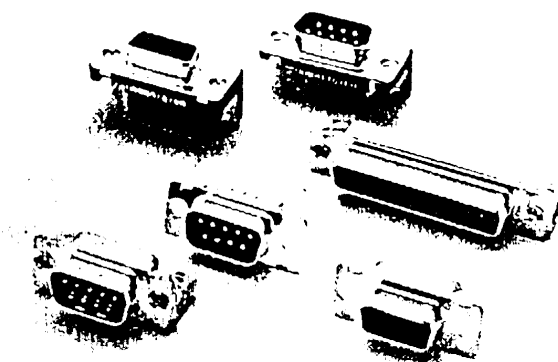


D-connector makers pin their hopes on product development

As prices touch ground, manufacturers look for ways to give their products special appeal

What buyers need to know:

- **Price trend:** Prices are said to be reaching the limit of their descent.
- **Technical trend:** R&D activity is accelerating as makers turn to innovation to lead themselves out of the slump.
- **Manufacturing trend:** Western companies are setting up more offshore production in the region.
- **Worth noting:** Although surface-mount models are on their way, mounting-equipment makers lag far behind.



D-connector prices continue to tumble

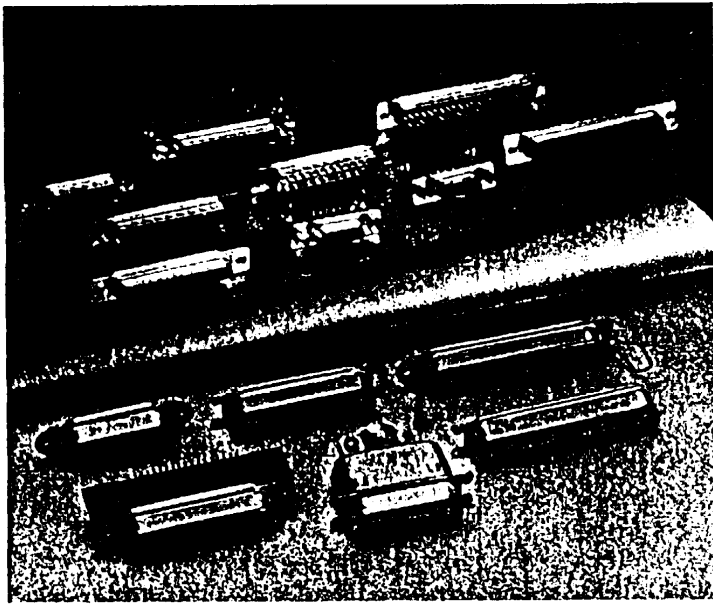
There is an air of depression hanging over the region's D-connector industry as prices continue to tumble. A worldwide slump in the micro-computer market is said to have depressed demand, resulting in quotes diving almost to rock bottom.

With tastes in Western countries changing to portable rather than desktop computing, makers do not expect a resurgence of demand for D-connectors coming from Europe or North America. Even though certain high-density models are now used in notebook computers, it is thought as computers get ever smaller new types of connector will be used.

Instead, Asian countries are continually being looked upon as the D-connector industry's future savior as sales of desktop computers start to take off around the region. In fact, evidence of this has already emerged in Singapore, where suppliers experienced growth in Asia/Pacific sales in 1991 as opposed to decline in traditional North American and European markets. The shift of demand is attracting more outside makers to the region, which is expected to further intensify competition.

But it seems unlikely the market can support more players. The Korean industry has already been beaten into submission, existing makers there relegating the product to sideline status and a potential new entrant being forced to reconsider its strategy. In Hong Kong, suppliers are set to focus on other products if prices fall further, while Japanese manufacturers are showing pessimism for the D-connector's future. China's industry found some relief from plummeting prices last year as imported material costs fell, but no such luxury is expected this year.

The highly competitive atmosphere is having a beneficial effect on R&D, though, as manufacturers search for something to make their product unique. Taiwan companies, long a dominant force in the in-



Falling U.S. sales are offset by rising regional demand

dustry, are particularly aggressive at developing higher-end models to improve profit margins. More densely packed and finer-pitch contacts, EMI suppression, improved plating materials and surface mounting are common areas of research. But even though surface-mount models are being developed, there is no ready market for them because of the lack of automatic placement equipment.

TAIWAN

Taiwan's D-connector makers, faced with eroding prices, are moving into higher value-added models to increase profit margins.

New models have high-density contacts with pitches of 1mm, 1.27mm and 2mm. Also new are surface-mount D-connectors, models with EMI filters, power connectors to replace BNC connectors, and low-profile metal-shell models.

