Volume 9 Number 6 November/December 1972

Information Display

The Journal of Data Display Technology

A Technology Publishing Corp. Publication

Published bimonthly by Barrington Publications, Inc., at 825 S. Barrington Ave., Los Angeles, Calif. 90049. Controlled circulation paid at Los Angeles, Calif.
SUBSCRIPTIONS for U.S., its territories, possessions, and Canada $20 per year. Foreign countries $40 per year.

Volume 9 Number 6 November/December 1972

Information Display

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The Cover

In this photograph, ¼-in. light-emitting displays are arranged in a mirrored chamber to depict "1971." The digits are composed of arrays of light-emitting diodes. Abstract photo courtesy of Fairchild Camera and Instrument Corp.

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Published bimonthly by
Barrington Publications Inc.
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Editorial

The graphics are here

Although we ordinarily reserve this space to comment upon the shortcomings and required improvements in our chosen field, this time we would like to express some satisfaction with the increasing appearance of moderate cost graphic terminals. For those who may not be aware of the product announcements in the past year or two, it should come as a pleasant surprise that graphics are truly here in price ranges that open the door to nearly any application. One need only peruse the advertisements or attend any of several equipment exhibits to recognize that the state of the display art has made a significant advance.

Even more than color, reasonably-priced graphic terminals open the door to countless applications which are limited only by the imagination. With graphics within the reach of smaller purses, there is the lurking danger of early setbacks due to inadequate application and field engineering such as that which still besets computers and alphanumeric terminals on occasion. Fortunately, there are indications that adequate support is, and will be, available from the manufacturer. This too bespeaks of the growing maturity in the display industry. At the same time, any tendency towards complacency on the part of the establishment is likely to be offset by the infusion of new blood which is in plentiful evidence.

As we approach the fourth year of this decade, we can look ahead with the expectation that man will be even better served by his machines through the efforts of the display community.

R.L. Kuehn

A simplified graphics language for mini computers

DUANE ELMS

Abstract

In the past, input to high quality automatic drafting machines was generated by large general purpose computers. These computers, while very powerful and very fast, have generally been inaccessible to drafting room personnel. This inaccessibility has resulted in several problems including long turn-around time, high cost of error correction, and lack of local control. To alleviate these problems, a drafting language was written which was designed to run on a small computer of the type used to control automatic drafting machines. This language provides a drafting room tool that is easy to use, works on local equipment, and allows easy error correction. This paper considers both prior art and current developments as related to the above situation.

Introduction

In the past ten years, automatic drafting technology has advanced considerably. Unfortunately, development of usable application software for this type of equipment has lagged far behind hardware development (see Figure 1). Due to this, only the largest companies with their large computing facilities have been able to take full advantage of automatic drafting techniques. Without suitable applications software for generating input for the machines, a small company simply cannot afford the high computational overhead required by today's graphics oriented software.

Graphics oriented programs have been written, but almost all of these require relatively large computer systems to be effective. As an example, the APT language, although not specifically designed for automatic drafting machines, does have post processors available which allow the output of the APT program to be input to automatic drafting equipment. The full APT system, however, requires a computing facility that only the largest of organizations can support. Companies that have this computing power generally have it located at some distance from the drafting machine.

There are other software systems with provision for output for an automatic drafting machine. Many of these, however, are proprietary packages used particularly in aerospace, automotive, and tire design and development. There are also other software systems used mainly for design that have facilities for output in a form usable with automatic drafting equipment. The structural design program, STRUDL, often has drafting subroutines associated with it as do other design programs like ADAPT, COGO, and AUTOMAP.

A large portion of the graphics oriented software development has been oriented toward interactive CRT display systems. Great strides have been made in software in this particular area. Unfortunately, few of the software advances are applied to the hard copy graphics area. An example of software in this area would be IBM's GSP (Graphics Subroutine Package) language. GSP is a collection of Fortran subroutines designed to implement the data structure and interface between IBM's S-360 computers and their 2250 interactive CRT console.

Figure 1: Automatic drafting equipment.

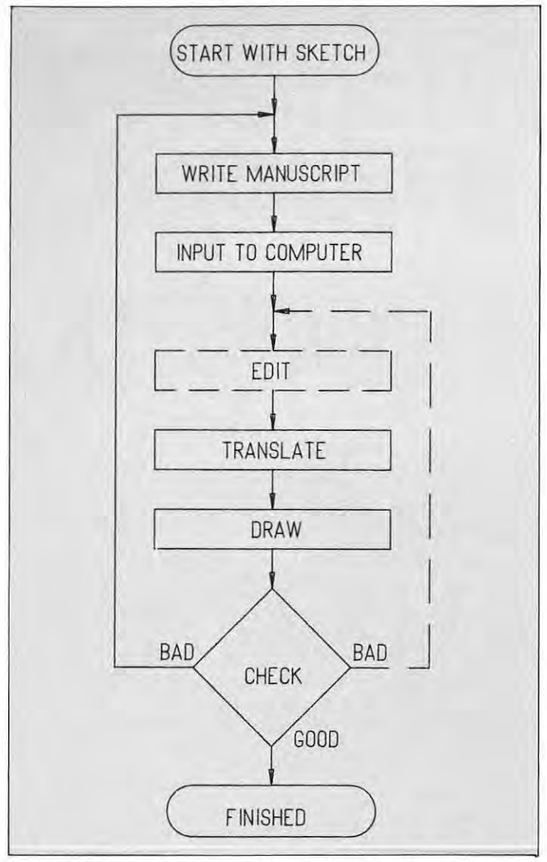

Figure 2: Showing the process of producing a drawing using a manuscript language.

