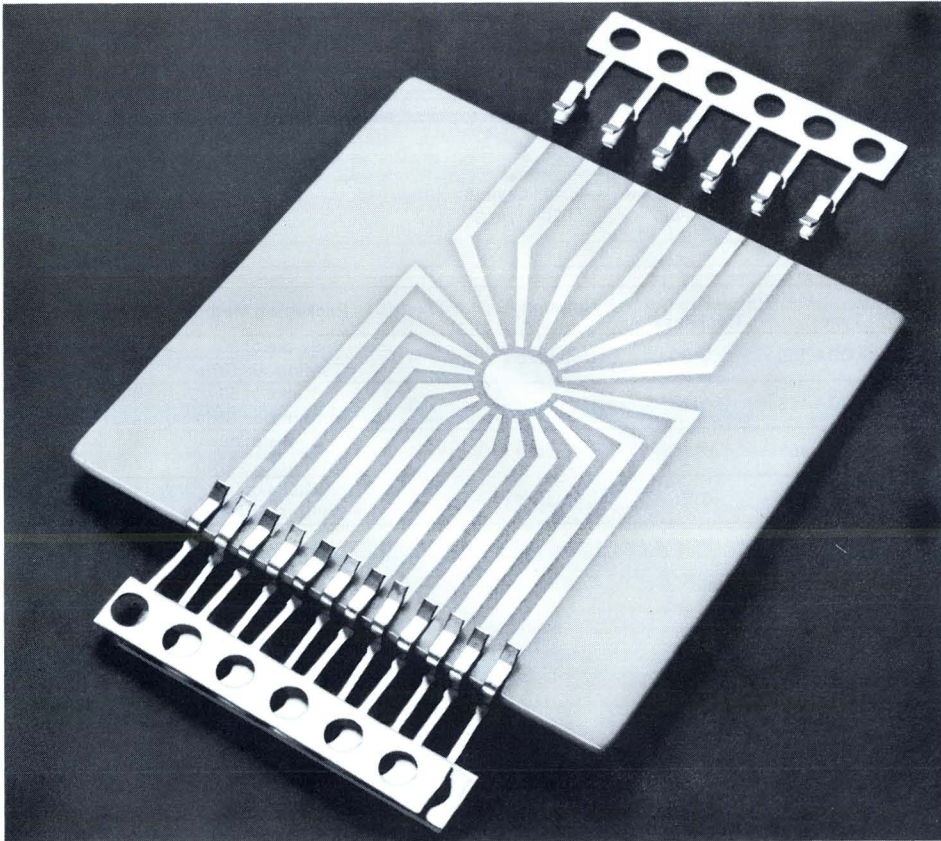


Specifications for TO-92 Lead Frames

TO-92 Lead Frames



Material		Finish	Style	Packaging Method	Part Number
Type	Thickness				
Alloy CDA 155	.012	Unplated	A	Sticks of 50	1-485144-2
				Continuous Strip	1-485144-0
Alloy CDA 155	.012	Unplated	B	Sticks of 50	485118-6
				Continuous Strip	485118-4
Alloy CDA 155	.015	Unplated	A	Sticks of 50	485144-9
				Continuous Strip	1-485144-1
Alloy CDA 155	.015	Unplated	B	Sticks of 50	485118-7
				Continuous Strip	485118-5



AMP Substrate Clips — another advance from AMP in the field of microelectronic packaging — provide a highly reliable, economic technique for producing many of today's integrated circuit components. They are especially designed to accommodate .025" thick substrates and can be used as input/output contacts for a variety of thick and thin film hybrid substrates as well as numerous dual in-line packages.

These unique clips are stamped and formed from cold-rolled steel or brass stock and are supplied with either a tin, bright tin, tin-lead or tin-over-nickel plated finish. For maximum production flexibility, AMP also furnishes the substrate clips in a choice of

styles and configurations. Available designs include versions with standard (.075") and shallow (.050") mating depths, with or without standoffs, with post lengths from .100" to .275", and with a "dam bar" feature to facilitate plastic molding operations after application to a substrate.

