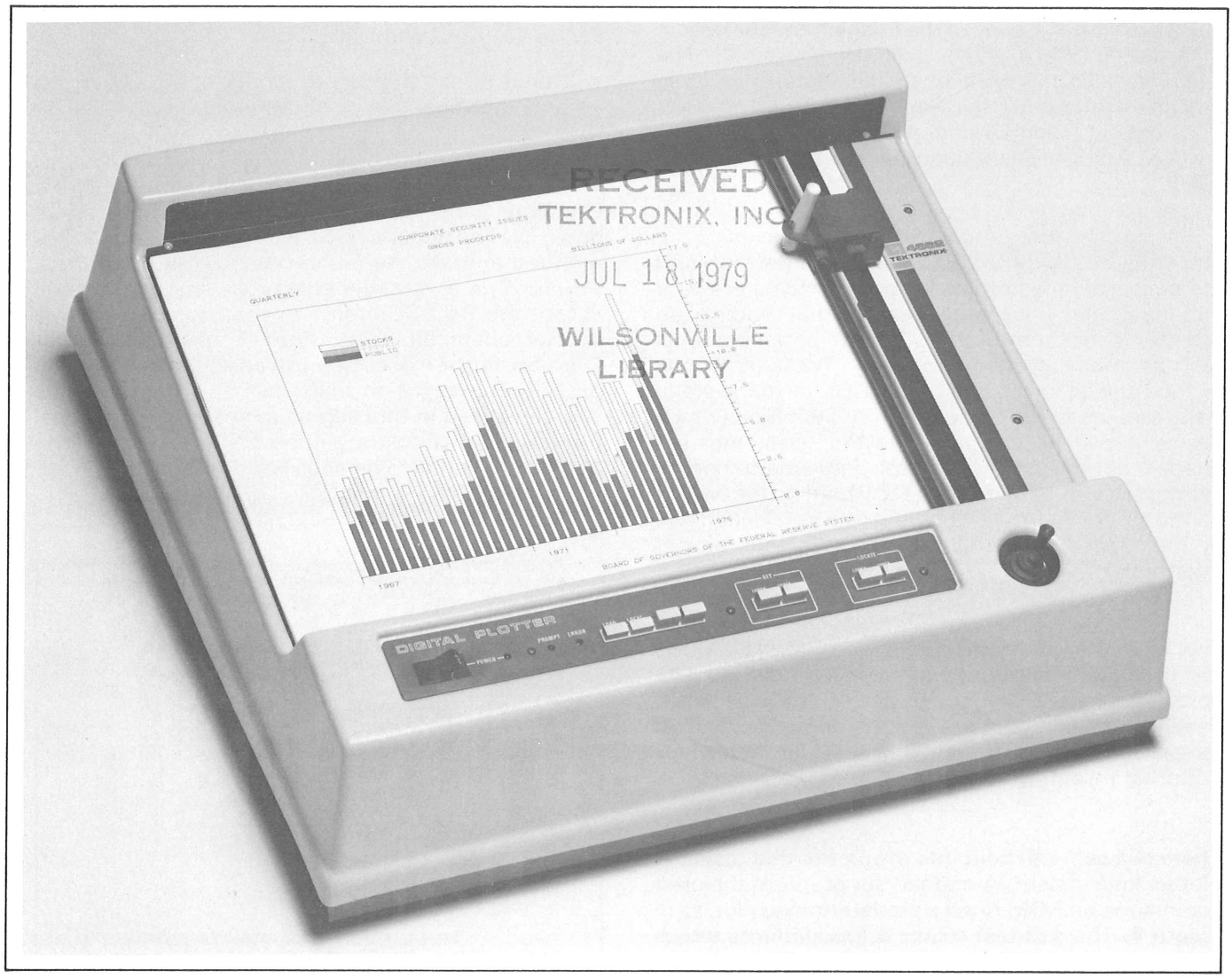
COMPANY CONFIDENTIAL

Engineering News

VOLUME 3/ NUMBER 7 JULY 1976 JOYCE LEKAS, EDITOR X6601 RHYS SCHROCK, ASSOCIATE EDITOR X6071 DS 50/462



4662 "It's A Plot"

4662 DIGITAL PLOTTER

The 4662 Digital Plotter is a new microprocessor based (intelligent) product from IDG in Wilsonville. Two different interfaces available as standard equipment permit the 4662 to be used as a peripheral for the entire 401X Terminal line, the 4051, and the 4081, as well as products from Hazeltine, Hewlett-Packard, IBM and most computer and data communication equipment manufacturers.

Basically, the 4662 draws lines on paper with a pen electro-mechanically controlled on both X and Y axes. The function is similar to an Etch-A-sketch.

The plotting surface is 10 x 15 inches which permits approximately 1:1 copy of the image from our largest CRT device (4014/4015 Graphics Terminal). The page may also be scaled for smaller plots, or multiple graphs on the same page. Paper is held with an 880V Electrostatic holdown pattern built into the writing surface. Any size paper up to "B" size (11 x 17) can be used.

The 4662 has both RS232C and GPIB interfaces. All the necessary electronics for both systems are built into the Plotter. Four rotary hexadecimal switches on the rear panel control the interface parameters, as well as many system functions. These functions include the plotter's device address in the system, Baud rate up to 1200 Baud, format definition (which device it will be compatible with), terminator sequence definition (the limiter), implementation of carriage return, scaling so the terminal picture will fit on the plotter paper, and plotting speed selection (full or half speed). Each switch encodes four bits of information.

The heart of the electronics is a Motorola M6800 microprocessor system. M6800s are used for I/O ports. There are 2 Kbytes of buffer. 400-500 bytes are used for systems "scratch", i.e. a scratch pad to hold temporary results. The rest of the buffer is used for buffering incoming and outgoing data.