There has been some work done in the area of manuscripting languages for hard copy graphics. An example of one of these languages is the Ortho-Action language developed by Numerical Control and Computer Services. This language is an extension of their highly successfuly N/C language, Action, and features extensive geometric capability.

There are several drawbacks to many of the programs available. There are generally long learning curves associated with most of these programs. This is due to the complexity of the programs, a situation which tends to push manuscript cost up. Many of them are oriented toward card input. This tends to lead to columnar formatting requiring special forms for accurate manuscript preparation. As mentioned before, these programs usually require large computers for efficient execution. These computers tend to be located remote to the automatic drafting equipment raising other problems like turn-around time and scheduling.

Motivation for a Local Language

To determine how to eliminate some of the above problems, consider the process of producing a drawing using a manuscript language. This process is flow charted in Figure 2. There are in general five, and sometimes six, basic steps involved. The first step is to write the manuscript using as a reference either a sketch or concept. This manuscript is then input in some manner into the computer. At this point, some languages allow an editing stage to take place. Next the input is translated and the output produced. This output is then drawn and checked. If the drawing is correct, the job is over, otherwise modification must be made to the manuscript. In languages without the editing feature, this requires going back to the beginning of the flow chart. If editing is a feature of the language, it is necessary to return only to the editing step to correct the manuscript.

From the flow chart, one can notice areas where the efficiency of the operation could be impaired. For example: if the language is too complex, the writing time of the manuscript could be longer than necessary. If the editing feature is not available, then the error correction process becomes more involved and costly. If the turn-around time between the completion of the manuscript and the receipt of the drawing information is too long or unpredictable, problems in both error correction and scheduling result. In general, the time required to actually draw the drawing and check the results will be small in comparison to the rest of the process. Improvements in these areas are beyond the scope of this effort.

The UDRAFT-8 Language

In consideration of the above, the Universal Drafting Machine Corporation developed the UDRAFT-8 language which is a software system consisting of two basic parts. Both parts operate in a mini computer of the type used to control many of the automatic drafting machines. The first portion of the system is a full text editor with which it is hoped to solve problems in input and error correction. The second portion of the system is the language translator. This program implements the statements of the language and is directed at solving problems of manuscript cost, computing costs, and turn-around time.

The UDRAFT-8 language is currently implemented on a 4K DEC PDP-8 computer equipped with a high-speed paper tape reader and handler, a high-speed paper tape punch, and an ASR 33 teletype.

The advantages of a language which uses only the control computer of the automatic drafting machine are obvious. This capability eliminates the scheduling problem for the drafting room supervisor. He is no longer dependent on long queues or low priority at the remote computer for turn-around time, and he can schedule the translation of his programs around his known equipment loads.

Text Editor

The text editor of the UDRAFT-8 software system is a complete line oriented text editor. The program can accept as many as 3,000 characters into its buffer for processing at one time. This is the equivalent of approximately 250 average UDRAFT-8 statements or the equivalent of one full single spaced typewritten page. The editor automatically assigns line numbers to the input information and automatically updates these line numbers when any changes are made in the buffer. Once the buffer is filled, editing can proceed as would be expected.

The editor is constructed in a way that allows input from the tape reader of the teletype. This feature allows the operator to prepare manuscript tapes off-line on any teletype while the automatic drafting machine is busy and then, when there is time available, to enter them into the editor buffer via the tape reader for correction. Additions to the contents of the buffer can be made at any time using the APPEND and INSERT features of the editor. The operator also has the capability of deleting lines from the buffer. The CHANGE command allows whole lines to be modified at once while the REPLACE command allows single characters to be changed. At any time the operator may LIST part or all of the contents of the buffer and may also direct the editor to punch the contents of the buffer onto paper tape via the high-speed punch. The output of this operation will be an ASCII tape of the contents of the buffer. This ASCII tape can then be listed on a teletype off-line for further error checking. Since there is no format restriction on the input data to the editor, the editor may be used for applications other than UDRAFT-8 manuscript checking. A list of editor commands appears in Figure 3.

Once the UDRAFT-8 manuscript has been input to the editor buffer and the operator is satisfied that all obvious errors have been eliminated through the editing process, the operator may have the editor check the statement structure of the contents of the buffer. The editor will then check the buffer contents starting with the first character in the buffer and continuing until either the buffer is empty or an error is encountered. If an error is detected, the editor enters the CHANGE mode and waits for the operator to correct the error. At this time, the editor also searches the macro table of contents in order to make sure that there are no calls for macros that don't exist and also to add the macro search code to the manuscript. When the statement structure check has been completed successfully, the manuscript can be translated with no errors in output due to incorrect statement structure.

