

The Sixty Minute JUGGLE YOUR PIZZA Training Program!



CRANE IN THIRTY (SECONDS)!



Crane Connectors is a Cincinnati-based manufacturer of PC board connectors for commercial and military applications. Crane offers a wide variety of headers, sockets and jumpers on 0.100", 0.079" and 0.050" centers in both **THRU-HOLE** and **SMT** versions. Tailored (Non-Standard/No Penalty) Products are a specialty. Crane is Registered to ISO 9001 by Underwriters Laboratories (File No. A-3620), and is approved for military use by D.E.S.C. (Defense Electronics Supply Center).

THE CRANE EDGE

To compete successfully, a company must have strategic advantage. At Crane, we sum up that advantage in two simple words: **CRANE CAN.** When other connector companies can't (or won't), Crane will do everything it can to provide the needed solution. Oftentimes this means:

- ✓ shipping samples in 24 hours or less
- ✓ same day service on prints (even specials)
- ✓ same day response on quotes
- ✓ quick, timely shipments
- ✓ custom and tailored product capability
- ✓ wide variety (nearly a million!) of "solutions"
- ✓ **FIRST TIME RIGHT!** Quality Commitment

CRANE CAN.

THE COMPETITION

Crane rivals are noted in the chart below. Samtec is highlighted, since their product line most closely parallels our own. Berg, AMP and Molex are major competitors as well. Offshore suppliers are noted with **BLUE** shading. These are the "cheap and dirty" guys.

SAMTEC	BERG	AMP	MOLEX
METHODE	COM CONN	RN	HARWIN
SPECIALTY	3M	MAJOR LG	CIRCUIT ASY
ADAM TECH	FOXCONN	KYCON	MAXCONN
STARCONN	OUPIIN	SPEED TEC	ASTRON

WHO BUYS CRANE CONNECTORS?

The majority of Crane's business comes from the telecom, datacom, and computer peripheral industries. Because of its durability in harsh environments, Crane products are also used in a variety of test & measurement, medical instrumentation and process control applications. Offshore suppliers have difficulty in meeting the requirements of these users. The chart below shows industry use of connectors nationwide for ALL connector makers.

INDUSTRY	PCT	INDUSTRY	PCT
Computer / Peripheral	26.6	Transportation	3.2
Office Equipment	3.1	Military	6.9
Instrumentation	2.1	Telecom	17.0
Medical Equipment	1.4	Consumer	7.5
Industrial processing	11.1	Other	5.7
Automotive	15.2 (Crane's fastest growing segment)		

BEST SELLERS

Although there has been considerable growth in 0.079" (2mm) and 0.050" products, connectors on 0.100" centers remain our biggest selling items. Here's a sampling of our best "movers" and the pages where they can be found in our C57 Full Line Catalog.

PEG	0.100" Pin Strip Headers	8-9
ATP	0.100" Board Mount Sockets	36-37
PGM	0.079" Pin Strip Headers	56-57
MPEG	0.100" Board Stacking Pin Header	12-13
DPEG	0.100" Detachable Insulator Pin Header	16-17
PLS	0.100" Shrouded Pin Header	32-33
MPLH	0.050" Shrouded Pin Header	82-83
ATF	0.050" Board Mount Socket	94-95
DESC	0.100" Headers and Sockets	103

NEED SALES ASSISTANCE?

Kelli Berger	Customer Service Supervisor
Brian Vornhagen	East Region Service Coordinator
Alicia Garr	West Region Service Coordinator
Steve McGrinder	East Region Manager
Dave Mullen	Vice-President, Sales

AREN'T ALL CONNECTORS THE SAME?

Absolutely not! Crane Connectors have many features and benefits that set us apart from the competition. Features like our unique **MATE-RITE TIP™**, **COINED** (rounded) **TAILS**, **DESIGN FLEXIBILITY**, and original **PEGGING SYSTEM** for alignment and board retention.

WHAT IS A MATE-RITE TIP™?

As a result of their pin manufacturing process, many connector companies produce (or broker) parts with sharp angles at the "shoulders" of their terminals. They may even be un-plated on the pin tips. When these parts are mated with a socket, the rough edges can scrape the mating surface leading to corrosion and possible shorts.



Crane's **MATE-RITE-TIP™** is the result of a multi-step forming process that insures the best pin tip geometry in the business. The result is a significant reduction in the possibility of scraping, plus lower insertion force (less drag). For more information on the **MATE-RITE TIP™**, request Crane Sales Bulletin **SB-700**.

WEBSITE UPGRADE UNDERWAY

PHASE ONE of Crane's new website has been completed, providing our customers with a handy reference to the:

- Names of Crane authorized distributors
- Names of Crane sales representatives
- Crane history and ownership
- Key contacts at Crane
- Overview of product offering
- What's new at Crane
- Crane quality statements

Work on **PHASE TWO** of the Crane Website is underway. In the near future, we expect our customers to be able to access the Crane site and download DWG and PDF files of Crane drawings. This work should be completed by the Fall of 1998.



