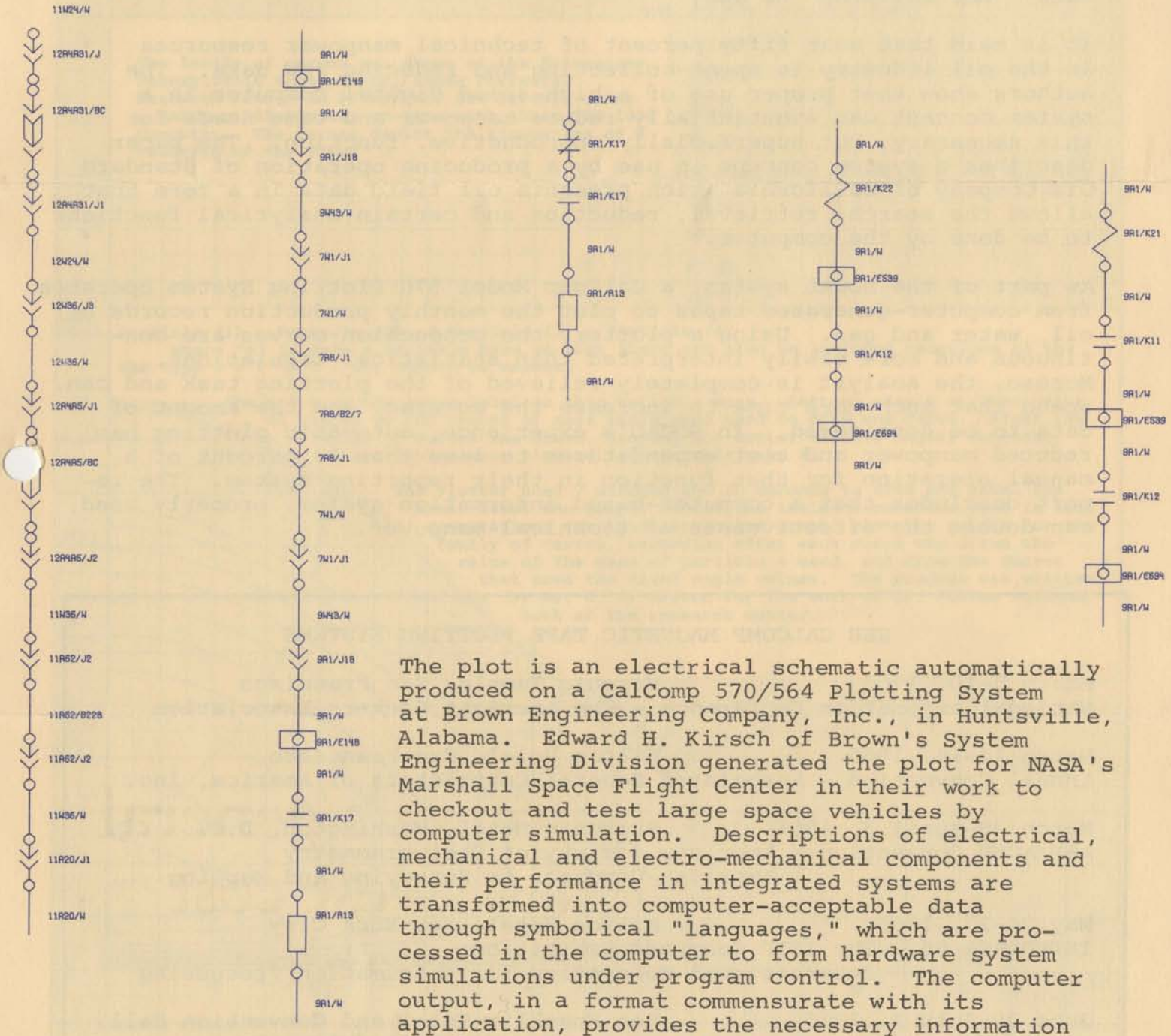
DIGITAL PLOTTING NEWSLETTER

CALIFORNIA COMPUTER PRODUCTS, INC. — 305 MULLER AVENUE, ANAHEIM, CALIFORNIA

January/February 1965



The plot is an electrical schematic automatically produced on a CalComp 570/564 Plotting System at Brown Engineering Company, Inc., in Huntsville, Alabama. Edward H. Kirsch of Brown's System Engineering Division generated the plot for NASA's Marshall Space Flight Center in their work to checkout and test large space vehicles by computer simulation. Descriptions of electrical, mechanical and electro-mechanical components and their performance in integrated systems are transformed into computer-acceptable data through symbolical "languages," which are processed in the computer to form hardware system simulations under program control. The computer output, in a format commensurate with its application, provides the necessary information display. The schematic is one of the various graphical and tabular output displays which have been developed by Brown Engineering for specific test applications.

"Water, Water, Everywhere,
And all the boards did shrink;
Water, Water, Everywhere,
Nor any drop to drink."

So starts a report by T. D. Mueller, R. W. Donovan and W. E. Block of Standard Oil Company of California. Titled "Increasing Effectiveness of Technical Resources with a Computer," the paper likens the plight of the Ancient Mariner to the modern technologist in the oil industry who finds himself in a moment of truth, surrounded by raw data, "nor any drop" to use.

It is said that near fifty percent of technical manpower resources in the oil industry is spent collecting and reducing raw data. The authors show that proper use of a high-speed digital computer in a system concept can substantially reduce manpower and time needs for this necessary, but superficially unproductive, function. The paper describes a system concept in use by a producing operation of Standard Oil Company of California which presents oil field data in a form that allows the search, retrieval, reduction and certain analytical functions to be done by the computer.

As part of the SOCAL system, a CalComp Model 570 Plotting System operates from computer-generated tapes to plot the monthly production records of oil, water and gas. Using a plotter, the production curves are continuous and more easily interpreted than statistical tabulations. Moreso, the analyst is completely relieved of the plotting task and can spend that much more time to increase the accuracy and the amount of data to be considered. In SOCAL's experience, automatic plotting has reduced manpower and cost expenditures to less than 50 percent of a manual operation for that function in their reporting system. The report concludes that a computer-based information system, properly used, can double the effectiveness of technical manpower.

SEE CALCOMP MAGNETIC TAPE PLOTTING SYSTEMS

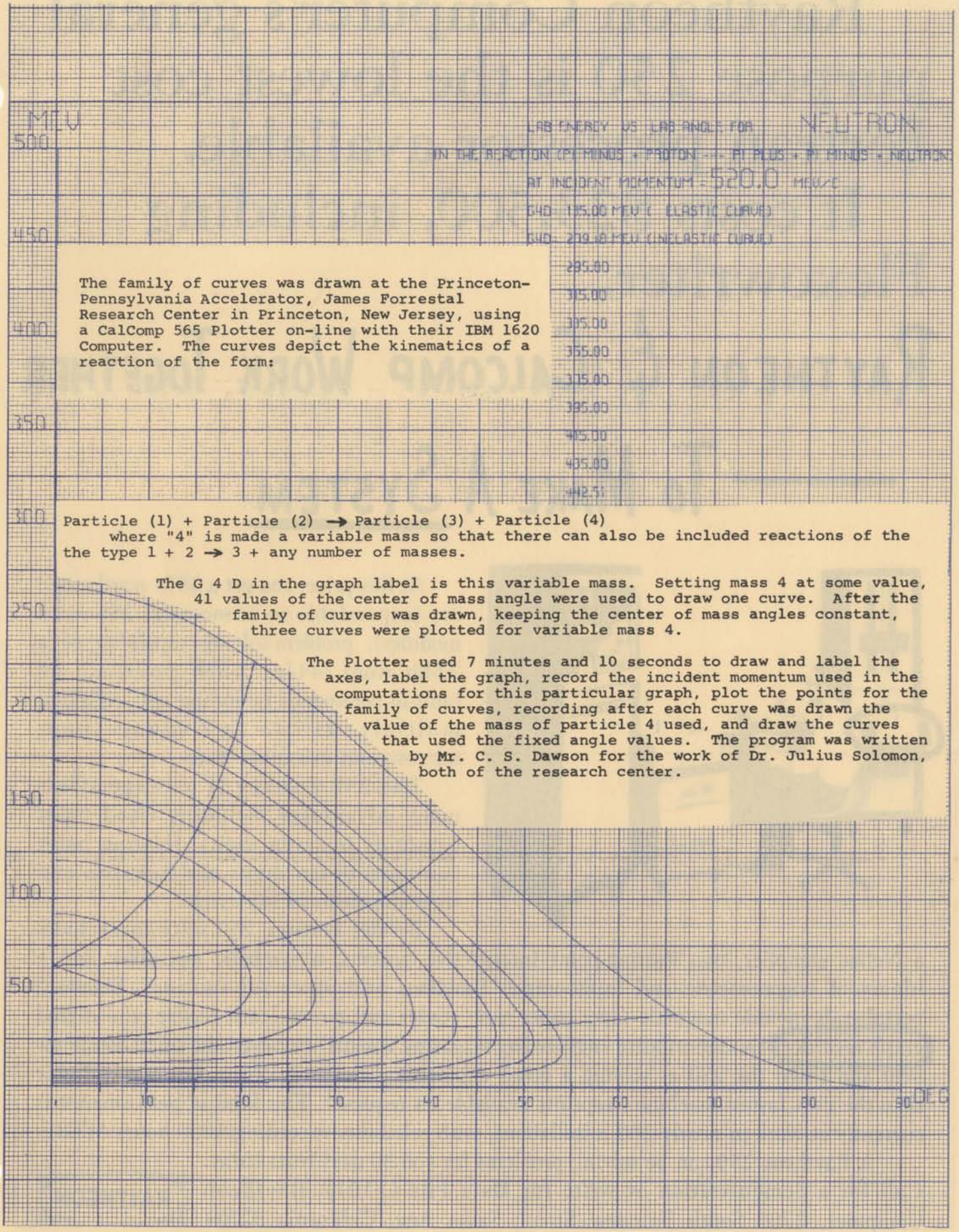
March 8-10, 1965 Masonic Temple, San Francisco
National Automation Conference - The American Bankers Association

March 14-16, 1965 Hilton Hotel, San Francisco
Annual Convention - Associated General Contractors of America, Inc.