One other feature of the editor is the ability to construct the necessary input to the macro library and table of contents. This feature enables the operator to include his own macros in the macro library with a minimum of effort.

Translator

The second and most important part of the UDRAFT-8 language system is the translator. This program accepts the input manuscripts and produces the information required by the automatic drafting machine for the production of drawings. The translator produces as output a paper tape punched in EIA code specifically formatted for automatic drafting machines.

FILL BUFFER
APPEND TO BUFFER
INSERT LINES
LIST LINES IN BUFFER
DELETE LINES IN BUFFER
CHANGE LINE
REPLACE CHARACTERS
PUNCH CONTENTS OF BUFFER
GENERATE LEADER
CANCEL COMMAND ENTRY
CHECK STRUCTURE
GENERATE MACRO LIBRARY DATA

Figure 3: Editor commands.

MOTION STATEMENTS
MOVE
DRAW
VECTOR
ARC
DOT
PRINT
ARO
PARAMETER STATEMENTS
START
END
HIGH
LENGTH
WIDTH
LINK
RETURN
MACRO CALL STATEMENT
USE

Figure 4: UDRAFT-8 commands.

The translator decodes and produces output based on statements in the UDRAFT-8 language. This language is both simple and powerful, assets which lead to short learning curves and low manuscript costs. A list of available statements is shown in Figure 4.

Motion Producing Statements

The motion producing statements are the working statements of the language. It is these statements which actually produce the drawing. The MOVE statement allows positioning of the pen at any specified point on the drawing without drawing a line. The DRAW statement draws to the specified point. The DRAW statement, can, as can other motion statements, optionally generate dash lines, phantom lines, or center lines. The VECTOR statement is also used to generate straight line motion, but its motion is specified by a magnitude and direction rather than a point.

Circular motion is generated by either the ARC or DOT statements. The first is used to generate portions of circles; the second is used to generate complete circles of specified radius centered on the current pen position.

Annotation is accomplished using the PRINT statement. This statement cannot only generate the necessary codes for drawing alphanumerics but can also position the annotation with respect to any definable point. In addition, the annotation can be left, right, or center justified. Optional underlining or overlining is also available in the PRINT statement. One other motion statement which falls into the category of special symbol generation is the ARO statement. This statement allows the generation of arrowheads with ease. The programmer simply specifies the direction in which he wants the arrowhead to point.

Parameter Modification and Mode Change Statements

In addition to the statements that produce motion, there is a need for statements to input information to the translator. The most apparent of these are the START and END statements which establish the initial drawing parameters and stop the processing respectively. Other parameter modification statements are the HIGH statement which sets the alphanumeric height, the TOLERANCE statement which sets the

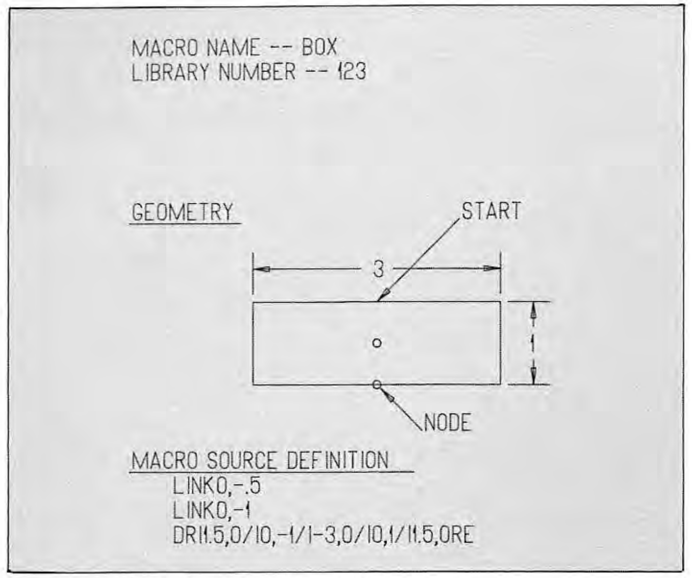

Figure 5: A typical macro and its definition.