There is a self-test built into the plotter that tests the plotter mechanism. A canned set of internal plotter commands on ROM draw a predetermined plot, as in Figure 1. The self-test draws a few patterns which may be examined to pinpoint errors in the mechanisms. The words show character quality. After the sequence the operator can move the pen to any point on the paper with the joystick. The program

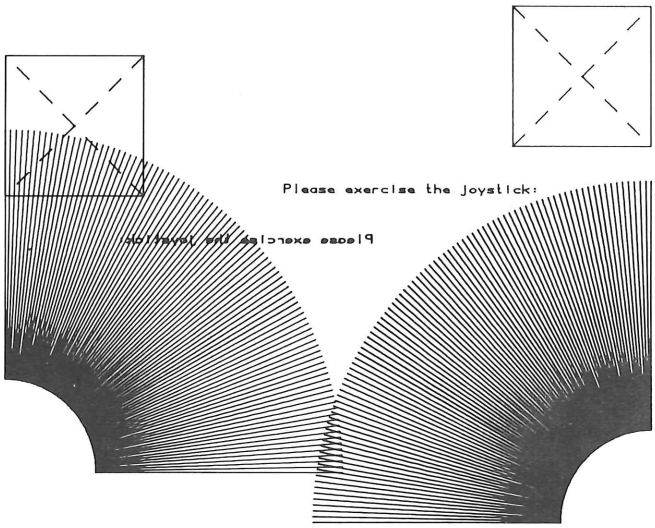


Figure 1. The test plot is internally stored on ROM. The pattern is designed to point out any mechanism errors. Note the "mirror image." This is done by choosing page scaling coordinates on opposite corners of the plotting area.

will then return the pen to its starting point which verifies the repeatability of the plotter.

The 4662 Plotter has internal alpha-numeric character generation. The host device sends ASCII down the line and the 4662 will figure out the strokes required to make the letters. As shown by Figure 2, the 4662 is a versatile character generator. It will accept the 94 ASCII printing characters as well as special character fonts. Font 2 has umlauts for German, font 4 makes Spanish possible, font 7 for top security messages in invisible ink, etc. Characters can be rotated in one degree increments for vertical printing or even follow a curved line. The size of the characters can also be specified to any scale.

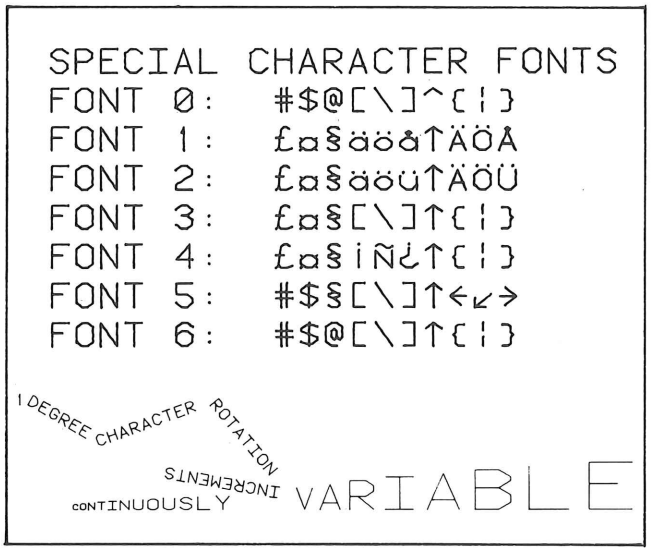


Figure 2. These characters were generated by the 4662 and illustrate some of the versatility of the internal electronics.

Movement of the pen is controlled in 3 axes. The X axis motion is provided by a stepping motor/pully/cable system connected to the carriage. Y axis motion to the pen carrier which rides on the X axis carriage is again provided by a stepping motor/pulley/cable system. Z axis (pen up/down) is provided by a rotary solenoid coupled through a cam/slider assembly.

The dynamics of the plotter mechanism were of paramount importance to achieve reasonable line quality vs. speed tradeoffs. Because the X axis carries the combined mass of the carriage and pen carrier, it is impossible to match inertias. Consequently the drive cables for the X and Y axes are different sizes in an attempt to match time delay for a step function. Furthermore the load imposed on the Y axis motor was increased by the addition of a higher mass pulley to match the load imposed on the X axis motor.

The drive electronics for the Plotter take into account practical limitations of the mechanism and motors by providing controlled acceleration and deceleration. Line aberrations are kept to a minimum by breaking down the addressable .005 inch resolution (which corresponds to one-half step (0.9°) of the motor) by a factor of eight.

This produces a motor resolution of 625 millionths of an inch. Dividing the movements into so many parts results in a very smooth line. For instance, if you wanted to plot a shallow vector, .005 inch resolution would produce visible staircasing, as in Figure 3a. Figure 3b shows the same vector at 8X resolution. The staircasing still exists, but it is not visible to the naked eye. Addressable resolution is still .005, but the steps are integrated to produce a smooth line.

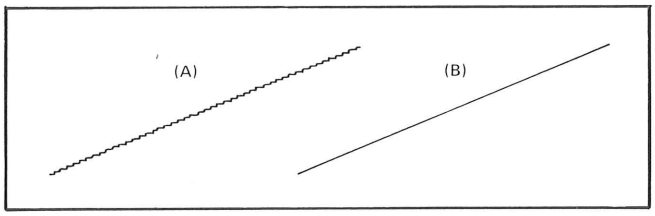


Figure 3. Line (A) shows exaggerated "staircasing." Line (B) would be the same line at 8x resolution.

Linearity of a vector line is insured by the same circuit which controls the accelerate/decelerate profile. Pre-processed information from the microprocessor scales the drive ratios of the X and Y axes to conform to the vector to be drawn. The microprocessor receives a coordinate point through one of the interfaces or from the front panel, subtracts the current pen position to extract ΔX and ΔY. The two deltas are compared and the larger axis receives the output of a programmable rate generator. The small axis rate is multiplied by the scaling factor $\frac{\Delta S}{\Delta L}$. Relative velocities are depicted in Figure 4.