March 28-April 3, 1965 Shoreham Hotel, Washington, D.C.
ASP/ACSM Convention - American Society of Photogrammetry
American Congress on Surveying and Mapping

May 24-27, 1965 Hilton Hotel, New York City
INTERDATA 65 - The IFIP Congress Exhibition
International Federation for Information Processing

June 29-July 2, 1965 Ben Franklin Hotel and Convention Hall, Philadelphia
International Data Processing Conference and Business Exposition
Data Processing Management Association



The family of curves was drawn at the Princeton-Pennsylvania Accelerator, James Forrestal Research Center in Princeton, New Jersey, using a CalComp 565 Plotter on-line with their IBM 1620 Computer. The curves depict the kinematics of a reaction of the form:

Particle (1) + Particle (2) → Particle (3) + Particle (4)
where "4" is made a variable mass so that there can also be included reactions of the the type 1 + 2 → 3 + any number of masses.

The G 4 D in the graph label is this variable mass. Setting mass 4 at some value, 41 values of the center of mass angle were used to draw one curve. After the family of curves was drawn, keeping the center of mass angles constant, three curves were plotted for variable mass 4.

The Plotter used 7 minutes and 10 seconds to draw and label the axes, label the graph, record the incident momentum used in the computations for this particular graph, plot the points for the family of curves, recording after each curve was drawn the value of the mass of particle 4 used, and draw the curves that used the fixed angle values. The program was written by Mr. C. S. Dawson for the work of Dr. Julius Solomon, both of the research center.

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The 250 Fortran II package offers many advantages including fixed point constants to seven digits, floating point constants to ten digits and one, two and three-dimensional subscripts.

Besides Fortran, 250 software includes a Neliac compiler, two floating-point interpretive systems, a symbolic assembler and a library of trigonometric and input-output functions and other sub-routines. Standard peripherals include magnetic tape, paper tape reader and punch, card reader, and digital graph recorder. An authoritative engineering magazine recently surveyed the small computer field and listed the 250 as solving a given engineering design problem four times faster than the next fastest machine (reprints available on request). This kind of performance is currently at work in nearly 200 installations, with reliability exceeding 1000 hours MTBF.

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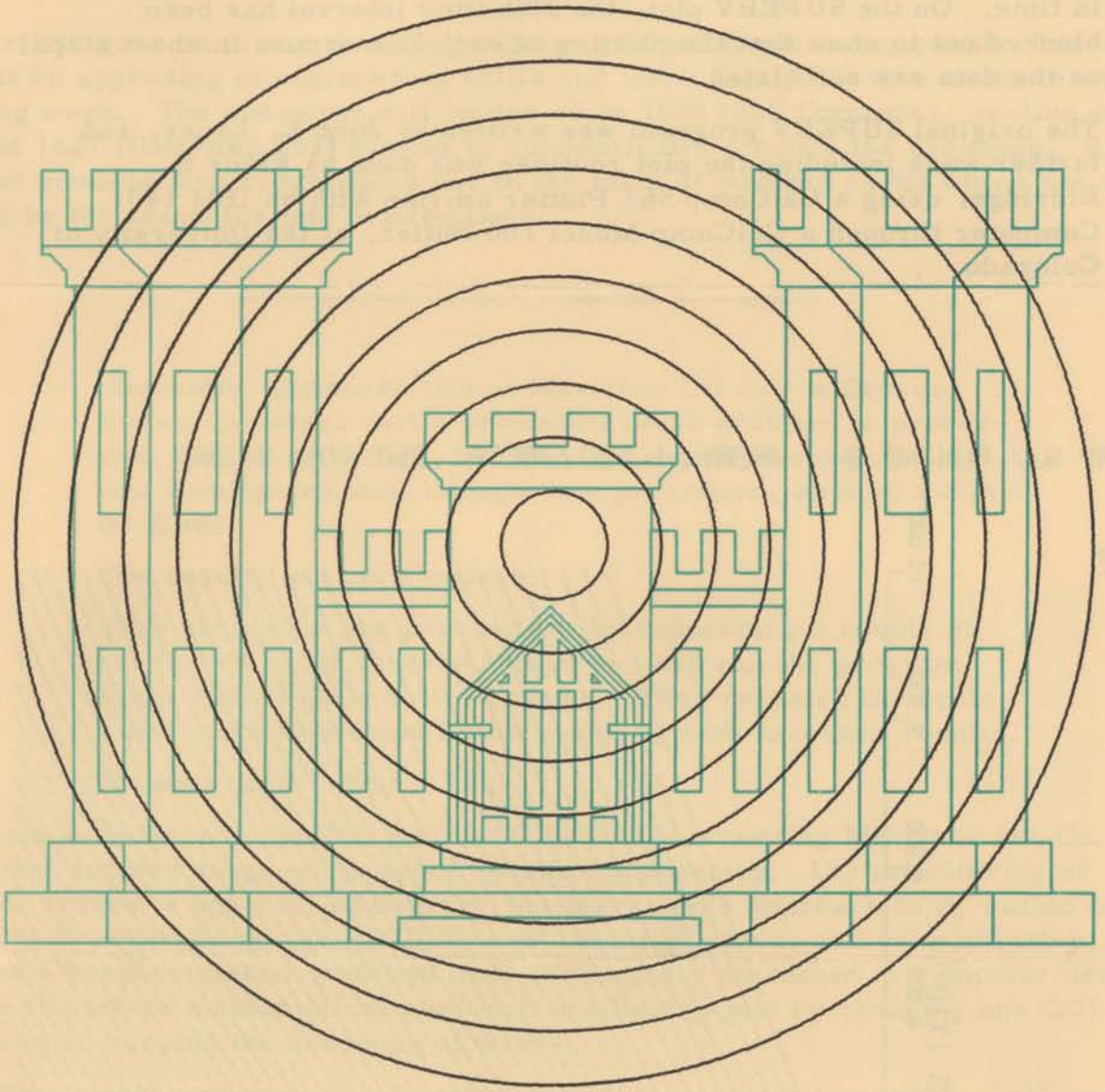
RAYTHEON