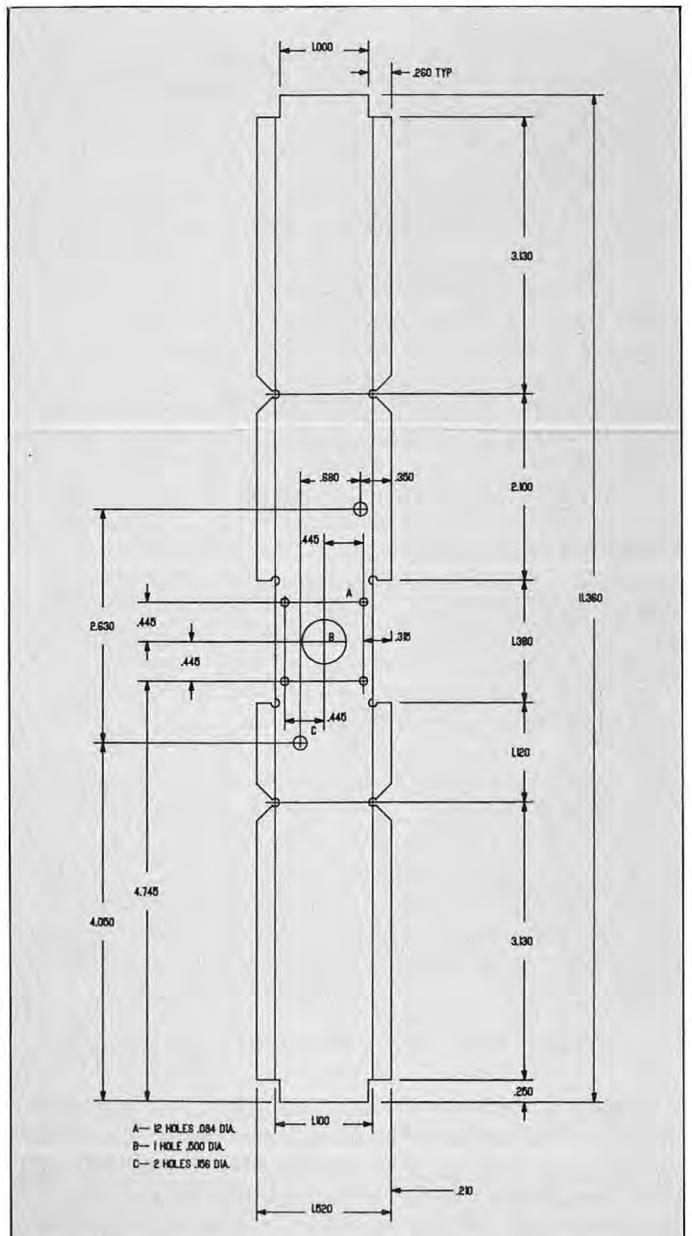

Figure 6: Sheet metal drawing.

chord height tolerance for circular motion, and the LENGTH and WIDTH statements which set the arrowhead size. The INSERT statement allows the insertion of any arbitrary codes into the output of the translator. Two other statements, which are associated with the macro capability of the language described below are the LINK statement and the RETURN statement. The LINK statement allows the definition of attachment points within a macro definition. The RETURN statement transfers translation control back to the main program upon exit of a macro.

Macro Capability

The UDRAFT-8 language is a macro oriented language. This means that in addition to the usual instructions associated with manuscripting languages, the ability of calling drawing subroutines is also provided. These macros, which can be thought of as small sub-drawings or predefined symbols, may be placed at any arbitrary position on the drawing. They may also be both scaled individually in each axis and rotated about their starting point. Data describing a macro instance, a unique usage of the macro in the drawing, may be stored and recalled at a later time in order to position other drawing elements in appropriate relation to the macro.

The macro is stored as a UDRAFT-8 source image in the macro library. This library may contain as many as a thousand separate macros and is accessed via the high-speed paper tape reader. A macro is defined by first defining the attachment points using the LINK statements and then describing the macro geometry using standard UDRAFT-8 statements.

The ability of the macro definition to contain attachment points or nodes is of great value. A specific macro instance may be assigned an integer code which will allow future statements in the manuscript to address the data associated with the placement and orientation of the instance. If this can be done, then a point can be defined by specifying the macro instance code and the number of the attachment point associated with the specific macro. This allows other statements of the language to rreference points associated with macros with ease. These points could otherwise be extremely difficult to define. Particular examples of potential uses of this feature are the placing of annotation in relation to symbols and the interconnection of elements in schematic type drawings.

The USE statement is the macro call statement and allows full usage of the macro capability. The USE statement can define not only the point at which the macro is to be placed, but can also specify individual x and y axis scale factors, a rotation about the start point and an instance number for later use in the program. Figure 5 illustrates a typical macro along with its definition.

Application and Examples

There are many varied applications for the UDRAFT-8 language. In addition to producing both schematic and mechanical drawings, the language can be used for making additions to existing drawings. This capability would allow the draftsman to\take advantage of the quick turn-around time of the language to complete a drawing, rather than force him to resubmit the drawing for complete retranslation by a large computer.

Other applications would be in the area of making small details and parts drawings (see Figure 6). Sheet metal drawings, inspection templates, etc. are also important areas where the language would be useful. This would be particularly so if the automatic drafting machine were equipped with a scribing head. This would allow the scribing of the layout directly on the material eliminating costly layout in the production area.

The production of schematic drawings is another area where the UDRAFT-8 language is particularly effective. The capability of calling and positioning macros significantly enhances this application. As can be seen by the structure of the flow chart in Figure 2, and the electronic schematic in Figure 7, there is a great deal of similarity in all forms of schematic type drawings. This enables several features of the language to be extremely effective when applied to these problems.