Prices have dropped by as much as 20 percent since 1990, but should not fall further in 1992 because of the rising NT dollar, according to sources.

Manufacturers are boosting capacity by automating or building plants offshore to meet demand. One supplier noted a benefit from the worldwide recession because major U.S. companies are being forced to cut production costs by purchasing low-priced D-connectors from Asia.

For this report, *Electronic Components* contacted Hon Hai Precision Industry Company Ltd, Ho Chien Enterprise Company Ltd, Advanced-Connectek Inc., Super Star Electronic Company Ltd and Ji-Haw Industrial Company Ltd.

Hon Hai Precision Ind. Co. Ltd, formed in 1982, is

the largest locally invested connector manufacturer in Taiwan. Paid-in capital doubled last year to NT\$720 million (\$27.8 million at NT\$25.9:US\$1) to fund upgrades in production equipment.

Available products include D-connectors, IC and SIMM sockets, IC cards and cable assemblies. Sales last year were about NT\$2.2 billion (\$84.94 million), with D-connectors bringing in 35 percent of revenue. Projected turnover this year is NT\$2.5 billion (\$96.53 million).

Demand for Hon Hai's D-connectors increases as computer makers cut prices, according to I/O-product marketing manager Michael Chung. "The recession is forcing U.S. PC manufacturers, such as Compaq and Apple, to lower their prices," he said. "That means they are purchasing more D-connectors from Asia to cut production costs." Hon Hai has sales offices in the United States, Singapore, Hong Kong and Korea.

Exports make up 70 percent of output, with the United States and Canada accounting for 90 percent of overseas sales. Well-known buyers include IBM, Daewoo Electronic Components, Hewlett-Packard, Apple, Compaq, Data General, Western Digital, Wyle and Zenith.

A new 14,654-square-meter plant now accompanies the maker's 2,352-square-meter factory in the Tucheng Industrial District, Taipei. Combined work force is 1,200. Cable assembly is done at a factory in Panchiao, Taipei.

Surface-mount, 1.27mm-pitch models this year

Production is 85 percent automated. "We do our tooling, mold making, stamping and plate processing for D-connectors at our new plant," said spokesman J.W. Tai. "The old building has plastic-injection and assembly facilities." Monthly output is 5 million D-connectors.

The DS series, scheduled for release this year, is made up of surface-mount D-connectors with a 1.27mm pitch. "The series will be priced at double to

COUNTRY FAST FORWARD:

Taiwan	see opposite
Japan	p260
Hong Kong	p274
China	p284
Singapore	p290
Korea	p298

■ D-CONNECTORS

Typical specifications of D-connectors from Taiwan

Company	Hon Hai	Hon Hai	Ho Chien	Ho Chien	Ho Chien
Model/series	UD	ZD	3006	3108	3007/3047
Pin count	9,25	9,25	9,15,19,23,25,37	15,26,44,62,78	9,15,25,37
Contact rows	2	2	2	3,4	2
Termination	PCB	PCB	right-angle PCB	crimp	IDT
Terminal material	—	—	gold plated over nickel	—	phosphor bronze
Contact material	copper	copper	copper	copper	phosphor bronze
Insulation material	PBT	PBT	PBT/ glass fiber	PBT/ glass fiber	PBT/ glass fiber
Shell	steel	steel	tin/zinc-plated steel	tin/zinc-plated steel	tin/zinc-plated steel
Current rating (A)	4	4	5	5	1.4
Contact resistance (mΩ)	15	15	—	—	—
Insulation resistance (GΩ)	5	5	1	1	1
Withstand voltage (KVAC)	1	1	1	1	1
Operating temperature range (°C)	-55—105	-55—105	-55—105	-55—105	-55—105

triple that of traditional D-subminiature connectors," Chung said. Also new this year is the QC series. Models have a 1.27mm pitch with 100 to 110 pins. Connec-

tors in the QC series sell for \$4 to \$7 each.