DIGITAL PLOTTING NEWSLETTER

CALIFORNIA COMPUTER PRODUCTS, INC. — 305 NO. MULLER STREET, ANAHEIM, CALIFORNIA

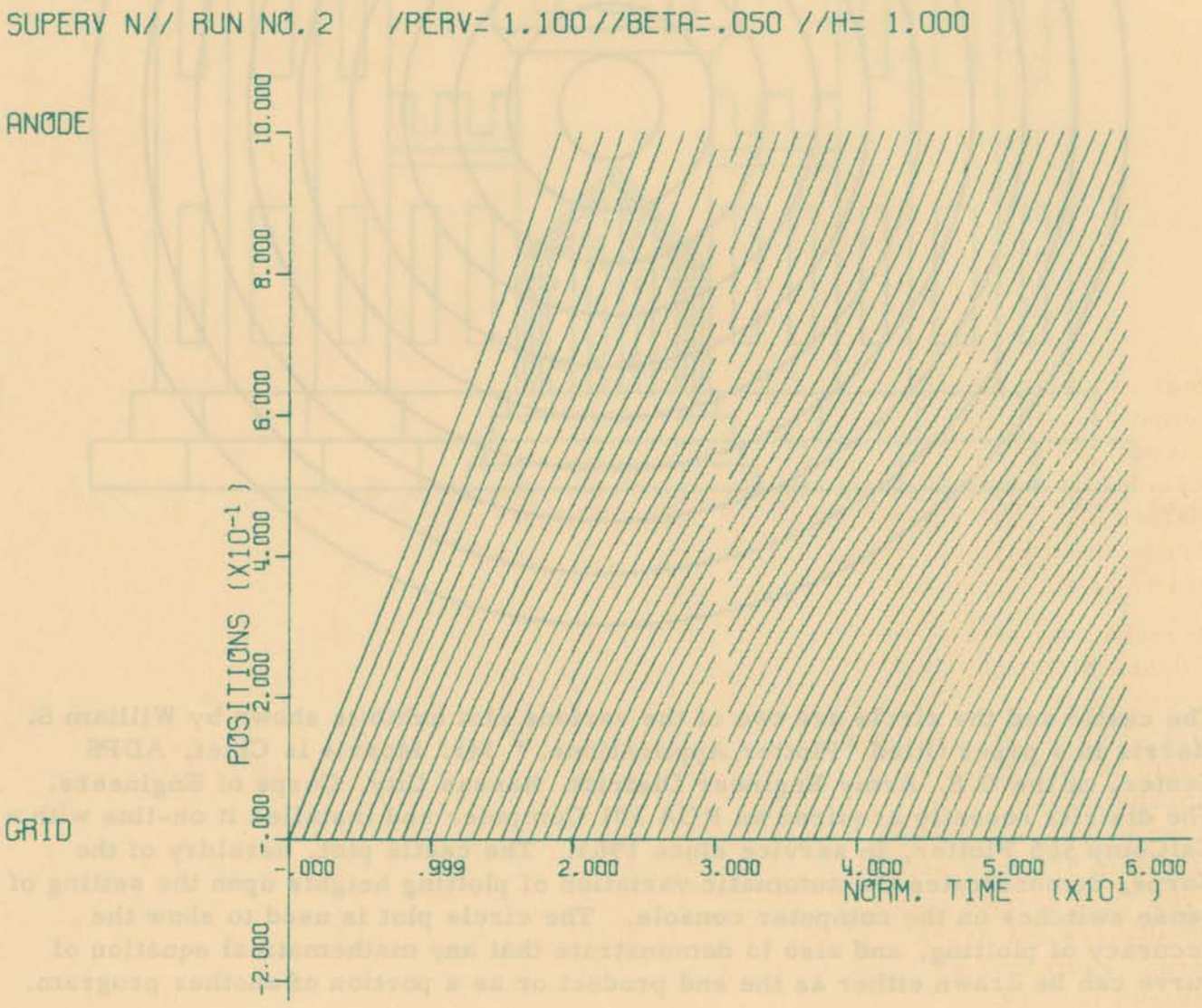
March/April, 1965



The castle and the circle are two of the various plot exhibits shown by William S. Morris in a paper titled "Plotter Applications." Mr. Morris is Chief, ADPS Center, at the U.S. Army Engineer District, Kansas City, Corps of Engineers. The district recently acquired an RCA 301 Computer and installed it on-line with a CalComp 565 Plotter, in service since 1963. The castle plot, heraldry of the Corps, demonstrates the automatic variation of plotting heights upon the setting of sense switches on the computer console. The circle plot is used to show the accuracy of plotting, and also to demonstrate that any mathematical equation of curve can be drawn either as the end product or as a portion of another program.

The SUPERV plot shows the trajectories of electrons which have passed through the grid of an electron tube, in a dense-current beam. The program handles both sub- and super-critical perveance beams. The trajectory of each electron is determined by the proximity in space of all other electrons, since in a dense beam the repulsion of electrons by each other is significant. The calculation is done sequentially in time, and the digital plotting is done for each interval in time. On the SUPERV plot, the 30th time interval has been blanked out to show that the plotting of each line occurs in short steps, as the data are calculated.

The original SUPERV program was written by John E. Lauer, and further work including the plot routines was done by Klaus E. Eldridge, using a CalComp 563 Plotter on-line with an IBM 1401 Computer through a CalComp Model 100 Buffer, at the University of Colorado.



FROM THE OIL AND GAS JOURNAL, January 11, 1965...

> "Sun Oil Company's engineering department plans to automate its industrial design and drafting chores by the use of a computer. The computer will turn out complete detail drawings, bills of material, and requisitions for assembling major pieces of equipment or estimates of installed cost."

The article goes on to say that the program will not displace any people, but will permit an upgrading of engineering skills and allow Sun Oil to take on more engineering work. The operation will center on an IBM 1620 Computer, on-line with an IBM 1627 (CalComp 565) Plotter to automatically produce the drawings. Related bills of material and requisitions are in the form of punched cards which are converted by the computer into printed lists.

> "Recently, geophysicists at Marathon Oil Co. 's Denver Research Center met a persistent noise problem in processing a seismic record. So they fed digitized seismic data into a computer and, using a new procedure, applied a digital filter.
>
> The result: not good enough.
>
> They changed a few parameters by repunching a couple of cards, fed these into the computer, and ran the program again with slightly better results. They repeated the cycle a few more times and finally came up with excellent results.
>
> Elapsed time: about 1 hour."

So starts an article in the OIL AND GAS JOURNAL covering Marathon Oil Co.'s new computer and new language to speed seismic processing. Digital filtering of seismic traces is not new, of course; but Marathon's approach to it, called Geophysical Oriented Language (GOL) is new, uncomplicated, and very effective. It enables a geophysicist or mathematician, relatively untrained in computer use, to change the entire mathematical approach to filtering just by changing one GOL control card or varying the sequence of others.

Marathon' s new computer is a Burroughs B5000, used off-line with a CalComp 570/563 Magnetic Tape Plotting System. In the GOL operation, data from seismic traces or from a velocity log are punched into cards. These data cards, along with control cards relating to memory storage, number of variables involved, and the length of the program, plus a series of cards bearing the GOL statements are all fed into the B5000, which applies the GOL processing to the digitized data. The computer output is both a tabulated listing and magnetic tape. The tape is placed on the CalComp 570 tape unit which commands the CalComp 563 Plotter to chart the filtered field seismograph, or synthetic seismogram. As shown earlier, where the results are not revealing, GOL statements are changed and the program quickly rerun, again and again, until a filtering effect is achieved that best brings out the desired results.

meet the 470...

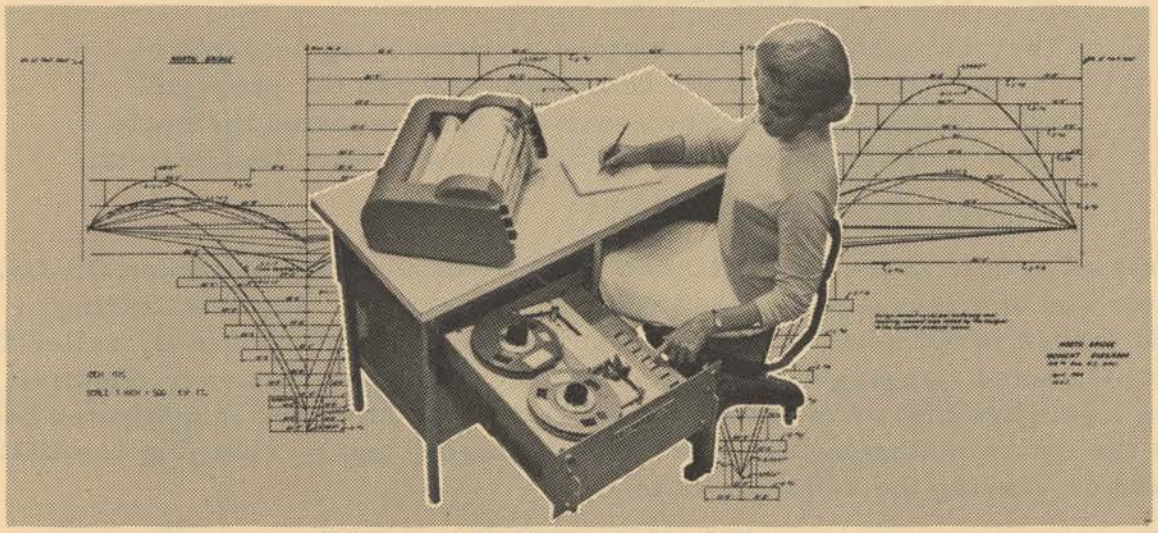
CALCOMP'S "COMPACT" PLOTTING SYSTEM

Here is a complete off-line plotting system at a "compact" price.

The CalComp 470 requires only a small capital investment, yet provides the basic features and flexibility needed for many applications.

It permits automatic plotting and annotation of graphs, charts, maps and drawings—with digital accuracy—while your computer is otherwise engaged.

It is simple to operate . . . does not require skilled personnel . . . occupies less space than a secretary's desk . . . reads IBM compatible tape at 200 bits per inch.



When work load or type of work requires high speed and added operational flexibility — investigate the CalComp 770 with "electronic gear shift"!

Write "Marketing" for complete details.