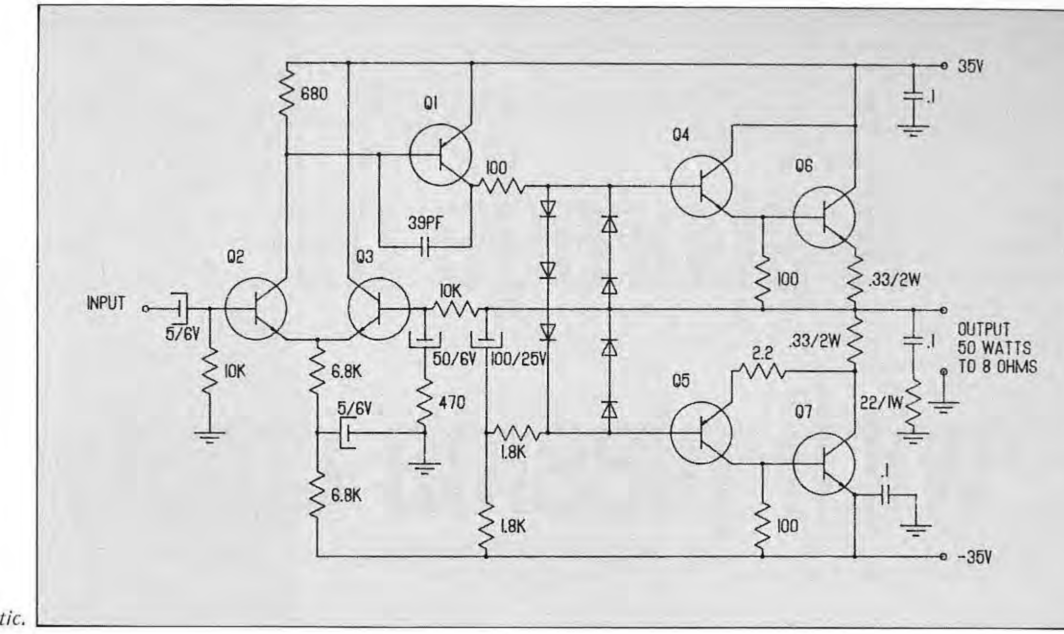

Figure 7: Electronic schematic.

```
S0,0H.2LE.2W.06TOL.001
USED1"START"(003)PRCI0,-.45"START WITH SKETCH"
MOA0,-.65DRI0,-.5AR0270AR00
DRI-2,0USED10"NODE"(007)MOI2,0DRI0,-.5AR0270
USESY.5D1"BOX"(001)PRCN1,9"WRITE MANUSCRIPT"
MON1,6DRI0,-.5AR0270USESY.5D1"BOX"
(001)PRCN1,9"INPUT TO COMPUTER"
MON1,6DRI0,-.5AR0270AR0180DRDI2,0USED11"NODE"
(007)MOI-2,0DRI0,-.5AR0270
DRDI1.5,0/DI0,-.5/DI-3,0/DI0,.5/DI1.5,0
PRCI0,-.35"EDIT"MOI0,-.15DRI0,-.5AR0270
USESY.5D1"BOX"(001)PRCN1,9"TRANSLATE"
MON1,6DRI0,-.5AR0270
USESY.5D1"BOX"(001)PRCN1,9"DRAW"
MON1,6DRI0,-.5AR0270
USED1"TEST"(006)PRCN1,11"CHECK"
/N1,7"BAD"/N1,6"GOOD"/LN1,5"BAD"
MON1,3MOI0,-4DRI0,-.5AR0270
USE"START"(003)PRCI0,-.5"FINISHED"
MON1,2DRI-1,0/N10,1
MON1,4DRDI1,0/DN11,1
MOA0,0IN"M02"END
```

Figure 8: Manuscript example with all the information necessary for production of the flow chart in Figure 2.

The manuscript example shown in Figure 8 contains all the necessary information for the production of the flow chart in Figure 2. As can be seen, information is supplied to the translator in an extremely compact yet readable form. This particular manuscript illustrates the use of the macro call, the ARO statement, the annotation capability along with other features of the language. When one examines the structure of the flow chart and the amount of information necessary to construct it, the power of UDRAFT-8 becomes increasingly apparent.

Conclusion

In view of the many drawbacks currently suffered by most methods of preparing input data for automatic drafting machines, the UDRAFT-8 language represents an advance in the capability of the local tools available in automatic drafting facilities. Although somewhat limited by the power of the hardware available, the language has both a powerful but straight forward command structure and a generous facility for error correction. Development is being continued on this language to add capability that will increase both the scope and application of the language. In particular, the areas of dimensioned drawings and geometric definitions will receive attention as will increased geometric potential. ■

Duane Elms is a Systems Engineer with Universal Drafting Machine Corp., Cleveland, Ohio. He is responsible for the development of the UDRAFT series of languages along with computer oriented graphic techniques. Prior to joining UDM in 1969, Mr. Elms gained experience in numerical control and systems design as Project Engineer for the Bunker-Ramo Corp. He received his B.S.E.E. degree from Case Institute of Technology and has done graduate work in systems and computer graphics at both Brooklyn Polytechnical Institute and Case Institute.