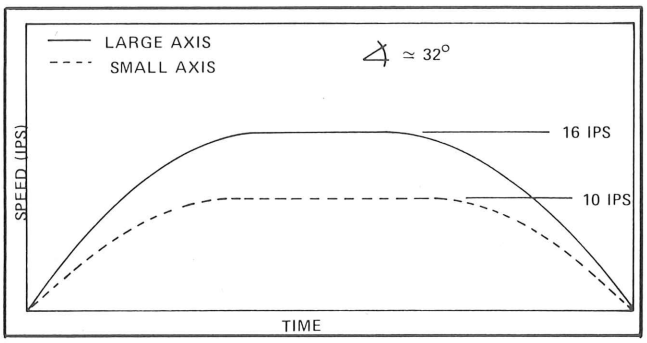


Figure 4. The relative axis speeds and acceleration and deceleration compensation for a line 32° off horizontal are represented here.

In sum, the significant features of the 4662 Digital Plotter are:

1. Multiple resident interfaces-IEC and RS232C.
2. Data buffering.
3. Resident character generation which is scalable and can be rotated in <1° increments.
4. Page scaling (allows for tolerances of pre-printed media) may also be used for "mirror image".
5. Digitizing; a joystick and cursor are provided to allow existing graphs to be digitized.
6. Superior line quality.
7. Self test routine on ROM.
8. Electro static paper holddown.
9. .005 inch resolution.
10. ±.0025 repeatability.

SHORT COURSES

George Washington University in Washington, D.C. is offering some short courses this September and October. They are: "Modern Data Communications", "Broadcasting Satellites", "Electromagnetic Wave Propagation for Communication Systems Design", and "Fiber and Integrated Optics". The complete notices are available in the Technical Information Office, 50-462.

IN-HOUSE INSTRUMENTATION

Instrument Control is becoming a big thing at Tek — maybe even bigger than one would expect. During FY600 instrument Control received and processed Capital Commitment Authorizations (CCAs, formerly RFEs) in excess of $2.4 million. With that kind of volume you'd expect to learn something, and they did. Probably the most exciting thing they learned was that 37% of the total catalog dollar value of these CCAs had been redeployed. In other words, almost $900,000 came from used and prototype instruments, relieving the damand on Manufacturing and assuring that existing assets are fully utilized.

Another point worth noting is the apparent need to standardize and perhaps streamline the CCA flow process. Here are some helpful hints for preparing and handling your CCAs for Electronic Test and Measurement Equipment, or Information Processing Equipment.

1. Do not bury the model number, manufacturer or quantity ordered amid a bunch of verbiage. List them clearly in open form with current price (Product Availability List for Tek products). If you are ordering accessories give the Tek Part Number, not the common name. Identify interface boards, current probes, cables, etc. by Part Number.

2. List Tek manufactured instruments on separate CCAs from those manufactured by other companies. The reason is quite simple—it will speed things up for you and make less work for several other people. Purchased instruments are processed by Purchasing Services and follow a different accounting flow than those which are manufactured by Tek. Instrument Control processes all internal orders. (See Agenda #63, May 28, 1976.)

3. If your list of test and Measurement Equipment (TME) is greater than the space available on the CCA, list the rest on a separate sheet of paper and attach it to the back of the CCA. Note the attachment on the face of the CCA.

4. Include the Delivery Station i.e., where the equipment should be shipped or where it will be used, and to whom it should be registered.

5. Include your phone number, just in case additional information is needed.

6. After the required **DEPARTMENTAL** signatures have been obtained, send all 5 copies to Instrument Control 58-188, for screening and further routing.

Instrument Control will log the CCA, initiate the screening process, and forward the CCA to the Budget Review Committee the same day. The advantage to you as a requestor to send your CCA directly to Instrument Control as soon as it has received all necessary Departmental approval is that the sooner it is received, the more thorough screening job can be done.

Which brings up a point:
When **any** TME or Information processing equipment becomes surplus to **your** needs don't give it away or save it for a trade. Someone may be waiting with a valid, approved need for it. All surplus instrumentation turned into Instrument Control is cataloged, stored, and available for redeployment. But without the necessary help within the Tek community the only source to draw from becomes finished goods—directly competing with our customers and ourselves.

Ray Barrett
Instrument Control
58-188

MAPPING UP

A map of the Wilsonville site with proposed names for streets and locations appeared on page 31 of the June 7 issue of ELECTRONIC DESIGN. Bruce Baur, Larry Biggs, Tom Cheek, Dan Denham, Joe Hubert, Dick Preiss, Scott Richmond, Harvey Rosener, Larry Shorthill and Jack Sterett are given credit for the cartographic efforts.

Immersion Tin Production Started

Because of low cost and good electrical conductivity, copper is the most acceptable conductive material for circuit boards. Since copper corrodes under normal atmospheric conditions, a coating is necessary both to assure solderability after several months on the shelf and to protect the board in the instrument. Acceptable coatings include solder, pine rosin, electro-plated tin or gold, and immersion tin. Electro-plated tin has generally been used at Tektronix. Immersion Tin (IT) was recently selected as an alternative, with significant dollar savings.

To electo-plate tin, each circuit board flat is loaded into a separate rack and the racks are suspended approximately twelve inches apart in the plating tank. The tank also contains tin bars which dissolve when direct current is applied. The tin, now in solution, is drawn to the circuit board flat and adheres to exposed metal surfaces. Since electro-plating is somewhat porous, a 200 μ-inch coating is required to ensure complete coverage.

The Immersion Tin process deposits a coating of tin on circuit board conductive runs, but unlike electro-plating, requires no electric current, and is limited to 40-50 μ-inches thick. It is applied in an aqueous bath which contains dissolved tin salts and other chemicals. Since it covers all exposed metal surfaces equally, a 40-50 μ-inch thick coating is adequate.