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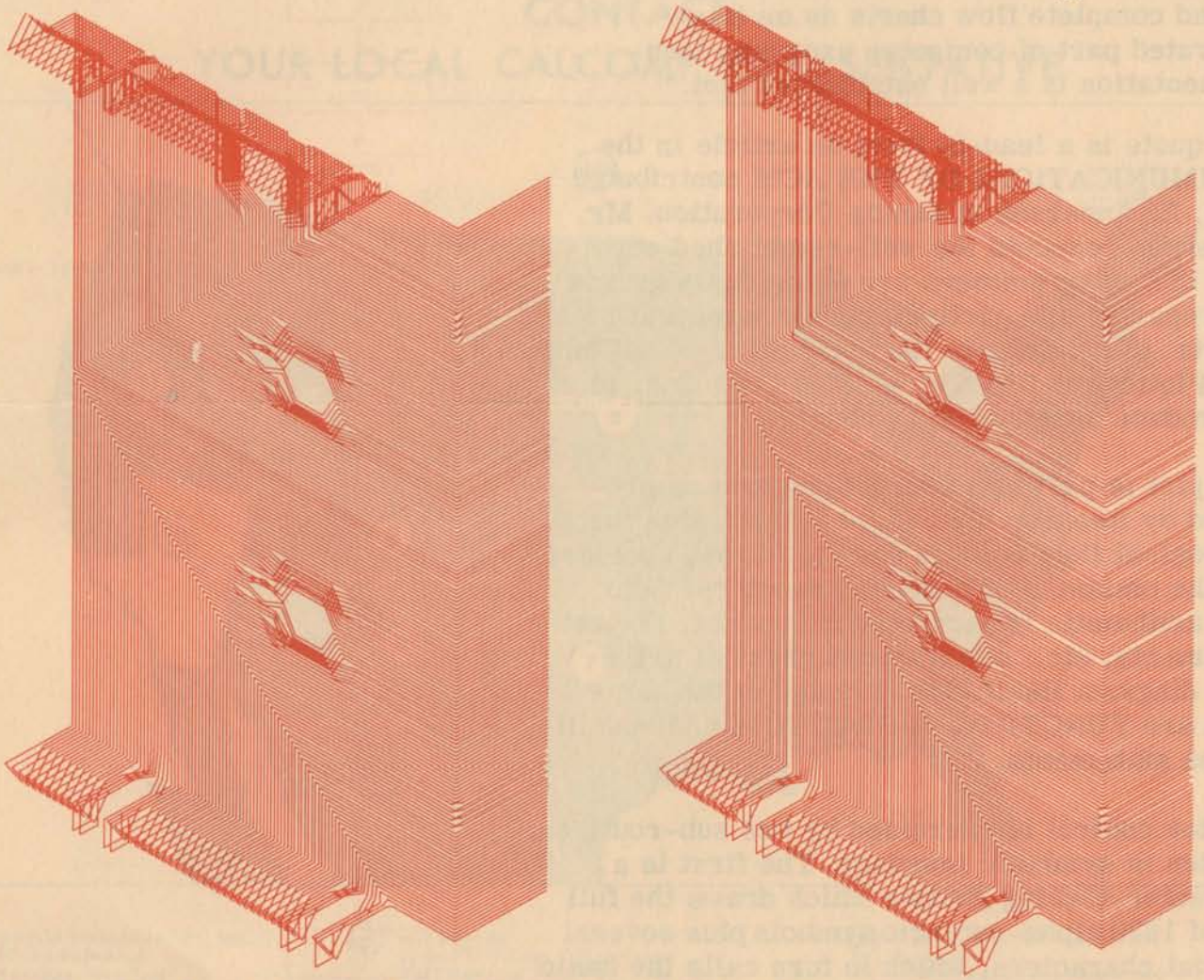
DIGITAL PLOTTING NEWSLETTER

CALIFORNIA COMPUTER PRODUCTS, INC. — 305 NO. MULLER STREET, ANAHEIM, CALIFORNIA

May/June 1965



Koninklijke Machinefabriek, Gebr. Stork & Co., N.V. at Hengelo, Holland, uses a CalComp Model 563 Plotter on-line with an IBM 1620 Computer. STORK's computer department, managed by Dipl. Ing. G. Akos, has developed an application to ease the shortage of manpower and the accumulation of work in the pipe-bending shop of the boiler construction facility.

The plot at the right is a 563 drawing from basic design data for piping in a boiler wall. That plot was returned to the drafting department for checking against the original design. The checking operation is a critical phase of the project, to assure the designer that the computer operations will be accurately performed to meet his design instructions. The plot at the left is a revised drawing from checking corrections, and which was approved and returned to the computer department for further computer operations.

On the basis of the approved drawing, the computer calculates and prints out bending lists and plots detailed drawings in orthogonal or isometric projections. The bending lists are routed through the estimating department, where they are used to make up instructions for the draw-bending machines. The detailed drawings are routed for final inspection of the constructed boiler wall.

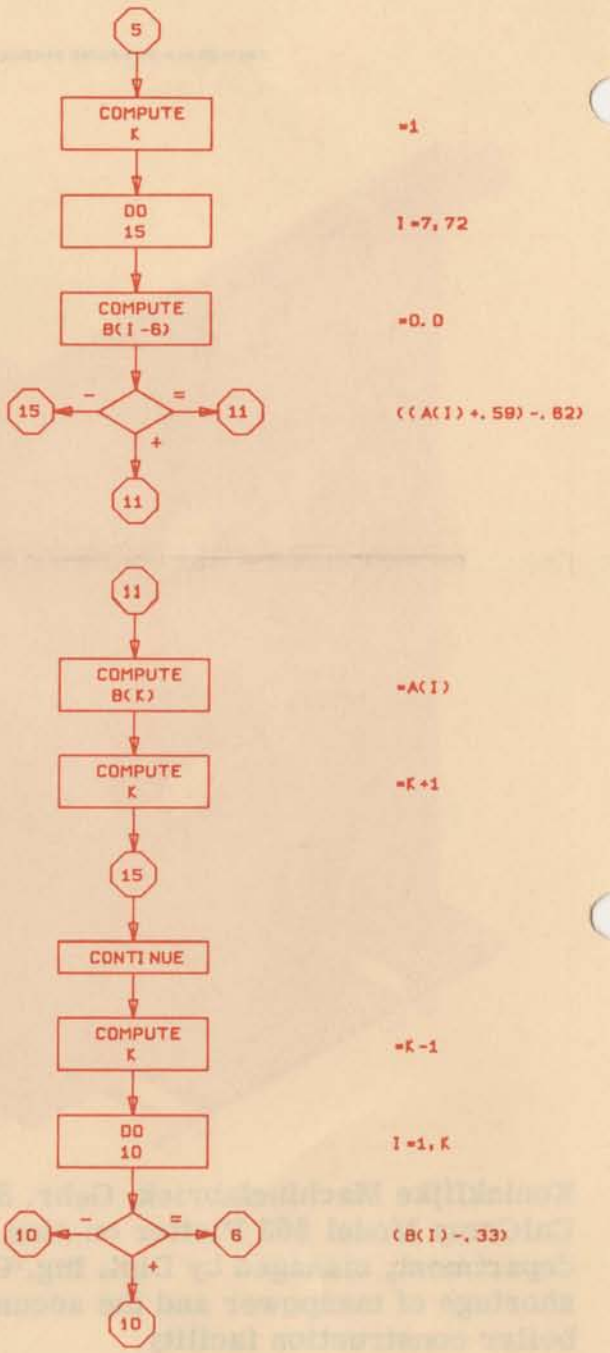
FROM . . .
COMMUNICATIONS OF THE ACM,
January, 1965

> "The desirability of concise, accurate and complete flow charts as an integrated part of computer program documentation is a well established fact."

The quote is a lead-in from an article in the COMMUNICATIONS OF THE ACM contributed by H. E. Anderson of Sandia Corporation. Mr. Anderson recounts the well-established corollary that programmers are notoriously averse to preparing and particularly to maintaining such charts. His answer to the problem is a CalComp 566 Plotter on-line with an IBM 1620 Computer to produce annotated flow charts.

The plot is part of a source program as produced by itself on the 566, and illustrates that the logical flow is quite easy to follow, considering the omission of branch connectors. Note that arithmetic statements, DO ranges, IF-test arguments, etc., are included parallel to the flow diagram itself. Also printed in the same area are FUNCTION, SUBROUTINE and specification statements.

Plotter control is exercised by two sub-routines, written in symbolic language. The first is a character-tracing routine which draws the full set of 1620 alpha-numeric symbols plus several special characters, which in turn calls the basic point-to-point straight line plotting routine. The mainline program, plus seven FORTRAN subprograms, call one or both of these routines as required. The FORTRAN subprograms set up the appropriate symbology and associated data for plotting.