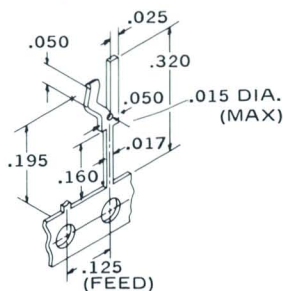
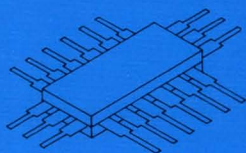
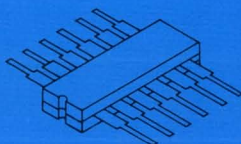
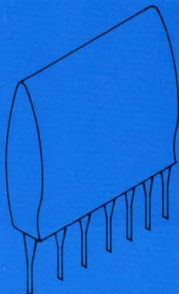
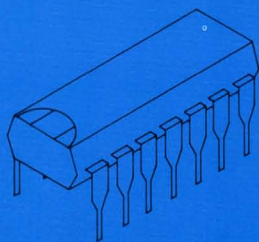
All AMP Substrate Clips are supplied in strip form for accurate, efficient assembly to substrates using either a hand-operated assembly fixture or AMP's automatic Substrate Clip Application Machine. This high-speed production machine can handle a wide range of substrate sizes, from .5" x .5" to 2.0" x 2.0", and is capable of applying strip form clips to one or both sides of the substrates.

## AMP Substrate Clips

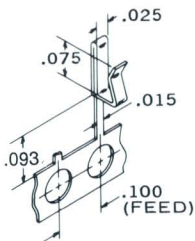
### Features

- Reliable, low cost technique for producing hybrid substrates and dual in-line packages.
- Input/output contacts accept .025" thick substrates.
- Choice of finishes include tin, bright tin, tin-lead and tin-over-nickel.
- Wide selection of available styles and configurations — post lengths from .100" to .275".
- Strip form clips applied by either hand-operated assembly fixture or automatic machine.
- Fixture and machine handle substrate sizes from .5" x .5" to 2.0" x 2.0".

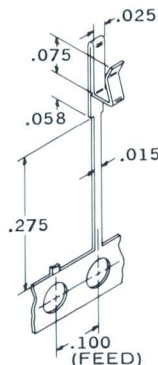
Specifications



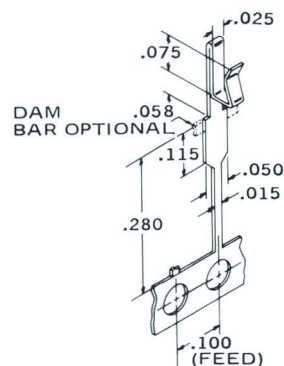
Material: Brass  
 Stock Thickness: .010  
 Finish: Tin-Over-Nickel  
 Part Number: 485084-1



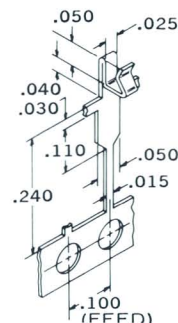
Material: Brass  
 Stock Thickness: .008  
 Part Number: 485092-4 (Finish, Pre-Tin)



Material: Brass  
 Stock Thickness: .008  
 Part Number: 485093-4 (Finish, Pre-Tin)



Material: Brass  
 Stock Thickness: .008  
 Part Number: 485094-4 (Finish, Pre-Tin)



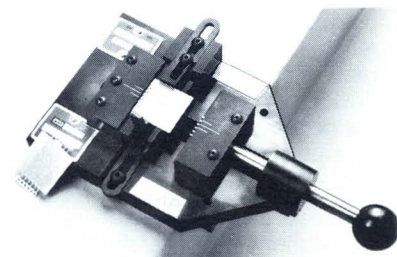
Material: Brass  
 Stock Thickness: .008  
 Part Number: 485095-4 (Finish, Pre-Tin)

NOTE: All clips shown are designed to accept .025" thick substrates.