The signficant cost advantage of Immersion Tin is that boards can be racked one-half inch apart for processing. This saves a lot of time. Electro-plating and immersion tin both require about fifteen minutes in the tank, but approximately 20 times as many immersion tin boards can be run in the same amount of space, and in the same time.

Immersion tin also requires only about one-sixth the amount of tin as electro-plating, although this does not represent a substantial saving in dollars.

Environmentally, the immersion tin process is cleaner than bright tin electo-plating. Bright tin is done with an under-layer of nickel. Nickel produces undesireable effluents, which the new process eliminates.

Electo-chem began developing immersion tin for Tek about three years ago on a "beaker" scale with small parts. The process has been used by other companies, most notably IBM which has over eight years of processing history. These off-site users were studied and their experiences applied toward our efforts. About one year ago an extensive report was compiled by Electo-chem Engineering documenting their progress to that point, and including the knowledge they had acquired from outside users.

Immersion Tin Today

Circuit boards produced by immersion tin have proven satisfactory as replacements for electro-plated circuit boards. Solderability has been tested after varying periods of shelf life. Single-sided boards soldered well after more than a year in normal storage. A production line has been installed and used to produce some single-sided boards for the T-900.

Two-sided boards initially showed some problems with through-hole soldering last year, but these problems have been overcome and solderability has been acceptable on boards after over six month shelf storage. The present production line has capability and capacity for both single-sided and two-sided boards.

For more information, contact Jerry Jacky, ext. 7830.

IDG TECHNICAL REPORT

Ned Thanhouser, IDS Engineering authored an IDG Technical Report which was presented at SIGGRAPH in Philadelphia in July entitled, "Intermixing Refresh and Direct View Storage Graphics." Ned describes an advanced technique in both hardware and software for an intermixed display of storage and refresh →

graphics. Direct View Storage Tubes store images directly on the CRT faceplate, eliminating the need for image regeneration. By adding a fast constant rate vector generator and high speed deflection system it becomes possible to display flicker-free refreshed images at the same time as stored images. Once the hardware is complete, it becomes necessary to provide integrated software and system support. In the system described, "refresh" and "storage" images can be constructed with the same commands. This paper describes the hardware, software, support, and operating techniques in detail.

Copies of this report are available from the Tek Library, 50-210. Also available are IDG Technical Reports "76-1, Graphics in a Language Directed Machine" by S.C Baunach and "76-2, Memory Technology I (Company Confidential)" by J.D. Grimes.

New Hybrid Connector System

Hybrid circuitry reduces the number of discrete components on a circuit board. This reduces the number and length of component leads, thereby reducing unwanted parasitic reactances. A problem arises, however, in connecting hybrid devices to other circuitry. Often pins are connected to a hybrid, and the long connections can introduce parasitic reactances.

Hybrid Circuits Engineering has created a hybrid-Printed-circuit-connector (HYPCON) system that reduces interconnection lengths to a minimum and thus parasitic reactances are minimized. The connection system also eliminates soldered leads, provides thermal dissipation, has very low contact resistance, can provide high density connections, and is relatively easy to produce and assemble.

The basic elements of the HYPCON system are shown in Fig. 1. The primary elements are the elastomer with contacts and a plastic frame that provides registration and mounting features. The elastomer provides resiliency, as well as contact force when it is captured between the plastic frame and the PC board. The hybrid is positioned on the PC board by registration pins in the plastic frame which also align the conductors on the hybrid and the PC board. The HYPCON connector provides an electrical "bridge" with contact resistance less than 20-miliohms.

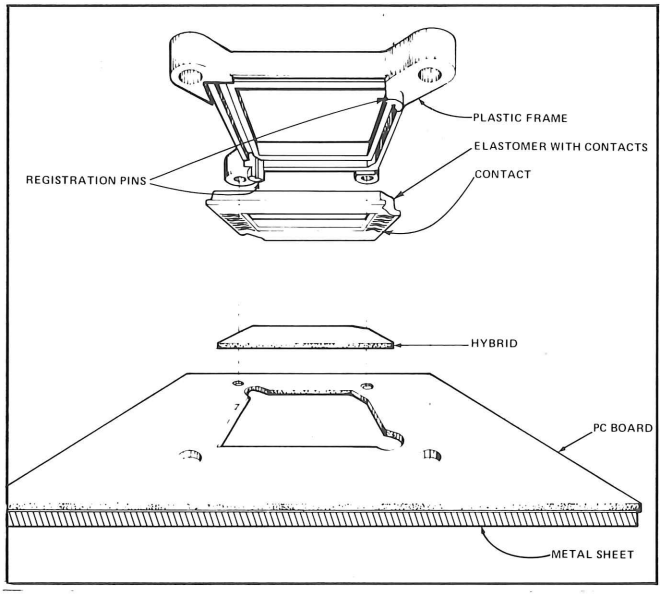


Figure 1. Exploded view of HYPCON connector system in the flat configuration.

HYPCON contacts are made using a technique similar to the photographic fabrication of PC boards. First, beryllium copper is pattern plated with gold over nickel to the desired contact shape. Next the elastomer is transfer-molded to the contacts to the desired topology. Finally, the unwanted metal is etched away (the gold plating on the contact shape acts as the resist).

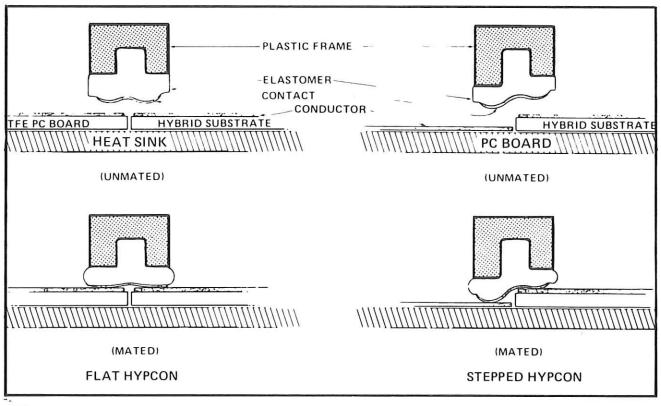


Figure 2. This cross section of the HYPCON system shows the mating action of both the flat and stepped configurations.