Introduced last year are the UD series (see table, this page) and ZD series (see table, this page). The UD

Your Connector Bank in Taiwan

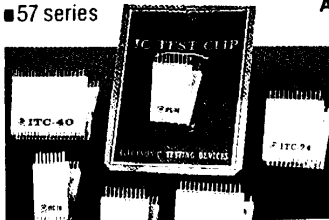
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- D-sub solder type: 9, 15, 19, 23, 25, 37, 50 (M&F)
- D-sub IDC low-profile & long-profile micro ribbon (all plastic & metal shell): M&F)
- D-sub crimping type: 9, 15, 19, 23, 25, 37, 50 (M&F)
- High density: (M&F)
- Crimping type: 15, 26, 44, 62, 78, 104
- Right angle type: 15, 26, 44, 62, 78
- Solder type: 15, 26, 44, 62, 78
- IDC sockets (10 to 64 pins)
- IDC card-edge (10 to 64 pins)
- 57 series IDC micro ribbon
- 57 series

Automatic lathe

Other Products:

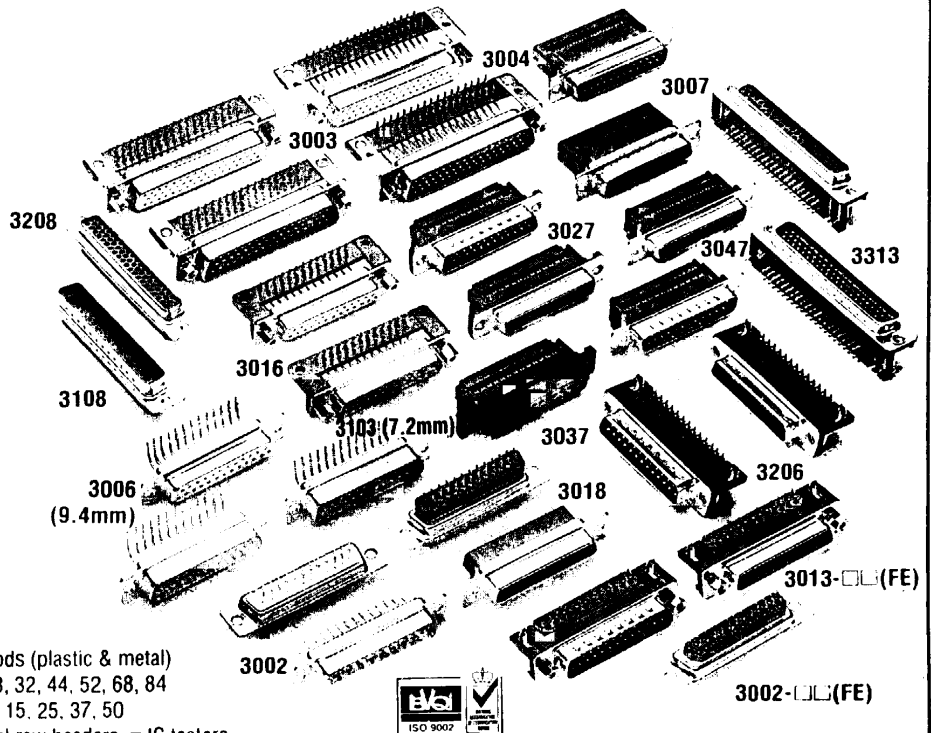
- Cable assemblies
- Molding
- Header pins (2.54mm & 2.0mm)
- DIN 41612 series
- D-Sub connector hoods (plastic & metal)
- PLCC sockets: 20, 28, 32, 44, 52, 68, 84
- Modular adaptors: 9, 15, 25, 37, 50
- SIMM sockets
- Dual raw headers
- IC testers



IC Testers S1TC-40 S1TC-28 S1TC-94

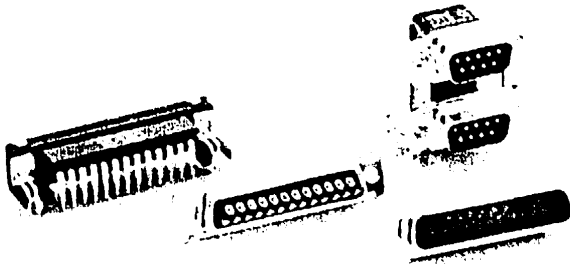
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Hon Hai D-connectors offer international-standard quality

series has an EMI filter and is designed for use in surface-mount PCB assembly. It features a special contact design to increase reliability. Models sell for \$1.50 to \$5 each.

The ZD series comprises half-pitch high-density connectors with an electrostatic discharge function. They feature a bellows contact design for reliability. Models are priced at \$10 to \$25 each.

Also available is the DV series. These high-density connectors have solder tails or right-angle posts. Applications are in notebook computers for connecting

to a monitor. Prices have dropped by 10 percent since late 1990.

Models with 9, 15, 25 and 47 pins account for 40 percent of D-connector output. Applications are in add-on cards for PCs. Quotes have fallen by 5 percent since late 1990.

Competition is not strong, according to Chung. "The quality of our D-connectors is accepted by internationally known companies, and our prices are 20 percent to 40 percent lower than those from the United States and Japan," he said. Chung predicted that 1992's prices will fall by about 5 percent despite the rising New Taiwan dollar.