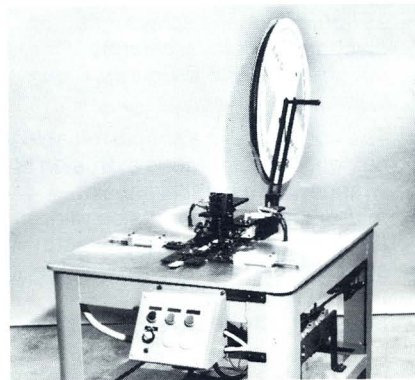
Tooling

Ideally suited for limited production applications, the AMP Assembly Fixture is specifically designed for installing strip form clips to .025" thick substrates. This inexpensive, manually-operated device offers the advantages of fast, easy application and can accommodate substrate sizes ranging from .5" x .5" to 2.0" x 2.0". The operator simply loads a substrate and a pre-cut strip of clips into the fixture and "gang" inserts the clips onto the substrate. Scribed lines are provided on the fixture to assure proper alignment of both substrate and clip strip.

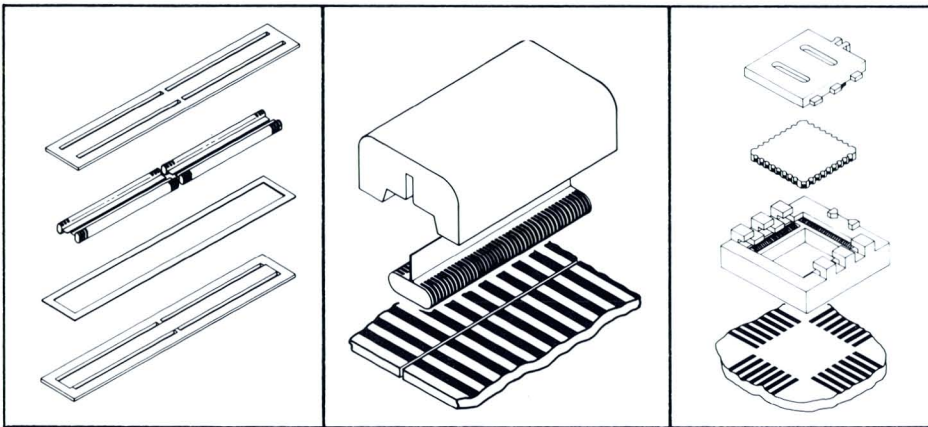
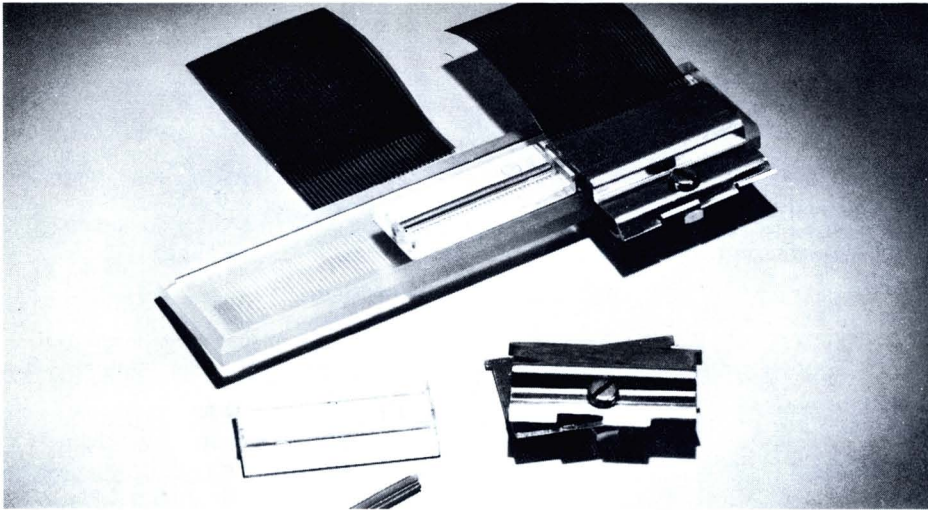
For volume production at the lowest installed cost, AMP also has available an automatic application machine. It is bench mounted, pneumatically powered, and capable of handling substrate sizes from .5" x .5" to 2.0" x 2.0". During operation, the substrates and clips are automatically fed into the machine where the proper number of clips are cut from the reeled strip and installed onto one or both sides of the substrate, as required.