HYPCON has evolved in two basic shapes (see Fig. 2): 1) a **flat configuration** for hybrids that require heat dissipation, such as those with high power densities. In this case, the hybrid fits in a square hole in the PC board. Both hybrid and PC board must be the same thickness. Heat is removed by conduction to a metal plate or heat sink on the side of the PC board opposite →

the HYPCON. 2) the **stepped configuration** is for low power density hybrids. The hybrid sets on the PC board, and the HYPCON must have a stepped shape to match the contour from the hybrid to PC board.

The advantages of the HYPCON system include:

1. Excellent electrical performance.
2. Contact wiping action is made as the plastic frame is screwed down.
3. Gold mating surfaces ensure low contact resistance, and discourage corrosion.
4. Thermal expansion will not break electrical contact.
5. Equal pressure along the substrate edge provide good ground and thermal contact.
6. Good thermal dissipation.
7. The flexible elastomer acts as a shock mount during severe vibration.
8. High contact density is possible (.075 center-to-center).
9. Test and intergration of systems of hybrids is very easy.
10. No leads to bend or solder.
11. Field replacement of hybrids is easy.
12. Elastromer is inert to acid and most electronic chemicals (except aromatic hybrocarbon solvents like toluene and xylene).
13. The plastic frame and elastomer dies can be used for any contact configuration. All that is needed is new contact artwork.

Copies of a paper entitled "HYPCON Connector System" which was presented at the 26th Annual Electronic Components Conference in San Francisco this past April are available for anyone who would like more information. The paper includes some thermal, electrical and environmental performance characteristics. For a copy of this paper or any other details on the HYPCON system contact Bill Berg, ext. 6124.

"TAZZARD"

Had a couple of random thoughts about the currently common expression "potential hazard." Potential, in this sense, means of course much the same as "possible." So we're reading a lot about possible hazards.

As we in Product Safety know, a hazard is "the possibility of harm." So a potential hazard becomes a **possible possibility of harm.** Redundancy seems to be a big thing these days.

It seems that many folk have a hard time talking about a simple "hazard." Such a mention seems to arouse feelings that we're getting too close to the nitty gritty—one step from **hazard** and you have actual **harm** or **injury.** And that could hurt.

The neat way out seems to be to put a slice of insulation between ourselves and the hazard. So we say "potential hazard." Then, if the interface between "hazard" and "injury" breaks down, we still have the insulating word "potential" between us and the hurt.

This sweet-talking about "potential hazards" has become so common that perhaps it's here to stay. Possibly in time it will become one word, as we often write "screwdriver" or "wheelbarrow." So we might get "potentialhazard."

But the electronics expert's penchant for jargon makes one wonder if "potentialhazard" won't get shortened to "pothazard." The next step, of course, would be "p't-hazard." And often the "p" is silent—as in "pneumonia" or "swimming." So we finish with something like "tazzard."

Now "tazzard" isn't far from the **hazard** that made us fear hurt. The only insulation is now "t". And I suspect that "t"—like the "p" above—is a fairly conductive fluid. So we have to put more nonconducting mass between us and the tazzard, keeping us away from the hurt.

Looks as if we'll come out with "potential tazzard." Then we can start all over again.

Scientific Computer Center

BRAILLE OUTPUT FROM CYBER

Charlie Montgomery, who recently joined the Scientific Computer Center staff, brought with him from Berkeley Laboratories an adapter system which allows the SCC line printer to print Braille characters. It consists of an elastic band which is attached to the line printer and a program that Charlie wrote.

The elastic band is positioned inside the line printer between the character elements and the striking hammers. The Braille characters are formed from periods, and the elastic band provides a soft backing which allows the period to actually poke holes in the paper. These holes form raised dots on the back of the paper.

The program Charlie wrote translates regular characters into Braille characters, and since the reading is done on the back of the paper, it reverses the character order.

Bob Jaquiss, also new to the SCC said that the Braille characters are easily read, but they only last a short time. The SCC is awaiting delivery on an interactive Braille Printing Terminal which prints on heavier stock for a permanent image and has a keyboard and other options for Braille input and output.

Monthly MUG Meeting

The Microprocessor Users Group monthly meeting was held on June 30 in the Technical Center (Bldg. 50) Council Room. Approximately 40 people attended. Topics of discussion included:

Test for TESLA—Volunteers were solicited to use TESLA, and new high-level microprocessor programming language, on an informal level. These preliminary users will aid in debugging the program and hopefully provide inputs to the Scientific Computer Center (SCC), which is developing TESLA (**TE**ktronix **S**ymbolic **La**nguage).

Zilog Z-80/RCA 1802 Software Support—The Microprocessor Support Group (part of the SCC) is planning hardware/software support for Zilog Z-80 and RCA 1802 (both are 8-bit microprocessors).

Software Library—There are plans in the Microprocessor Group to start a microprocessor software library. User generated microprocessor programs as well as those written by the SCC will be included in this library.

High-Level Language Efficiency—Also discussed was the efficiency of high-level languages in general. It was concluded that high-level languages have historically been somewhat inefficient in volume of code generated and execution speed, althought the philosophy under which TESLA is being written minimizes problems of code efficiency which characterize most high-level languages, while allowing their advantages of programmer and maintenance efficiency.

NOTE: The last sentence of the above paragraph was analyzed by STAR, an English language reading difficulty program. STAR gave the test sentence a grade level equivalent of 22.3, with a Flesch Index of −12.1, and a Dale Index of 12.18. To run STAR, just type STAR on the Kronos system. STAR requires a permanent file for your text input.

WALL CHART RELEASE

FFT Wall Chart Printed—Bob Ramirez
It's really here this time! The FFT wall chart has been printed, and there are a few copies available for internal distribution.