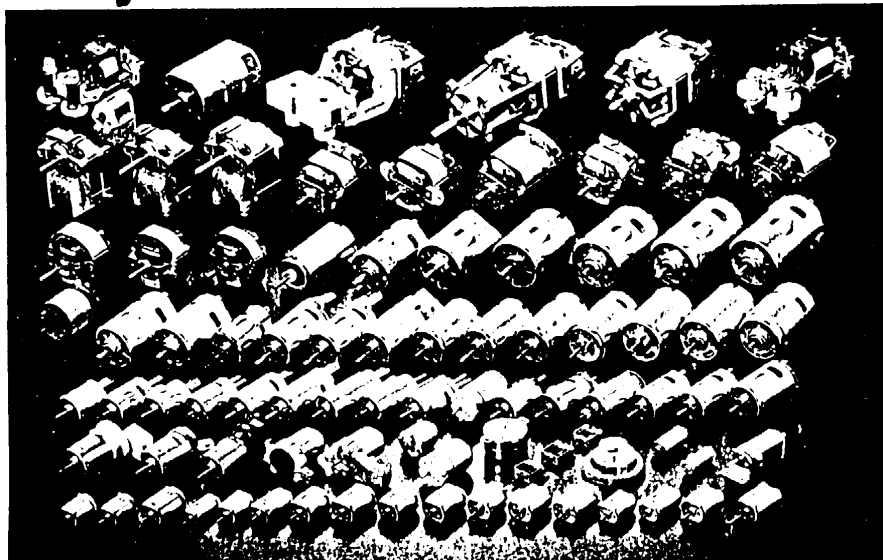
Raw materials are purchased locally. Prices have been stable for several years.

Hon Hai invests 3 percent to 10 percent of turnover into two R&D centers, one in the United States and one in Taipei. Combined staff is 100 engineers.

Incoming and final QC, carried out by a team of 50 inspectors, is to an AQL of 0.25 percent for major defects and an AQL of 1.5 percent for minor defects. All connectors are inspected during in-process QC.

No minimum order is required for standard connectors. Delivery is within 28 days of receipt of a letter of credit. →

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Ho Chien uses local UL-listed plastics for its D-connectors

Ho Chien Ent. Co. Ltd, established 1979, manufactures D-connectors and hoods, Centronics connectors and dual-row, high-density headers. Also available are header pins, miniature jumpers, terminal housings, low-profile IC sockets and center-crimp terminal housings. Paid-in capital is NT\$5 million (\$193,050).

Turnover last year was about NT\$150 million (\$5.79 million), expected to rise by 8 percent this year.

Domestic and overseas demand is up, according to

vice president C.Y. Lin. "But unit prices have dropped, so there is no significant growth in sales figures," he said. Exports, which account for 60 percent of output, are up 10 percent since 1989. Major outlets are Germany, France, Switzerland, Italy and Spain. "We expect exports to grow by 10 percent in 1992 because the quality of our D-connectors is accepted in Europe, where quality is very important," Lin said.

Focus on value-added units

Connectors are produced by 50 workers at a semiautomated 1,157-square-meter factory in Cheung Ho, Taipei. The maker uses a total QC (TQC) system.

Ho Chien is concentrating on producing custom value-added models. "We gave up manufacturing low-priced solderable D-connectors two years ago," Lin said. "Ten years ago they sold for NT\$10 (39 cents) each; now they sell for NT\$2 (8 cents)."

On offer is the 3006 series (see table, page 248) of PCB right-angle connectors, which have machined pins with gold-over-nickel plating. Models with 25 contacts are quoted at NT\$25 (97 cents) each.

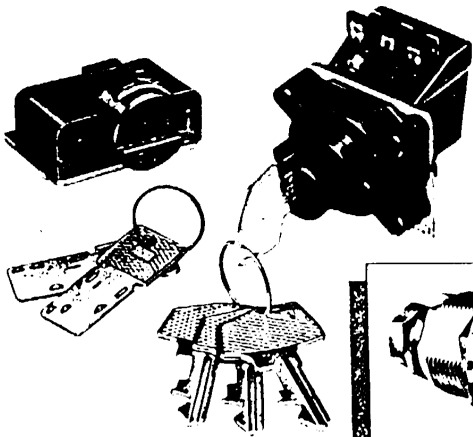
The 3108 series (see table, page 248) of male high-density commercial connectors are available with fully or selectively gold-plated pins. Models are priced