AMP Assembly Fixture, Part No. 456155-1



AMP Automatic Application Machine



The AMP Elastomate Connector is a unique and extremely simple, yet reliable, connector which fulfills the requirement to interconnect miniature devices by pressure alone, without the necessity for soldering, bonding, or large space-consuming connector bodies and associated hardware.

These versatile connectors will find applications wherever there is a need to obtain maximum packaging density in a minimum amount of space: such as liquid crystal displays, gas discharge displays, ceramic substrates, LSI, PC Boards, Flex Cable, etc.

The connector is a simple, reliable design: an elastomeric extrusion is wrapped with parallel lines of micrometallized circuits on thin, flexible film. When the connector is compressed between two parallel planes, these metallized lines interconnect the circuitry on each plane.

The parallel lines of micrometallized circuits may be as narrow as .003" [0.08 mm] and spaced as closely as .007" [0.18 mm] centerlines. These connectors can be used in virtually any application having a centerline spacing of .025" [0.64 mm] or greater. Even with .015" [0.38 mm] wide pads on .025" [0.64 mm] centers, the .007" [0.18 mm] centerlines of the connector assure dual redundancy on each pad surface. And, working with these small dimensions, it's nice to know that the connector is extremely tolerant of misalignment or can actually float between the boards.

A variety of cross-sections and lengths are available. While the close circuitry centerlines are standard, greater path widths and larger centerlines can be obtained. Depending on specific applications and environmental considerations, the optimum circuitry plating will be recommended.

## AMP Elastomate Connector

### Features

- Eliminates solder connections which allows:
  - Lower packaging costs
  - Higher assembly speeds
  - Reduced package volume
  - Convenient assembly, repair and replacement of connected item
  - No heat during assembly minimizes damage to components
- Wide variety of cross-sections and lengths available
- Maximum packaging density in a minimum of space
- .003" [0.08 mm] paths on .007" [0.18 mm] centerlines can be used in virtually any application having a centerline spacing of .025" [0.64 mm] or greater
- Multiple redundancy assured down to .015" [0.38 mm] on .025" [0.64 mm] centers
- Extremely tolerant of misalignment
- Copper conductors with gold over nickel platings provide known, low resistance, stable, reliable connector paths
- Resists compression set since the circuitry is the conducting member — not the elastomeric core
- Resistant to the effects of shock and vibration
- Compensates for interconnection surface irregularities

### Dimensioning:

All dimensions in inches and millimetres. Values in brackets are metric equivalents.

**Specifications subject to change. Consult AMP Incorporated for latest design specifications.**

Specifications

Typical Performance Characteristics

Per AMP Product Performance Specification No. 108-16012 — Measured with 3 redundant connector paths, between gold plated connector and gold plated printed circuit board pads .015" [0.38 mm] wide on .025" [0.64 mm] centers, at 10 volts open-circuit potential

**Contact rating:** 500 milliamperes per pad, with 10°C temperature rise

**Operating temperature:** -65°F to +185°F [-53.8°C to +85°C]

**Humidity:** 95% relative humidity

**Capacitance:** Less than 0.5 picofarads between pads

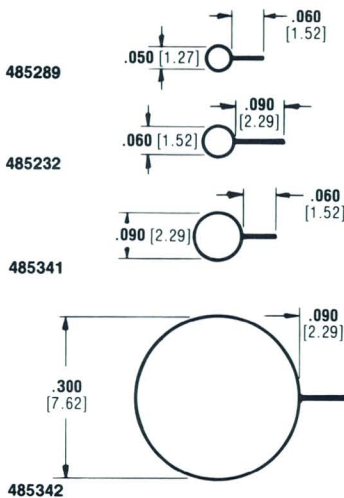
**Inductance:** Less than .005 micro henries from 5 KHz to .5 MHz