TECHNICAL NOTE

National Bureau of Standards Technical Note 249 is titled "A Program for Plotting Circles of Constant Overpressure Around Targeted Points" by Mai Liis Joel and Douglas D. Lottridge. The report describes a program written for the IBM 7094 and useable with the CalComp 570 plotting system to produce overlays for World Aeronautical Charts covering the Continental United States. The overlays comprise circles representing a radius of constant overpressure around the target point of a given nuclear weapon. Based on hypothetical attacks, the overlays provide the user with a means of visualizing the hardness required of communication facilities to survive in particular areas. The booklet is for sale (40 cents) by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

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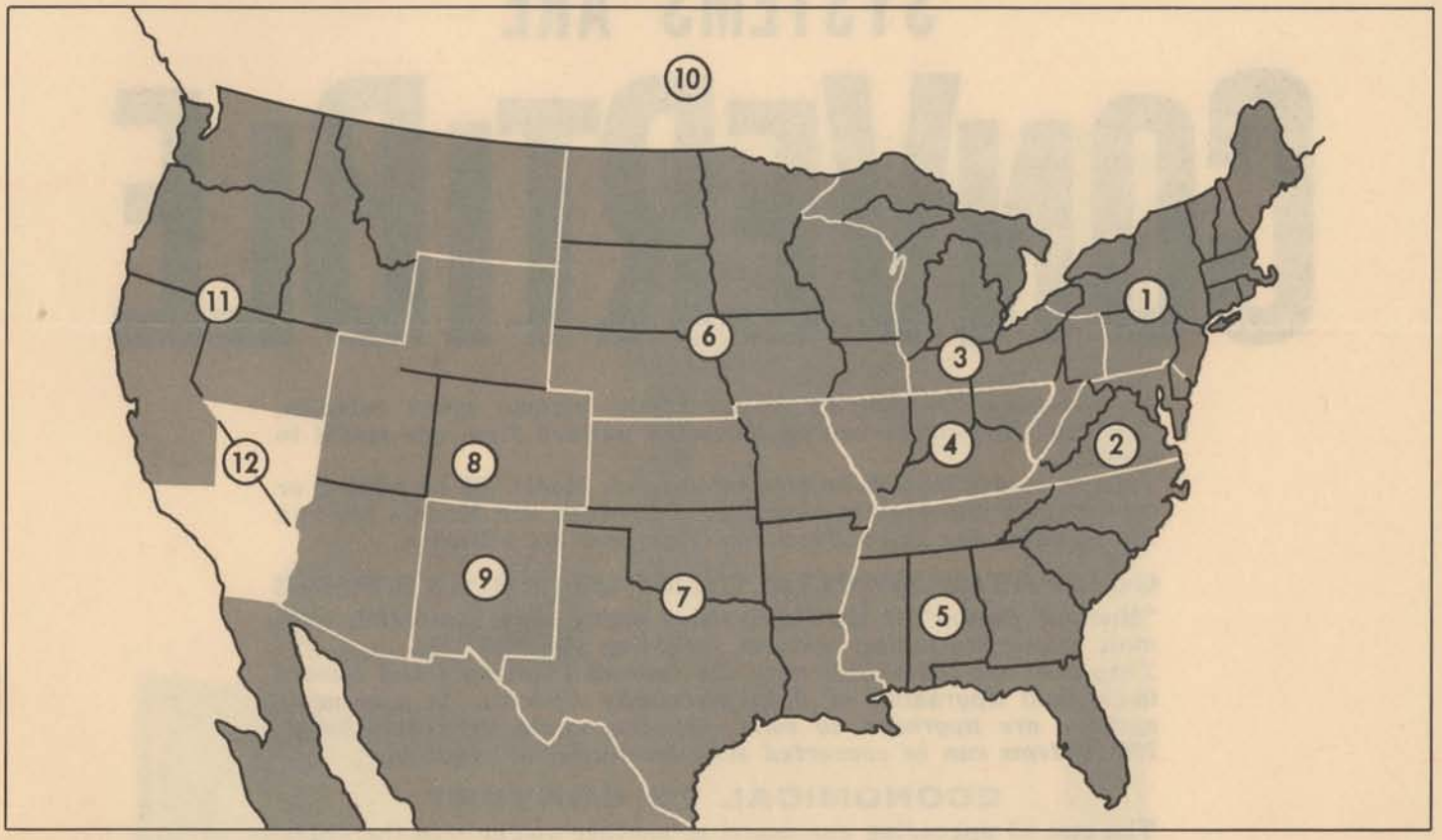

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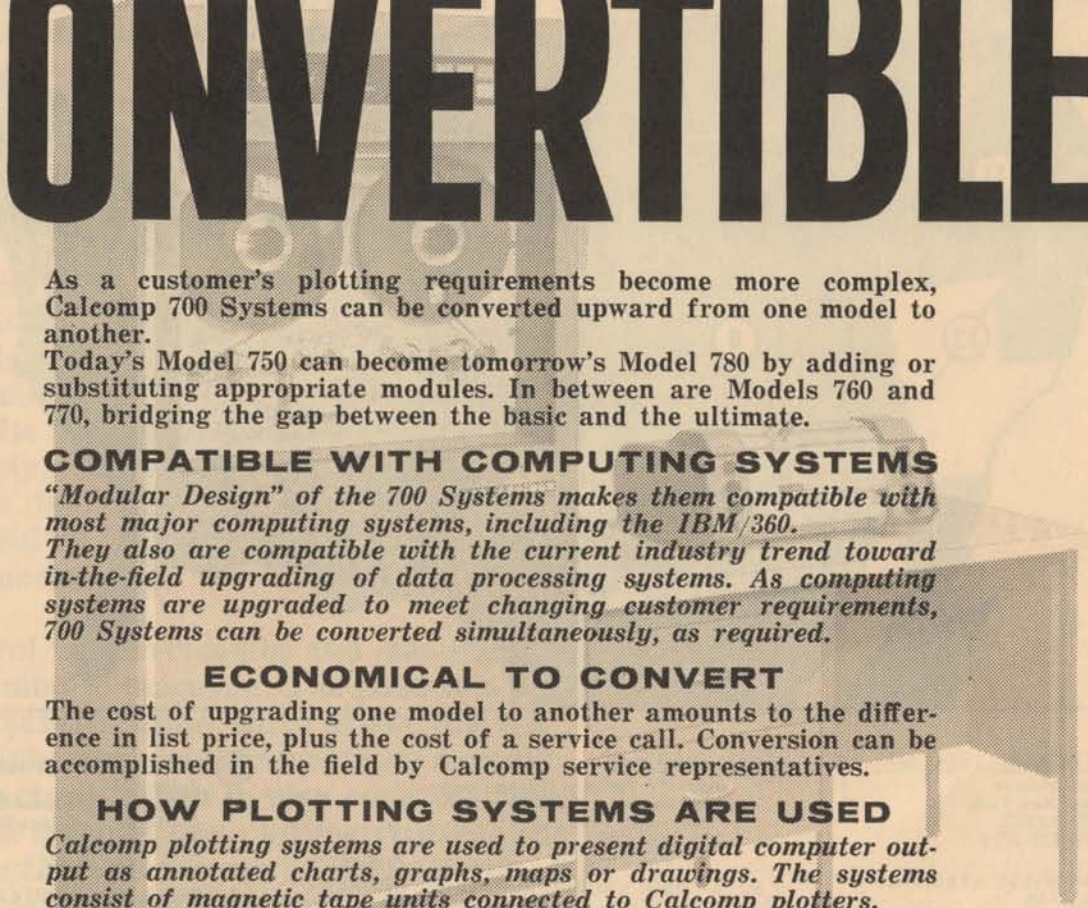
CALCOMP DIGITAL PLOTTING SYSTEMS ARE

CONVERTIBLE



As a customer's plotting requirements become more complex, Calcomp 700 Systems can be converted upward from one model to another.
Today's Model 750 can become tomorrow's Model 780 by adding or substituting appropriate modules. In between are Models 760 and 770, bridging the gap between the basic and the ultimate.

COMPATIBLE WITH COMPUTING SYSTEMS

"Modular Design" of the 700 Systems makes them compatible with most major computing systems, including the IBM/360.
They also are compatible with the current industry trend toward in-the-field upgrading of data processing systems. As computing systems are upgraded to meet changing customer requirements, 700 Systems can be converted simultaneously, as required.

ECONOMICAL TO CONVERT

The cost of upgrading one model to another amounts to the difference in list price, plus the cost of a service call. Conversion can be accomplished in the field by Calcomp service representatives.

HOW PLOTTING SYSTEMS ARE USED

Calcomp plotting systems are used to present digital computer output as annotated charts, graphs, maps or drawings. The systems consist of magnetic tape units connected to Calcomp plotters.
Model 750 drives 500 series plotters and provides display and search features.
Model 760 also drives 500 series plotters, provides display and search, and employs tape format which reduces computer time required to prepare tape for plotting.
Model 770 works with high speed 700 series plotters and introduces variable step sizes (.005 and/or .01 inches) and ZIP MODE® capabilities which permit finer plotting resolution at advanced speeds.
Model 780 provides all of the features of the 770 plus the ability to read higher density tape, and increases computer efficiency by packing more data per inch of tape.
For additional features of the "700 Systems," their advantages over other digital systems, and their capabilities — one compared with another — write "Marketing."