**CRANE CONNECTORSE-MAIL
ADDRESS**

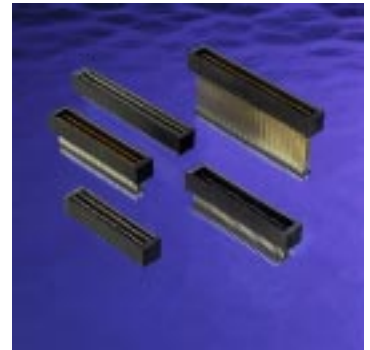
INFO@CRANECONNECTORS.COM

HIGHLIGHT: MPLH Series Shrouded Headers

FINE LINE

Shrouded Headers

Crane Connectors has introduced a series of 0.050" x 0.100" Shrouded Headers featuring a **FINE LINE TAIL** Option. By coining the tails to a diameter of 0.018", the designer is given the option of running his traces between the pins instead of around them saving valuable board space.



EXCELLENT FOR INTRUSIVE REFLOW

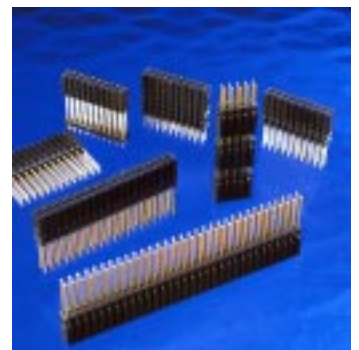
In addition to space saving, Crane's **FINE LINE TAIL** Option is excellent for **PIN AND PASTE** applications. The tail displaces the least amount of paste, allowing the formation of good solder joints. For more information, request Crane Sales Bulletin **SB-900**.

HIGHLIGHT: MATP Series Board Mount Sockets

Although **PC/104** modules have been around since 1987, a formal specification was not published until 1992. Since then, interest in the **PC/104** format has skyrocketed. Companies using **PC/104** "module stacks" within their products frequently create their own application-specific modules. In the

majority of these applications, the modules are **SELF-STACKING**. Since the design does not utilize backplanes or card cages, stackthrough board mount sockets are required.

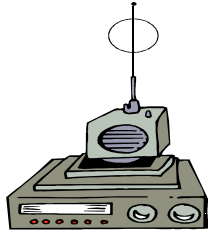
Crane's new MATP Series Board Mount Sockets feature a **SQUARE TAIL** (versus the rectangular tail of standard sockets) and meet the requirements of the **PC/104** spec.



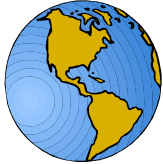
For more information, please reference pages 40-41 in Crane's **C57** Full Line Catalog, or request Sales Bulletin **SB-600** for more details.

CRANE CONNECTORS IS D.E.S.C. APPROVED

Crane Connectors is one of three connector manufacturers in the United States approved for military use by the Defense Electronics Supply Center (D.E.S.C.).



Crane connectors have been designed into a wide variety of military applications including secure field communications systems (Singars Radio), the Patriot Defensive Missile System, flight instrument panels, F-16 defensive measures instrumentation, torpedo navigation systems, ship board radios, surface-to-air and air-to-air missile navigation systems, and electronic fuel systems for fighter aircraft.



At Crane, we like to tell people that our connectors are **OUT OF THIS WORLD**. This is no marketing "fluff" either. Crane Connectors was chosen to provide headers for use on the space shuttle control arm.

For more information on D.E.S.C. approved connectors, please reference page 103 in our C57 Full Line Catalog, or request Crane Sales Bulletin **SB-300**.

THE REAL MESSAGE

Although the sale of military connectors amounts to a small percentage of Crane's overall sales, the **SAME LEVEL** of attention that goes into a D.E.S.C. part goes into **EVERY** commercial part as well.

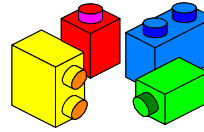
TAILORED PRODUCTS A CRANE EDGE

Avoiding The "C" Word If there's one word that makes connector specifiers turn red, it's the word **CUSTOM**. When a standard off-the-shelf part will not meet the design requirement, buyers and engineers alike know going the custom route can be an expensive road to travel. Custom products typically carry a load of penalties including:

- ☹ **Long leadtimes**
- ☹ **Higher piece price**
- ☹ **High tooling or NRE costs**
- ☹ **High minimum order levels**
- ☹ **Slow (or no) turnaround on samples**

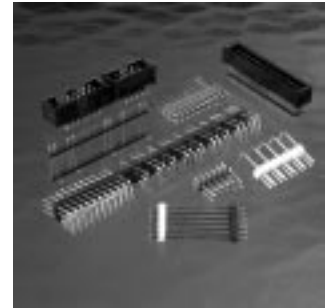
TAILORED PRODUCTS - Continued

Legos® And Crane



Instead of looking first for expensive custom solutions, Crane engineers are trained to look for possible answers within standard components. Our engineering team is experienced at looking at raw materials much like a kid looks at a stack of Legos®. How many different ways can they be put together?