**Contact resistance:** Less than 100 milliohms

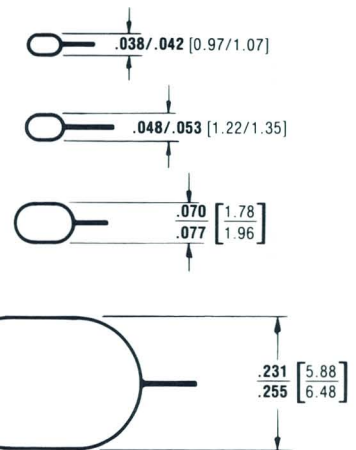
Typical Elastomate Connectors Cross-Sections

Free Height Extrusion and Tab Dimensions

Basic Part Number (see notes)



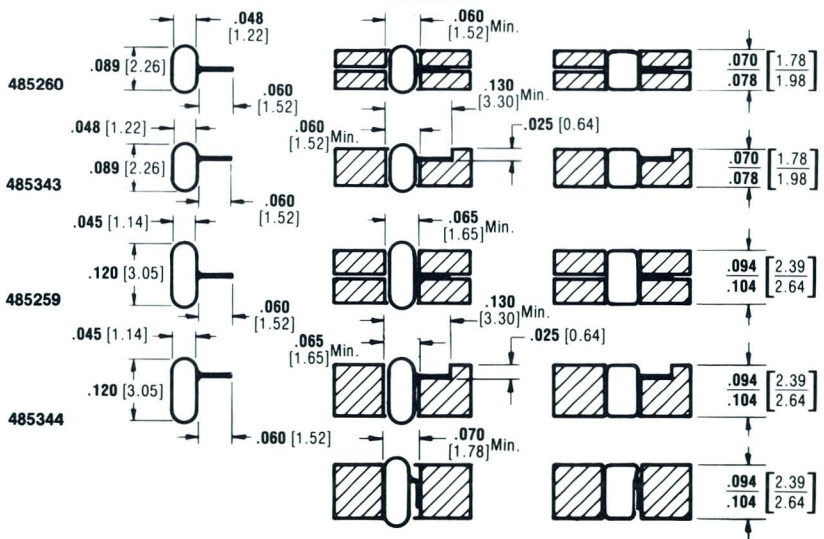
Compressed Height Overall Min./Max.