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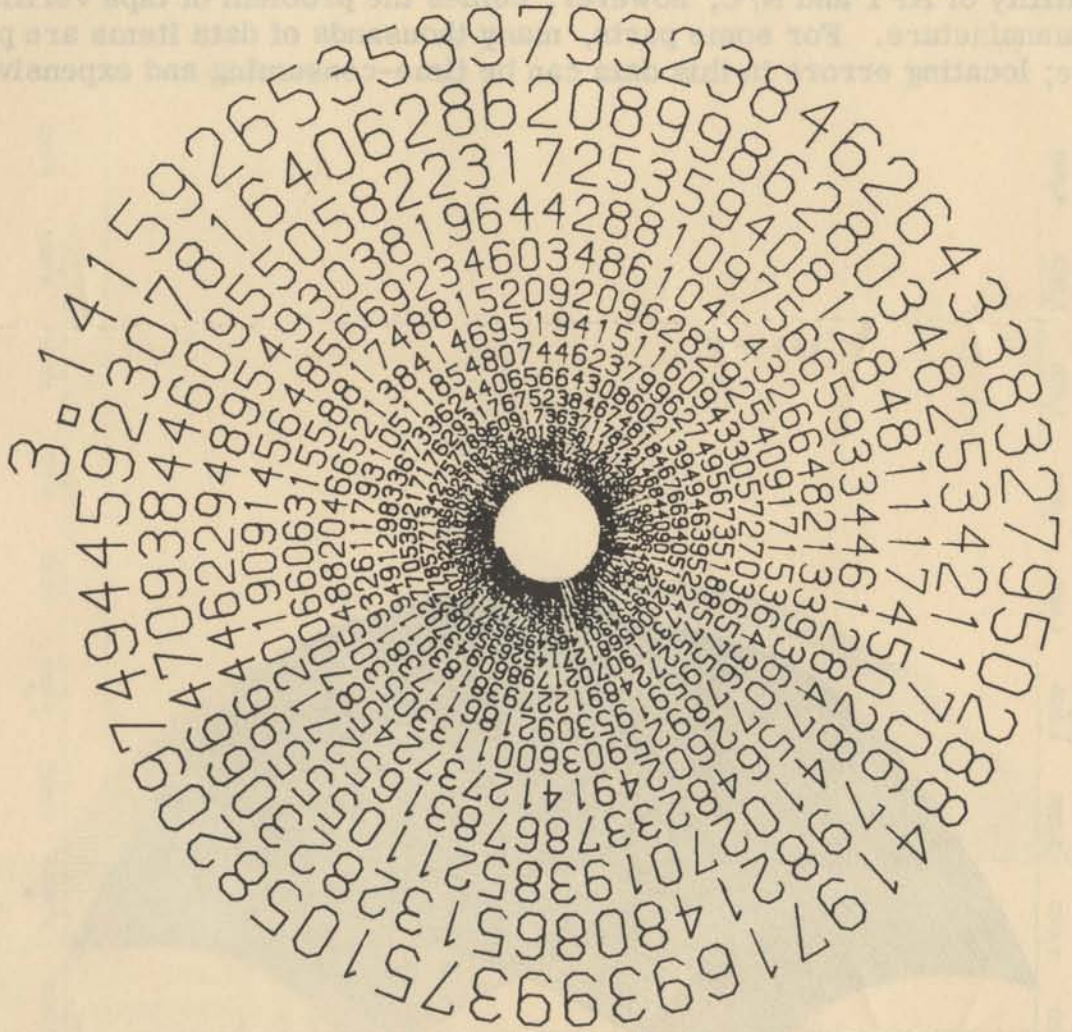
DIGITAL PLOTTING NEWSLETTER

CALIFORNIA COMPUTER PRODUCTS, INC. — 305 NO. MULLER STREET, ANAHEIM, CALIFORNIA

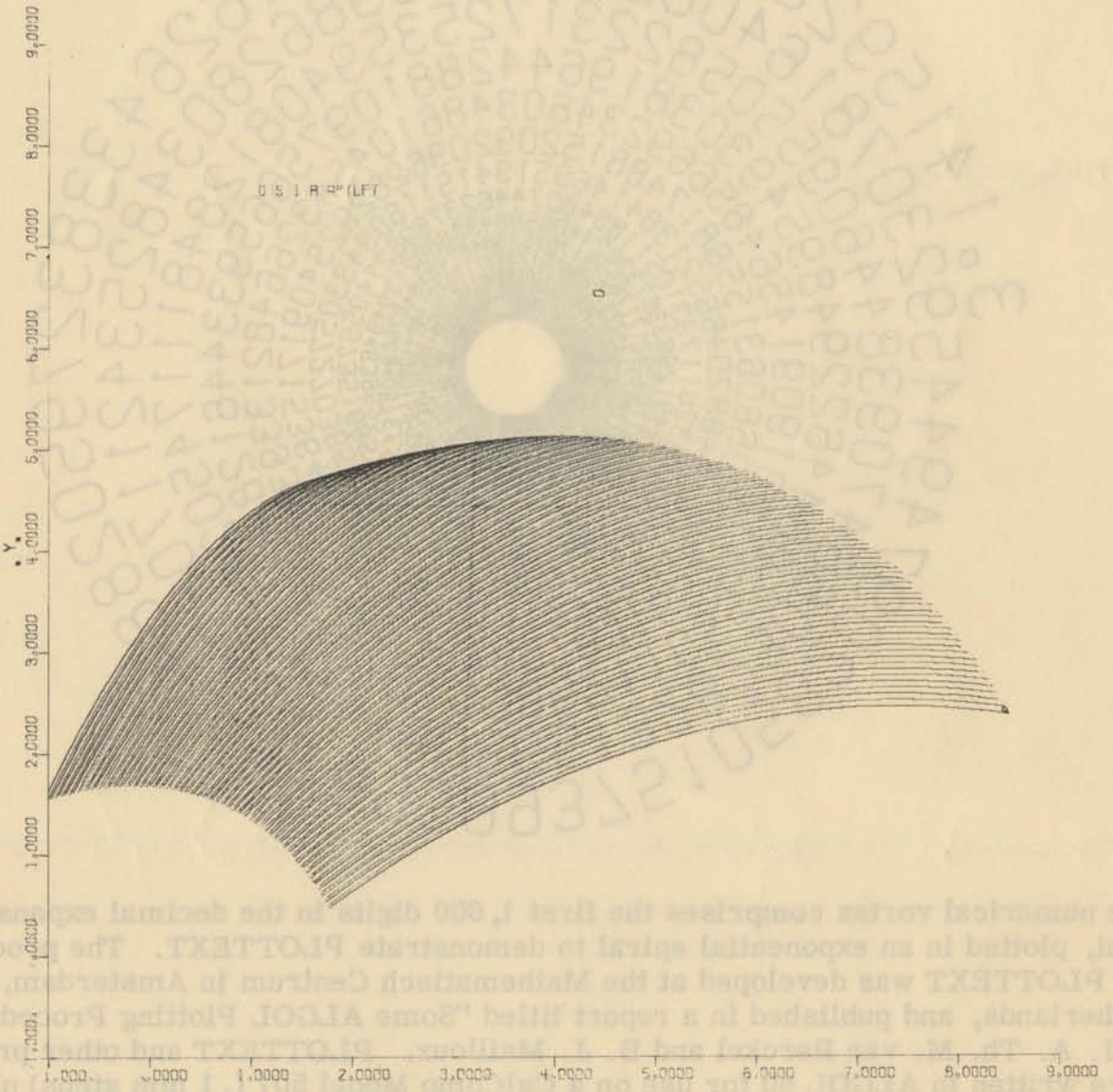
July/August 1965



The numerical vortex comprises the first 1,000 digits in the decimal expansion of pi, plotted in an exponential spiral to demonstrate PLOTTEXT. The procedure for PLOTTEXT was developed at the Mathematisch Centrum in Amsterdam, Netherlands, and published in a report titled "Some ALGOL Plotting Procedures," by J. A. Th. M. van Berckel and B. J. Mailloux. PLOTTEXT and other programs were written in ALGOL 60 for use on a CalComp Model 507 (.1 mm steps) plotter, operating on-line with an Electrologica X1 computer at the mathematical center.