A storage oscilloscope with plasma display panel

an approach to practical problems

SHOZO UMEDA and TERUO TUBA

Abstract

A storage oscilloscopic display employing a plasma display panel with inherent memory is described. Constant luminance even with nonrepetitive phenomena is obtained. The panel employed has 128 x 128 cells with a pitch of 0.6 mm developed by Fujitsu Laboratories Ltd. in Japan. Writing speed is reported to be 50 μs per picture element.

Introduction

The Plasma Display Panel (PDP), invented at the University of Illinois, is a crossed grid gas discharge device having a narrow gas space between orthogonal electrodes covered with thin dielectric material. In the presence of a sustaining power source, each cross point can represent a picture element with memory. Gas discharge is initiated selectively in a cell by a writing pulse. Light is emitted during every half cycle of the sustaining wave providing a display of constant luminance until an erase signal is received. The characteristics of a PDP suggest its application to storage oscilloscopes, one mechanization of which is described in the following paragraphs.

Performance

The panel used is constructed with a grid of 150 x 150 electrodes having a pitch of 0.6 mm and an effective area of 90 x 90 mm. In both axes, 128 of the 150 lines are employed for addressable electrodes. The firing potential is about 150 V and the minimum sustaining voltage is approximately 120 V. The display color of the panel is the typical orange-red of a neon-rich gas discharge. Figure 1 is an external view of the panel.

The panel may be driven in either a single sweep or repetitive mode. Vertical signals are amplified with a bandwidth of dc to 5 MHz (−3dB). Two vertical input channels are provided which can be displayed independently, alternately or combined algebraically. Erase time is 25 μs per picture element, although it is anticipated that a few μs per frame will be possible. An erase pulse is regularly applied to a line prior to a write pulse. Maximum access time is 50 μs or twice that of writing time.

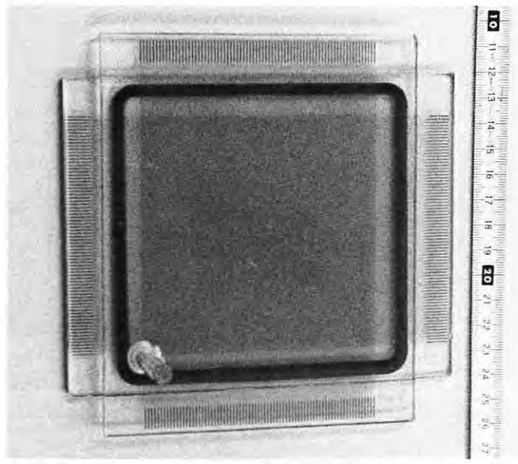

Figure 1: External view of a panel containing 22500 cells (150 x 150). Upper scale shows the size in mm.

With the use of the block and timing diagrams in Figures 2 and 3 the performance of the PDP oscilloscope, or YT* display, can be described. In the single sweep mode, the triggering signal causes a flip-flop to change state and switch on the time base oscillator. The signal to be displayed is sampled, held and converted from an analog value to a 7-bit digital equivalent. During this sequence the vertical line at which new data is to be written is designated by the time base counter and is erased.

Write pulses are fed to the vertical coordinate specified by the 7-bit signal and to the time coordinate at which erasing had just been accomplished. In this way, voltage coincidence is established to fire a cell at the selected YT cross point. After writing as described, the value 1 is added to the time base counter. Then the same sequence is repeated at new pulse intervals from the time base oscillator.

When 128 points are written, the value of the time base counter is fixed at 127 so that no further counting or resetting can occur. The scanning mode flip-flop is reset to 0. Thus a single sweep display on the 128 x 128 PDP has been completed. Figure 4 illustrates a single sweep display of a damped oscillation in an LCR network.

In the repeat sweep mode the time base counter is reset at every value of 127 and restarted by a trigger signal producing a display like that of a conventional oscilloscope. Multi-recording of phenomena is easily accomplished by inhibiting the generation of all erasing pulses. Figures 5 and 6 are examples of multi-recording.

Panel Excitation

Voltage wave forms applied to selected Y and T electrodes and a selected cell of the panel are illustrated in Figure 7. The shaded areas designate the erase and write pulses. The other pulses are present for the purpose of providing sustaining excitation to the PDP. Erase pulses must effectively drive the addressed electrode to sustaining potential for a shorter duration. Write pulses, however, exceed in amplitude the firing voltage of the cell.

Neon-filled plasma display panels require sustaining frequencies less than about 50 kHz. Consequently a maximum writing speed of 20 μs per picture element is a reasonable limit. If a half-cycle of a repetitive pattern requires 10 picture elements to be displayed with adequate definition, then the upper frequency becomes 2.5 kHz. One hundred elements along the time axis can only represent phenomena having periods greater than 2 ms. Consequently, equipment using the inherent PDP memory will be most useful where relatively slow phenomena are encountered as in medical, biological or mechanical fields.