The wall chart is actually two charts, with reference material on classical Fourier analysis printed on one side and material on the fast Fourier transform (FFT) printed on the other side. If you are interested in →

either of these subjects, you might like to request one of the wall charts for your working area. But make sure you can really use it first. The wall chart is large—34 inches by 44 inches—and you'll need an open wall to put it on. Also, it has only been printed in a limited quantity for distribution to selected customers and educational institutions so there are not enough charts to make this a general "give-away" item.

If you'd like to take a look at the wall chart, there is a sample one hanging in the SPS Manuals area (58-157). If after seeing the sample you decide you can use the wall chart and you have a place to hang it, contact Erin Lambert in Advertising. She'll see that you get a wall chart for your area.

TECHNICAL STANDARDS

PROPOSED CAM SWITCH STANDARD IN FINAL STAGES

A standard for cylindrical cam switches is being submitted for final approval and will be issued soon. This standard is presently issued as 062-2319-00, Switch Standards, Cylindrical Cam Switch and can be obtained from Reprographics.

FIRE PROTECTION REPORTS

Technical Committee Reports of the National Fire Protections Association (NFPA), 1976 are available for perusal in the Technical Standards area, 58-187. These reports will be presented at the committee meeting in Cincinnati in November, 1976. Of particular interest is a section on installation of Electronic Computer Systems, which will be a revision of ANSI C128. 1-1974. Many other fire-protection standards are included in this report.

KNURLS

Please note: work is under way on a knurling standard. If you have any input you can make to this standard, call Audrey Brown, X7451.

"K" SECTION OF STANDARDS REVISED

A revision of the "K" section of alpha-series standards is being distributed to all holders of Vol. 1, Tektronix Standards.

NEW STANDARD ISSUED:

The American Society for Testing and Materials and the Institute of Electrical and Electronic Engineers have coordinated their activities to combine ASTM Standard E380, Metric Practice Guide, and IEEE Std 268, Recommended Practice for Units in Published Scientific and Technical Work, into a dual-identification standard, ASTM E380-75/IEEE STD 268-76, Standard Metric Practice. The standard is closely coordinated with the International System of Units (SI). Price is $4.00 and can be ordered through Technical Standards, 7976.

METER/METRE

We doubt if this spelling hang-up will ever be amicably resolved, but the Federal Highway Administration has notified all State highway organizations that METRE will be the official spelling for all FHWA issuances.

PART-NUMBERED STANDARDS

The following new part-numbered standards are available from Reprographics X5577 or 58-038.

062-1874-00	Drafting Standard, Line Conventions and Lettering
062-2801-00	Occupational Safety Standard (Special), Distribution Procedure
062-1801-01	Occupational Safety Standard (Special), Warning Alarms

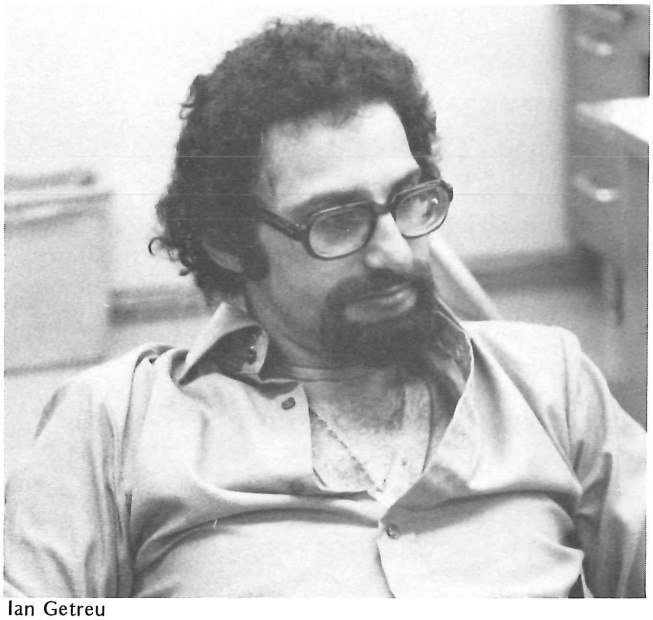
IN PRINT

ARTICLE APPROVAL

Remember, all articles and papers for presentation must be cleared with the Patents and Licensing Department. The Technical Information Office does this routinely for you. Bring your articles and ideas to 50-462 and we'll help you with every phase of preparation, including typing, editing, graphics, communication with trade magazines, and clearing through the Patents and Licensing Department. Call Joyce, ext. 6601.

MODELING THE BIPOLAR TRANSISTOR

Ian Getreu's book **Modeling the Bipolar Transistor** is now available. It is an expanded version of the 1973 Tek Labs "Appendix A: Modeling the Bipolar Junction Transistor" that many of you have seen. There are two major sections in this book, 1) a theoretical explanation of the device parameters in terms of the physics of the devices; and 2) the determination of these parameters.



Ian Getreu

The book is oriented towards three computer programs: SLIC, SINC, and SPICE, although the parameters described can be adapted to other programs. A cross reference for the parameters required by SLIC, SINC, and SPICE is included in the last Appendix (6).

The section on Parameter Measurements has the parameters labelled at the top of each page for easy reference. One or more pages are devoted to each parameter with a definition, typical value, and at least one measurement scheme.

To obtain a copy of this book, contact Ian Getreu, ext. 6318, Ken Lindsay, ext. 7952, or Technical Information, ext. 5674.

TELEVISION MEASUREMENTS

Stu Rasmussen, TV Product Marketing, authored two articles on television measurements which appeared in two issues of VIDEO SYSTEMS magazine. The first article was in the January/February issue and is entitled "Dollars and Sense: Considerations for Test Equipment." Stu explains that as a television system becomes more complex, it becomes less practical to make eyeball adjustments, thus making signal monitoring and test equipment desirable. He describes three pieces of equipment for this application and their basic features and functions: (1) a type 523 Waveform Monitor for operational adjustments to a system, (2) a full function waveform monitor (1485C) which has extra measurement capability, and (3) a 1420NTSC Vectorscope for examining color signals.