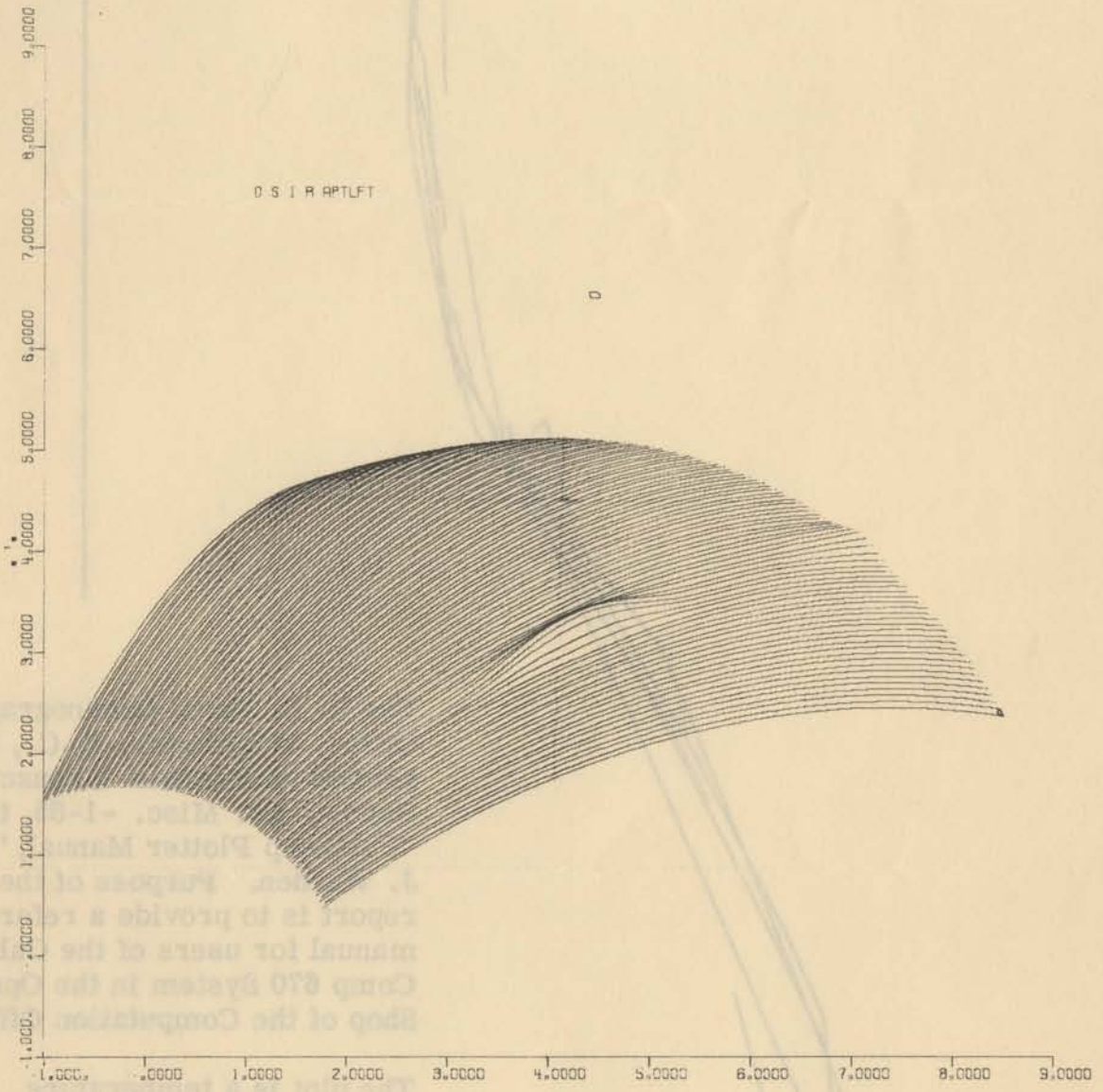
An important application of the plotter is typically Dutch; the Cultuur Technische Dienst (Government Service for Land and Water Use) takes time on the 507 for the development of polder drainage and irrigation schemes, and for measuring discharge of rivers and canals. Another user is the Instituut voor Kernphysisch Onderzoek (Institute for Nuclear Physics Research), who use the plotter for the drawing of elementary particle tracks.

The APT Long Range Program at IIT Research Institute in Chicago, is conducting research, development, and maintenance on the APT computer system for aiding in the preparation of numerically controlled machine tool control tapes. In a paper, Charles E. Drayton, IITRI, points out that N/C machine tools can produce one or several parts accurately and economically, and then be switched to another part in a matter of minutes by changing the control tape. With the power and versatility of APT and N/C, however, comes the problem of tape verification prior to manufacture. For some parts, many thousands of data items are punched in the tape; locating errors in this data can be time-consuming and expensive.

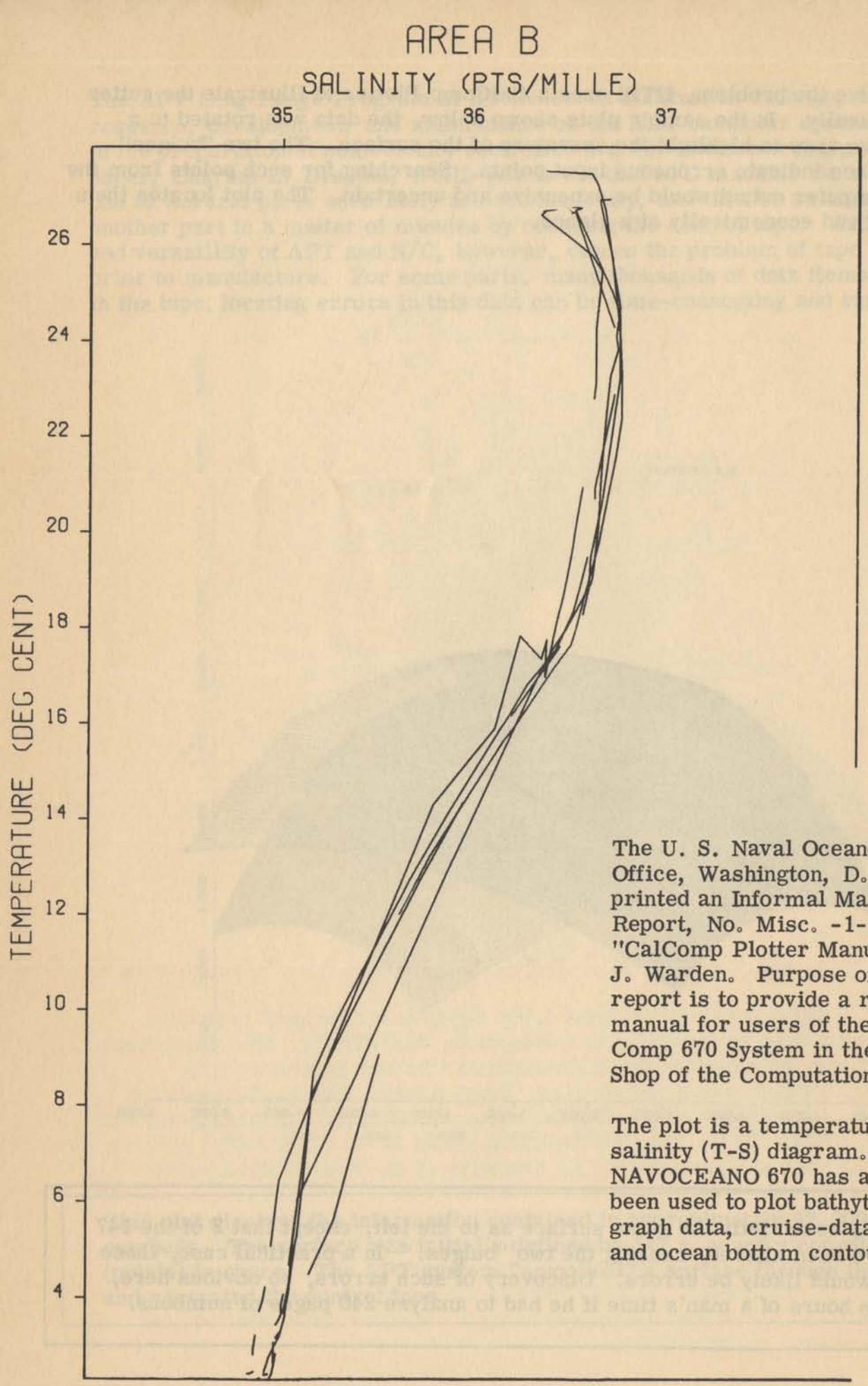


This plot displays the information contained in approximately 42,000 eight-digit numbers. The surface was initially defined by 147 x, y and z coordinate sets (points) in space. The APT system "smoothed" a surface through these points and generated the control tape.

To help solve the problem, IITRI uses a CalComp Plotter to illustrate the cutter path graphically. In the sample plots shown below, the data was rotated to a perspecitive view to highlight the curvature of the surface. The two "bulges" in the surface indicate erroneous input points. Searching for such points from the printed computer output would be expensive and uncertain. The plot locates them accurately and economically at a glance.



This plot is essentially the same surface as to the left, except that 2 of the 147 points have been altered, causing the two "bulges." In a practical case, these "bulges" would likely be errors. Discovery of such errors, so obvious here, would take hours of a man's time if he had to analyze 240 pages of numbers.