Another mechanization of the PDP employs a semiconductor memory to buffer high-speed signals. In this way waveforms as fast as 100 nanoseconds per picture element can be

*YT refers to an XY display where X = T, or the usual time-based oscilloscopic format.

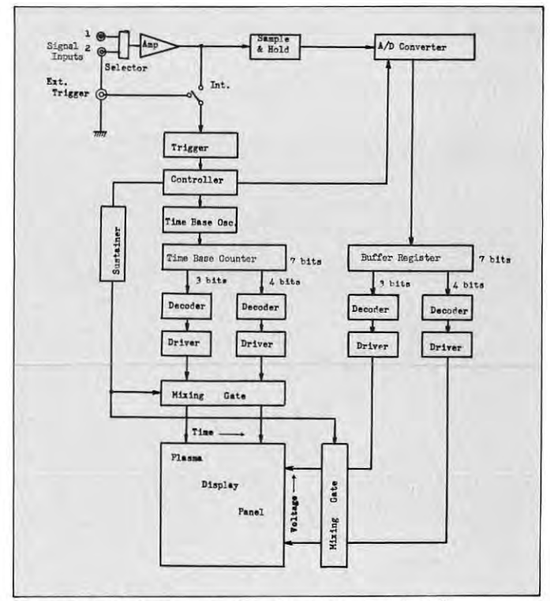

Figure 2: Block diagram of a storage oscilloscope with PDP.

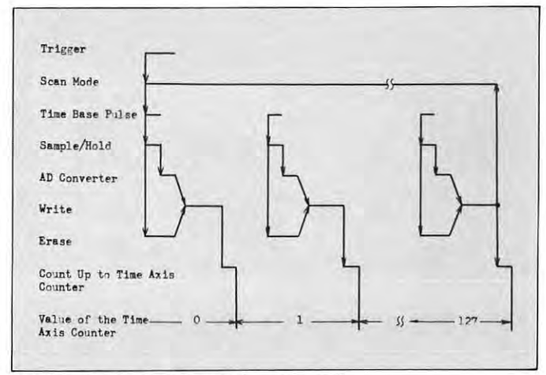

Figure 3: Timing chart in a single sweep mode.

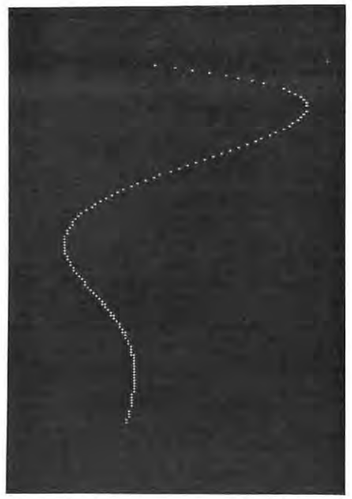

Figure 4: A single sweep mode display of a damped oscillation by LCR network is memoried and displayed on PDP. Horizontal: 12.5 ms full scale. (Reduction 53%)

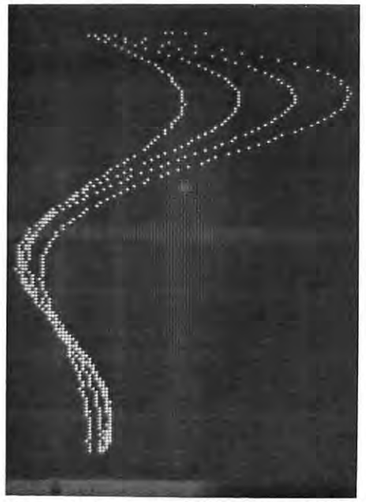

Figure 5: Four sets of damping oscillation waveforms are accumulated in one display panel. Horizontal: 12.5 ms full scale. (Reduction 53%)

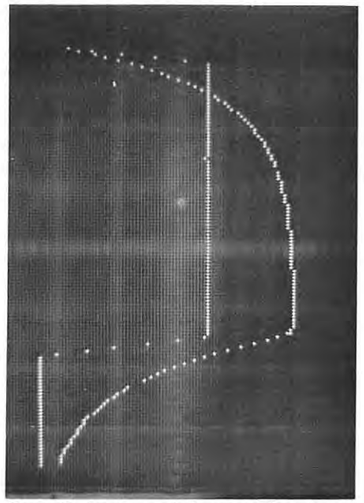

Figure 6: An accumulating recording of a rectangular wave and its amplified output. Horizontal: 12.5 ms full scale. (Reduction 53%)

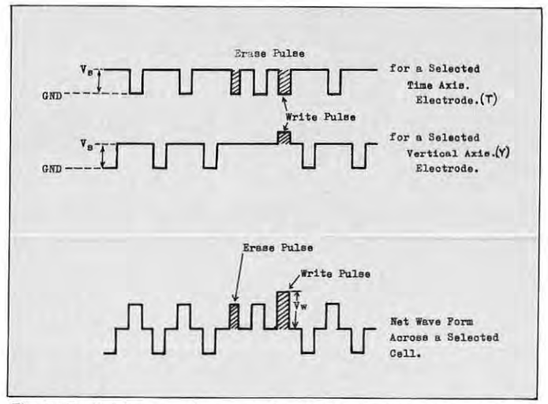

Figure 7: Driving waveforms at the display panel employed in the storage oscilloscope.