"Correct Video Levels: The Key to Good Pictures" in the March/April issue describes how to adjust video levels in a television video system with the help of a waveform monitor.

TECHNICAL PAPERS

Four Tektronix engineers presented papers at the **1976 Society for Information Display** (SID) International Symposium in Beverly Hills, California on May 4-6. The SID Journal containing these papers is available in the library.

Thomas Bentley, Service Instruments Division (SID), co-authored a paper with Gary W. Meyer of Bell Laboratories entitled "Design and Evaluation of a Text Editing Console." It describes work Tom and Gary did at Palo Alto Research Center (PARC) for their graduate thesis. They designed a keyboard, pointing device and CRT display to replace typewriters in office systems.

Michael L. Rieger, IDP Engineering, authored "A Monolithic Constant-Velocity Vector Generator." He describes

the design considerations for a non-linear analog filter that provides constant velocity vector generation on a monolithic integrated circuit.

Harvey Golladay, IDP Engineering, and **Biony Rosario**, Monolithic Circuits Engineering, coauthored a paper entitled "A Monolithic IC for Pincushion Distortion and Defocus Correction in CRTs." They describe the design of an integrated circuit which corrects the distortion and defocusing in CRTs by pre-distorting input signals before they are applied to the deflection amplifiers. (See Engineering News, March 1976 issue, page 11.)

Call For Papers

The 1977 IEEE Symposium on Circuits and Systems will be held in Phoenix, Arizona April 25-27, 1977.

SPONSOR: IEEE Circuits and Systems Society.

TOPICS: The symposium is devoted to all aspects of theory, design, and application of circuits and systems. Areas of interest include but are not limited to:
- New concepts in circuits and systems design
- Large scale circuits and systems
- Digital and Analog solid state circuits
- ICs
- Passive and Active filters
- Distributed and Microwave networks
- Nonlinear and time-varying circuits & systems
- Graph theory
- Digital Signal processing
- Computer-aided analysis, design, layout, testing and manufacturing
- New devices and circuits

PAPERS: Submit four copies of each paper (20-minute presentation) by October 1, 1976 to:
T. N. Trick
Dept. of EE
University of Illinois
Urbana, IL 61801

OTHER: The format of papers is described on the back cover of any IEEE Transactions on Circuits and Systems.

The 1977 Winter Meeting of the IEEE Power Engineering Society will be held January 30-February 4, 1977 at the Statler Hilton Hotel in New York City.

SPONSOR: IEEE Power Engineering Society.

TOPICS: The meeting is a general meeting and covers the entire field of Power and its many areas of technical interest. Authors who have important information to contribute are invited to submit papers for presentation and discussion at the meeting.

ABSTRACTS: Prospective authors should immediately request an author's kit from the Technical Conference Service Office at IEEE headquarters. The authors kit discusses a number of mandatory requirements regarding the preparation of manuscripts. September 1, 1976 is the deadline for receipt of the original manuscript.

OTHER: For information concerning papers, exhibits or attendance, contact:
Technical Conference Services Office
IEEE Headquarters
345 East 47th Street
New York, N.Y. 10017

The Second Annual Control of Power Systems Conference and Exposition will be held March 14-16, 1977 at Texas A & M University in College Station, Texas.

SPONSOR: Houston Section of Region 5 of IEEE and Texas A & M University.

TOPICS: Technical papers are solicited in the general area of power systems control including:
- Control of generation and interconnected systems
- Control and automation of transmission and distribution systems
- Control and management of utilization devices and systems.

ABSTRACTS: The title and a 200-500 word abstract are due by September 1, 1976. Mail abstracts to:
Dr. B. Don Russell,
Technical Program Chairman
Texas A & M University
Electrical Engineering Dept.
College Station, Texas 77843
Phone: (713) 845-1423

The 1977 Microcomputer-77 Conference and Exposition will be held April 6-8, 1977 at the Lincoln Plaza Forum in Oklahoma City.

SPONSOR: Region 5 and Oklahoma City Section of IEEE.

TOPICS: Areas of interest include the following aspects of Microcomputer Systems:
- Current applications
- Future development
- Data acquisition

Control
Communications
Instrumentation
Theory
Implementation

ABSTRACTS: The deadline for abstracts is October 1, 1976.

OTHER: For information concerning papers, exhibits or attendance, contact:
Dr. S. C. Lee
School of Electrical Engineering
University of Oklahoma
Norman, Oklahoma 73069

The 1976 IEEE International Electron Devices Meeting will be held December 6-8, 1976 at the Washington Hilton Hotel in Washington, D.C.

SPONSOR: IEEE Electron Devices Group.

TOPICS: Specific areas to be covered include:
Solid State Devices
Device Technology
Electron Tubes
Energy Conversion Devices & Quantum Electronics
Image Transducers and Optoelectronic Devices
Integrated Electronics

ABSTRACTS: A 200 word abstract which defines a planned 20-minute paper is due by August 9, 1976. Abstracts should be typed, double-spaced, on one side of the paper only, and must include the title, author's name, phone number, address, company affiliation and city and state of company. The abstract should state (a) purpose of the work, (b) how much it advances the art, and (c) specific results.

OTHER: Submit an original and fifteen copies of all material to:
Dr. Josef Berger
1976 IEDM Technical Program Chairman
Hewlett-Packard Company
1501 Page Mill Road, Building 1U
Palo Alto, California 94304

The World Electrotechnical Congress will be held June 21-25, 1977 in Moscow, U.S.S.R.

SPONSOR: Ministry for Electrical Engineering Industries of the U.S.S.R. and the U.S.S.R. Academy of Sciences.