The only thing limiting the possibilities is the creativity of the builder. And our "builders" are pretty darn creative! To see how, take a look at pages 4-5 in our C57 Full Line Catalog. You'll see a dozen Case Studies where Crane was able to find a **tailored solution** to the customer's problem, saving both time and money. For more information on Crane's



TAILORED
(Non-Standard / No
Penalty)
PRODUCTS

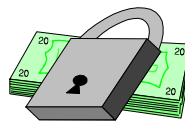
request Crane Sales Bulletin **SB-400**.

Do you know six words that can double your sales?

Does this part mate with anything?

THE KEY TO SUCCESS (In Selling Crane)

Over the years we've noted one common trait among those who have the greatest success selling our products. They sample. A lot. We know that whenever we can put a sample of our products in a prospect's hand, our chances of getting added to the print are greatly increased. We encourage you to follow what one of our reps describes as the three keys to selling Crane ...



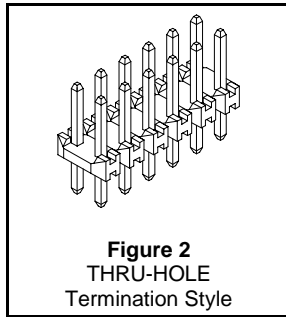
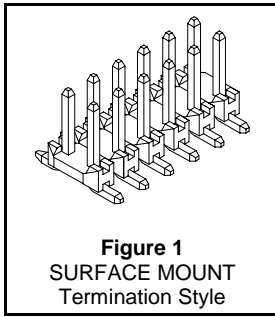
SAMPLE! SAMPLE! SAMPLE!

A Few Connector Basics

Generally speaking, PCB connectors fall into one of two families: **SCREW MACHINE** or **STAMPED AND FORMED**. Screw machine sockets and headers are more expensive, since the terminals and contacts have to be “turned” on a lathe. These types of terminals and contacts are frequently seen in PGAs (Pin Grid Arrays), IC Sockets and Adapters. Crane specializes in **stamped and formed** products on 0.100" (2,54mm), 0.079" (2,00mm) and 0.050" (1,27mm) centers. Products are available in THRU-HOLE and SURFACE MOUNT termination methods. Here’s a look at some data usually associated with our type of products.

TERMINATION STYLE

Termination Style refers to the type of tails the connector has. A **surface mount** termination style (see Figure 1) sits flush on the top of the PCB (printed circuit board). A **thru-hole** termination style (Figure 2), on the other hand, features a connector with straight tails which go through plated-thru holes in the PCB.



TERMINATION METHODS

Termination method refers to the manner in which the connector is attached to the PCB (printed circuit board). The most common methods are wave soldering (thru-hole parts), reflow soldering (SMT parts), and intrusive soldering.

WAVE SOLDERING: The most common method used to attach thru-hole components. Wave solder involves conveying a populated PCB over a “wave” which deposits solder on the tails of the leaded components on the underside of the board.

REFLOW SOLDERING: This solder method, used primarily to attach SMT components, involves screening solder paste onto the surface of the PCB. The components are then placed on the board before heating. The solder is caused to “reflow” when the heat is raised either in a convection oven or with infrared processing.

INTRUSIVE RELOW: This solder method allows thru-hole parts and SMT parts to be soldered in the same process. Solder paste is “pressed” into the PTH’s (plated thru holes) in the PCB. Leaded components are then placed on the board along with SMT components. The entire board is then heated (convection, vapor cloud, or IR) causing the solder to reflow.

CONNECTOR CHECKLIST

Selecting the right connector is an important responsibility. Before a component engineer designs in a connector, they will often consider the following:

- ✓ centerline spacing (pin-to-pin)
- ✓ connector height
- ✓ pc mounting requirements
- ✓ contact tail length
- ✓ plating requirements
- ✓ number of contacts
- ✓ pc board thickness (0.062", 0.093", etc.)
- ✓ insertion / withdrawal force
- ✓ contact tail diameter
- ✓ polarization requirements
- ✓ available board space
- ✓ unit cost
- ✓ total installed cost

CONNECTOR COMPONENTS

INSULATOR: A key factor in the design of any connector is the insulator material or plastic housing. A good design will fail if the wrong materials are chosen. The prime function of the insulator is to hold contacts in position for other operations, protect the contacts from damage, establish specific electrical attributes, and establish visual appeal. Insulator materials range from regular glass filled (GF) polyester for standard applications, to thermoplastic materials for high temp (reflow) requirements.

TERMINALS / CONTACTS: Equally important to the design of a good connector is the terminal post or contact. Factors impacting the selection of each include: deflection range, normal force, contact resistance, temperature, size and cost.

PLATING: Surface finishing (plating) is the process of overlaying a thin coating of metal on metallic components to enhance other desired properties. Benefits include:

- ✓ improved appearance
- ✓ corrosion resistance
- ✓ abrasion resistance
- ✓ improved lubricity
- ✓ improved solderability