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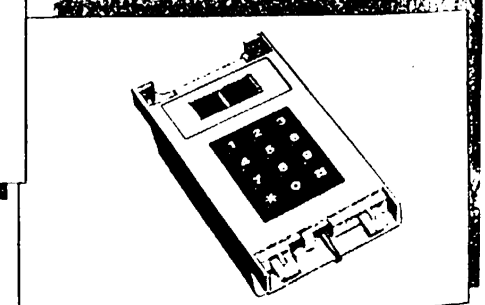
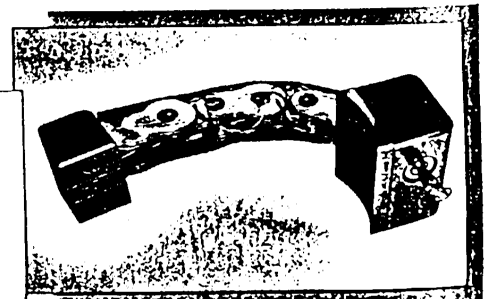
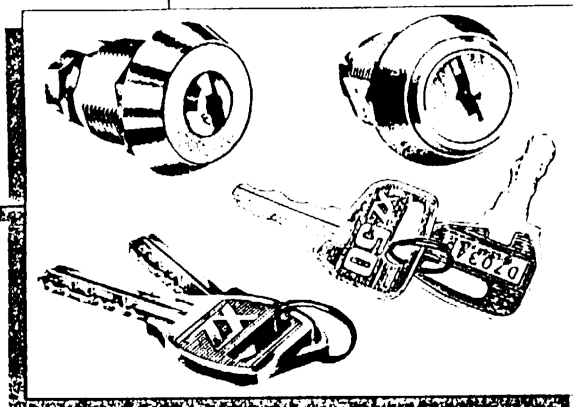
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at NT\$55 (\$2.12) each.

Also available are the 3007 and 3047 series (see table, page 248) of flat-cable connectors with 9, 15, 25 and 37 contacts. The 3007 25-pin model is priced at NT\$23 to NT\$25 (89 cents to 97 cents), while the 3047 25-pin connector costs NT\$14 to NT\$16 (54 cents to 62 cents).

Prices of older models have dropped 5 percent since 1990 but should remain unchanged this year. "The NT dollar is strong, causing our profit margins to thin," Lin said. "We can't afford another price cut."

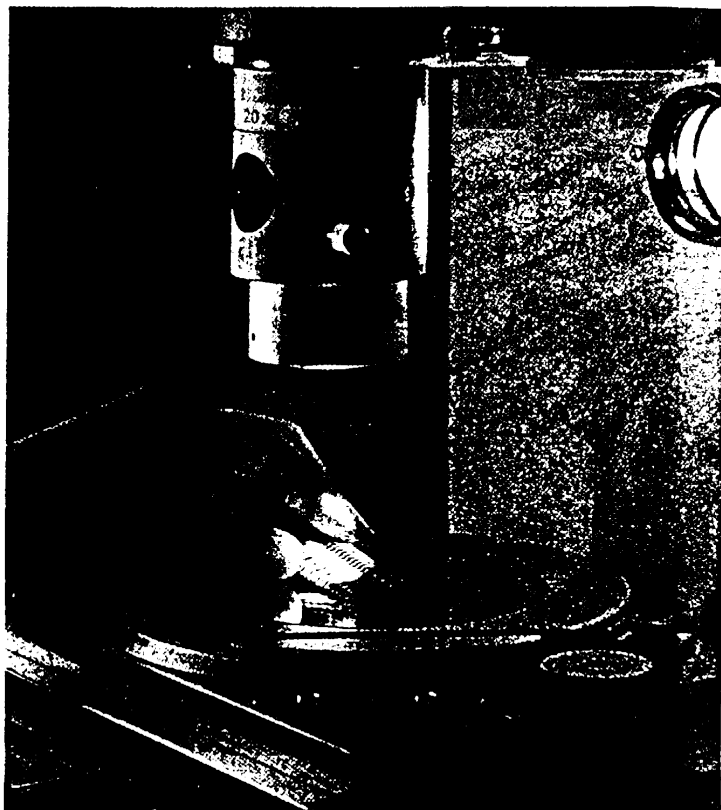
UL-listed plastics used

Competition, both domestic and overseas, is not strong, according to Lin. "Actually, prices for Taiwan-made high-end D-connectors are still 20 percent to 50 percent lower than those from the United States and Japan," he said.

Ho Chien uses UL-listed plastics. All raw materials are purchased locally, and prices have been stable for several years.

The company invests 3 percent to 5 percent of sales into R&D, which employs three engineers.

No minimum order is required. Delivery is within 14 days of receipt of a telegraphic transfer. →



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