TOPICS: The program will emphasize current and developing challenges in the development of electrotechnology and electronics. Such topics include:
Construction of electrical equipment for thermonuclear plants
Utilization of superconductivity for generators & transmission lines
Application of new methods of energy conversion
Application of electronics in various branches of science and technology

SUMMARIES: The titles of papers, names of authors, author's affiliations and summaries of the papers should be received by the Congress Organizing by September 1, 1976:
Organizing Committee
World Electrotechnical Congress
Kalinin Prospect, 19
Moscow G-19, U.S.S.R.

OTHER: A complete 25-page Announcement and Provisional Summary with complete instructions for paper preparation is available for perusal in the Technical Information Office, del. sta. 50-462.

SOLDER WICK REPLACEMENT

After several years and many attempts to find a substitute for Solder Wick, IDP Manufacturing has found a practical solution in a Tek-made, braided, tinned, copper wire. The wire is dipped in flux as it is used, and is considered as effective as, if not superior to, the purchased Solder Wick in their application.

Edna Hobbs, IDP Engineering, did a cost analysis of replacing Solder Wick with the Tek-made wire in her circuit board area. They can reduce costs in their area from $2,496 a year to $312 a year.

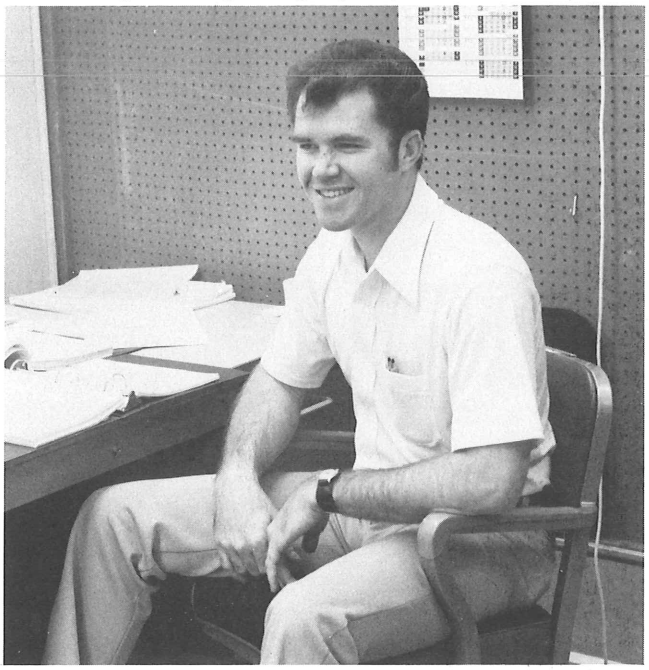
There is one small addition to the procedure with the replacement wire. With Solder Wick, the Wick is positioned on an excess solder area, heat is applied, and the excess solder is drawn off. The replacement wire must first be dipped in flux, then positioned on the excess solder.

PORTUGUESE TRANSLATOR NEEDED

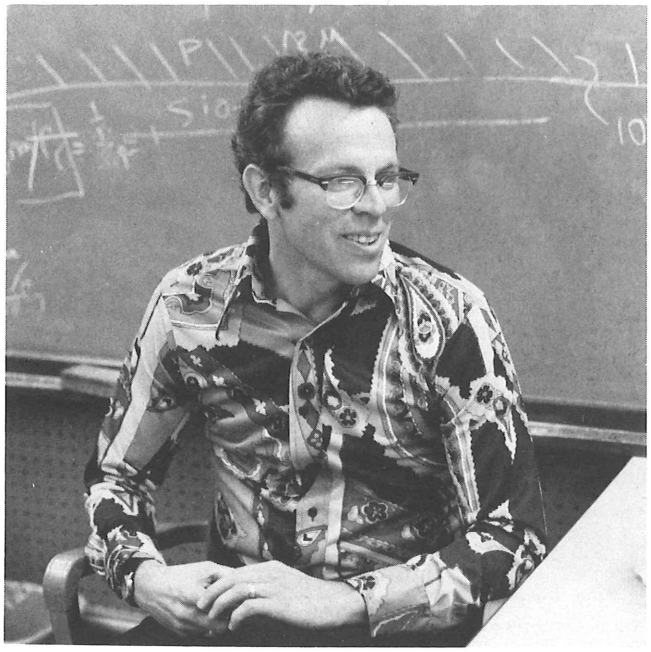
The Patents and Licensing Department needs someone to translate a short document from Brazil. Anyone fluent in Portuguese should call John Winkelman, ext. 7675.

ICE ADDS TWO DESIGNERS

Randy Young and **Jim Dunkley** have been added to the IC Engineering design group.



Randy is a MOS/LSI design manager, in charge of our MOS design program. A designer himself, Randy was formerly with Motorola in Austin, Texas. He was involved in Motorola's M6800 microprocessor program.



Jim is a Senior IC designer with a wide range of experience in process engineering for device and circuit design. He has worked with Motorola and National Semiconductor. Two of his most recent projects before coming to Tek were advanced Integrated Injection Logic Design and BI-FET process engineering.

DESIGN FILE

Here is another addition to the Special Design File. If you would like a copy of this drawing package, or any of the files listed in earlier issues of Engineering News, contact Rhys, ext. 6071.

If you have any designs or circuits that you think might be useful to someone else in their work, send a copy of your ideas to Special Design File, 50-462.

File No. 0018
T800 VERTICAL PULSER

1. Fits 7000 plug-in with 115 VAC inputs.
2. Internal 60 kHz to 200 kHz trigger generator (or 10 kHz to 800 kHz).
3. Internal 60 ns prepulse time base trigger output.
4. Provide 300 ps Tr typical with settable pulse width at 20 volts into 50 Ω pulse width output without snapoff system, and 75 ps Tr typical with snapoff system.
5. Pulse output amplitude variable from 8 to 20 volts with pulse trigger output.
6. Pulse output repetition rate variable 60 kHz to 200 kHz (or 10 kHz to 800 kHz).
7. Circuit current monitor.
8. Plug-in off/on switch.

Maureen Key 60-553