The U. S. Naval Oceanographic Office, Washington, D. C., has printed an Informal Manuscript Report, No. Misc. -1-65, titled "CalComp Plotter Manual," by J. Warden. Purpose of the report is to provide a reference manual for users of the Cal-Comp 670 System in the Open Shop of the Computation Office.

The plot is a temperature salinity (T-S) diagram. The NAVOCEANO 670 has also been used to plot bathythermograph data, cruise-data charts and ocean bottom contours.

CALIFORNIA COMPUTER PRODUCTS, INC. – 305 MULLER AVENUE, ANAHEIM, CALIFORNIA

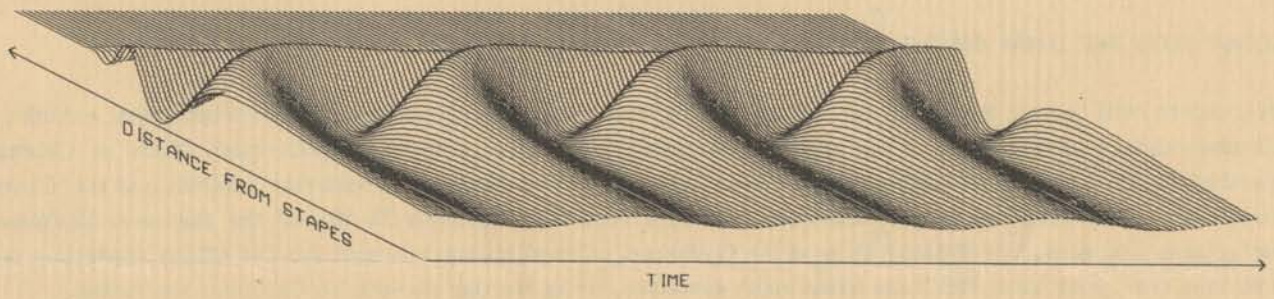
DIGITAL PLOTTING NEWSLETTER

SEPTEMBER/OCTOBER 1965

CALCOMP 565 PLOTS SILENT SOUND

The graph below illustrates research at the Biomedical Computer Laboratory of Washington University, St. Louis, on hydromechanical properties of the inner ear. The inner ear is a hollow bony tube, coiled like a snail shell, and filled with fluid. Sound waves cause vibration of the elastic partition within the tube, producing patterns which are a function of time and distance along the partition.

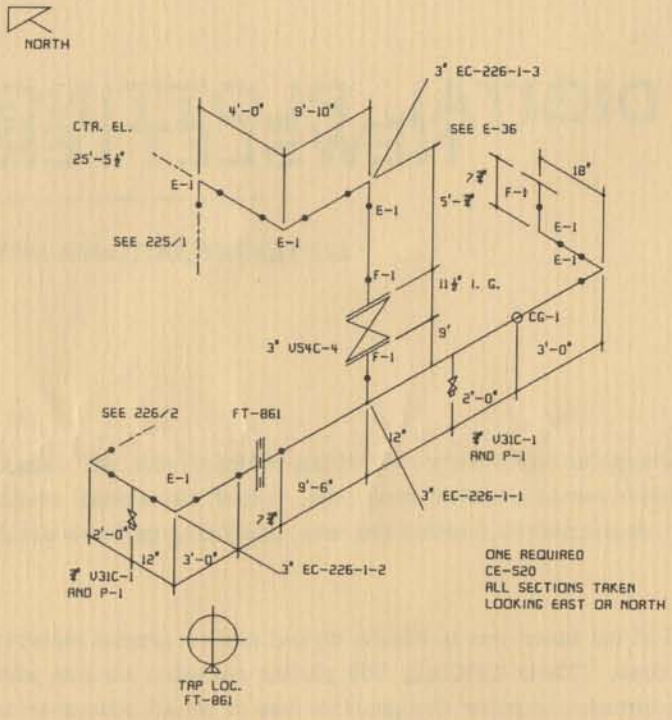
Biomedical researchers at WU use a theoretical model of the inner ear to obtain digital plotter graphs showing how the amplitude of motion varies both in position and time. Their CalComp 565 plotter operates on-line with a Laboratory Instrument Computer (LINC), a stored-program computer designed for use in small laboratories that require on-line data processing and control.



CALCOMP PATENT AWARD

On August 3, the U.S. Patent Office issued patent No. 3,199,111 to California Computer Products, Inc. The patent, which covers digitally-controlled graphical plotting and display systems, was applied for in May, 1962 and is applicable to all CalComp digital incremental plotters and magnetic tape plotting systems.

Other CalComp patents pending include the 471 Incremental Curve Follower announced recently, a device for automatically tracing any line or curve and converting the tracer position to digitally-coded data for processing by a computer. One important future application for this system, in conjunction with CalComp plotters, is in the garment industry, where patterns for all sizes can be produced automatically by tracing the designer's original pattern.



THE SUN (OIL CO.) ALSO RISES

Faced with an increasing work load in its Engineering Department and the need to shorten construction time schedules, the Sun Oil Co. of Philadelphia has risen to the occasion by automating its industrial design and drafting operations. Sunoco uses an IBM 1627 (CalComp 565) plotter on-line with an IBM 1620 computer to product "piping isometrics" of the type shown here, as well as other types of detail drawings. Key to the system is a set of detailed instructions which the computer uses to convert engineering specifications to final form. An important benefit, besides reduced drafting work loads, is the additional time available for engineers to make value judgments--a function no computer can ever perform.

In addition to driving the on-line digital plotter for automated drafting operations, Sunoco's 1620 processes the engineering specifications to produce complete bills of material, purchase requisitions, and cost estimates.

CALCOMP PUTS THE SHOW ON THE ROAD

CPN readers will have a chance to see the latest CalComp equipment in action at three trade show exhibits in September and October. First is the National Machine Tool Builders show at McCormick Place in Chicago, September 21-29. Also in Chicago, October 2-6, is the American Bankers Association exhibition at the Conrad Hilton Hotel. The third and largest takes place in New York City, October 25-29 with the Business Equipment Manufacturer's Association (BEMA) show at the Coliseum. Complimentary tickets for the BEMA exposition may be obtained from your local CalComp sales representative, or by writing directly to CalComp Marketing.

FOREIGN ALPHABETS AVAILABLE TO MU SYMBOL VIA OSYMBF

GREEK ALPHABETS

LOWER CASE

1	α	13	ν	25	Α	37	Ν
2	β	14	ξ	26	Β	38	Ξ
3	γ	15	ο	27	Γ	39	Ο
4	δ	16	π	28	Δ	40	Π
5	ε	17	ρ	29	Ε	41	Ρ
6	ζ	18	σ	30	Ζ	42	Σ
7	η	19	τ	31	Η	43	Τ
8	θ	20	υ	32	Θ	44	Υ
9	ι	21	φ	33	Ι	45	Φ
10	κ	22	χ	34	Κ	46	Χ
11	λ	23	ψ	35	Λ	47	Ψ
12	μ	24	ω	36	Μ	48	Ω

CAPITALS

RUSSIAN ALPHABET

1	А	17	Р
2	Б	18	С
3	В	19	Т
4	Г	20	У
5	Д	21	Ф
6	Е	22	Х
7	Ж	23	Ц
8	З	24	Ч
9	И	25	Ш
10	Й	26	Щ
11	К	27	Ъ
12	Л	28	Ы
13	М	29	Ь
14	Н	30	Э
15	О	31	Ю
16	П	32	Я

MULTILINGUAL PLOTTER

Midwestern Universities Research Association recently taught its CalComp 563 to speak Greek--and Russian too. Programmers at MURA have expanded their incremental plotting routines to include an extended list of symbols and characters, including upper and lower case Greek alphabets and Russian capitals. The routines are written for use on an IBM 704 and plotting is accomplished on-line with an auxiliary IBM 1401.

The characters and symbols to be plotted are selected by a table-look-up procedure. MURA programming also permits a choice of calling sequences so that the characters are plotted erect, or at any desired angle.

Marshall J. Miller, head of the Computer Division at MURA, reports that he and his staff will be happy to answer inquiries concerning their plotter programs. The address is P.O. Box 6, Stoughton, Wisconsin.

COGO COMBO: CALCOMP PLOTTERS AND IBM 1130

IBM's new 1130, first computer to rent for less than $1,000 a month, and CalComp digital incremental plotters provide an unbeatable combination for engineering applications, particularly when used with the COGO (COordinate GeOmetry) program designed for civil engineers. Originally developed by Professor Charles L. Miller, head of MIT's civil engineering department, COGO enables engineers to state problems for the computer in their own professional language and get immediate answers--in printed or graphic form.

The photo shows an IBM 1627 (CalComp 565) plotter operating on-line with the 1130 to produce a contour map--just one of many uses. IBM states that the COGO program, available next year, is applicable to most phases of horizontal geometrical design such as right-of-way computation, subdivision layout, highway design, and bridge structures. COGO can also be used in many other engineering design applications, since the concepts involved are based on generic geometric terms.