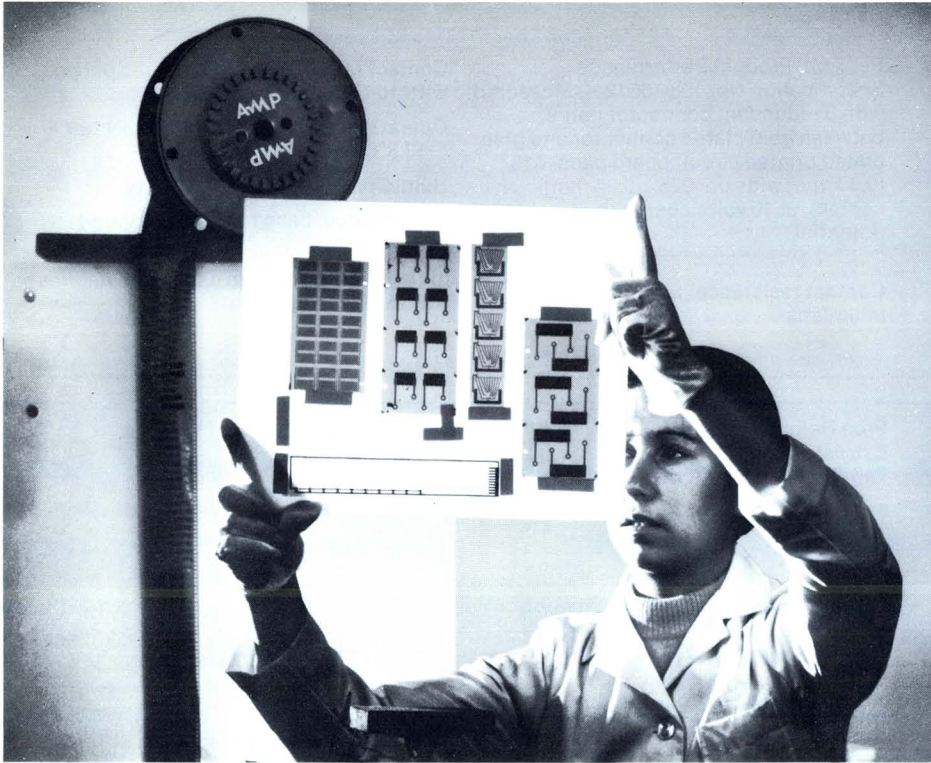


Dimensioning:

1. All dimensions in inches and millimetres. Values in brackets are metric equivalents.
2. Complete specifications on basic part numbers must be obtained from AMP Incorporated.

Slot Dimensions





The AMP engineering expertise in electronic interconnection methods continues to expand into the latest concepts for optimum packaging efficiency.

The continuing growth of the microelectronics industry has fostered the need for more advanced and economical application techniques. AMP recognizing these requirements has developed the technology of Micrometallization—photochemical manufacturing processes for producing micro-miniaturized flexible circuitry.

With applied cost savings in mind, AMP Microelectronic Engineers will evaluate your particular requirements and recommend materials, construction and format designed to perform, yet meet your overall cost objectives.

Micrometallized circuits are available on a variety of flexible film materials and can be supplied on individual film, flat sheets with multiple circuits and, for large volume users, in continuous strip form mounted on reels for automatic machine application.

With the knowledge gained from many years of experience as the leader in automated terminating techniques, we offer these same skills in developing associated equipment necessary to utilize continuous film circuitry in high volume applications.

See the AMP Micrometallization Capabilities Chart for basic guidelines on this unique manufacturing process. For a complete evaluation of your specific application, contact AMP Incorporated.

### Micrometallization— photochemical processes for micro-miniaturized flexible circuitry

#### Reverse Beam (overhanging beam) Circuits

These circuits are produced on continuous, sprocket-fed film in 70mm, 35mm, 16mm or 8mm widths depending on customer's requirements. Supplied on reels, they are designed for semi-automatic and automatic inner-lead gang bonding to integrated circuit chips.

#### Continuous Film Circuitry

The circuitry can be produced on a variety of flexible materials depending on customer's application. These include polyimide, polyamide/imide or polyester. A choice of plating metals is available and can even be selectively applied to the circuit paths.

#### Individual and Sheet Form Circuitry

With the same quality manufacturing processes and features of the continuous strip product, this type of circuitry is designed for those applications requiring special circuit shapes that are not conducive to the continuous film format.

**CAPABILITY GUIDELINES  
MICROMETALLIZATION**

	<b>Flexible Circuitry</b>	<b>Electro-Formed Foils</b>
Base Material	Polyimide, Polyamide/Polyimide, Polyesters	Nickel, Copper
Base Thickness	.0007" to .005" (.002" Max. for Polyamide/imide)	.001" to .004" (Tol. + .0004" in Ni at Nom. .0025" Thk.)
Base Metallization	Copper	See "Base Material"
Plating	Gold, Nickel, Tin, Tin-Lead, Others	Gold, Silver, Tin, Tin-Lead
Conductor Widths (Dependent on Thickness)	<i>Examples:</i> .003" wide for 1/2oz. CU, .010" wide for 2oz. CU	<i>Examples:</i> .0015" wide for .001" thk, .003" wide for .0025" thk. (Tol. ± .0005")
Conductor Thickness	.0007" (1/2oz. CU) to .0028" (2oz. CU)	See "Base Thickness"
Continuous Strip (8, 16, 35, 70mm)	Yes	No
Individual or Sheet Form	Yes	Yes
Overhanging Beam Circuits for Direct Chip Attachment on Continuous Film	Yes	N/A