Figure 8: External view of the memoryscope with the developed plasma panel, named PLASMASCOPE.

readily displayed with a continuously sustained bright image. Since digital memories are commonly available, a digital device like a PDP can display patterns more effectively than an analog CRT unit.

Power Consumption

Although applied voltage in a plasma display is on the order of 150 V, the discharge current per cell is only about 100 μA. With a duty cycle of 1/50 at 50 kHz, for example, the sustaining power is 300 μW per call, about 40 mW per line (containing 128 cells) and 5 watts per 128 x 128 cell matrix. Approximately one-tenth of the full discharging power is lost at the sustainer to flow displacement current to the capacitive load of the panel.

Discharging power consumed at a continuous write address is only on the order of 200 μW, assuming that addressing is point by point every 20 μs. Because of such low addressing power consumption, highly compact low-cost driving circuits are feasible.

A photograph of the PDP storage oscilloscope described in this paper is shown in Figure 8.

Acknowledgments

The authors are indebted to the Director, Dr. Kojima, Vice-Director, Dr. Owaki, Manager Takashima, Chief Nakayama and members of the Electron Devices Laboratories of Fujitsu for their support in the development described herein.

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SHOW COVERAGE

1972 IEEE International Electron Devices Meeting

The Annual Technical Meeting of the Electron Devices Group will be held at the Washington Hilton Hotel in Washington, D.C., December 4-6, 1972. This meeting will emphasize aspects of research, development, design and manufacture of electron devices. Specific areas to be covered include: device technology, integrated electronics, solid state devices, imaging, storage, information processing, display devices, lasers and other opto-electronic devices, microwave and power tubes.

For further information contact Roland H. Haitz, Technical Program Chairman, Hewlett-Packard Associates, 620 Page Mill Road, Palo Alto, Calif. 94304.

Display Update '73

The 5th Annual One-Day Technical Conference of the Society for Information Display, *Display Update '73*, will take place in San Diego, Calif., at the Sheraton Inn-Airport on Friday, December 8, 1972. Richard Thoman, Chairman, hopes that by holding the conference on the Friday following the Western Joint Computer Conference they can attract to San Diego many of the computer fraternity. Mr. Gerald Chandler, chairman of papers selection, says the response to the call for papers has been more than he expected and he looks forward to an excellent and interesting program. There will be morning, luncheon and afternoon sessions. A guest speaker will address the luncheon meeting. For advance copies of the program and registration, please contact Harold P. Field, Conference Publicity Chairman, c/o Gamma Scientific Inc., 3777 Ruffin Road, San Diego, Calif. 92123.

1973 National Computer Conference

A call for papers has been issued for the 1973 National Computer Conference and Exposition to be held June 4-8 in the New York Coliseum. According to Conference General Chairman Dr. Harvey L. Garner of the University of Pennsylvania, the NCCE brings together at one time and in one place all of the interests of the data processing community on a once-a-year basis.

Deadline for submission of advance abstracts: December 31, 1972. Deadline for completed papers: February 1, 1972. For information concerning the conference or manuscripts please contact: Dr. Carl Hammer, Chairman, Science and Technology Program, c/o Univac, 2121 Wisconsin Avenue, N.W., Washington, D.C. 20007. Telephone: (202) 338-4958; R.W. Bemer, Chairman, Methods and Applications Program, c/o Honeywell Information Systems, P.O. Box 6000, Phoenix, Ariz. 85005. Telephone: (602) 993-2569. ■

ID Products

Cathode Ray Tube

Gencom Div. of Emitronics Inc., Plainview, N.Y., is marketing an EMI GGO phosphor cathode ray tube which is an electro-magnetically focused and deflected film cathode ray tube, type MX71. It is designed for both positive and negative color film scanning. It uses a non-solarizing faceplate having a neutral density tint for improved contrast and flare reduction, says the company. Both surfaces are optically flat and parallel. The GGO phosphor has a broad spectral emission peaking at 520 nm. EMI photomultipliers for use with this tube are type 9656F for blue and green channels, and type 9598A for the red channel.

Circle Reader Service Card No. 10

Projection Readouts

Three random access readouts, featuring a single lamp projection system and single black-and-white or color film reticle, are now available from Major Data Corp., Costa Mesa, Calif., for visual display use in control systems, electrical and electronic equipment, data systems, land/sea/air vehicles, vending machines, security, teaching machines, medical and scientific instrumentation and switching equipment applications. Designated the Major 16/32/64 (depending on number of messages), the readout contains necessary electrical, electronic and mechanical components to properly position (index) the film reticle in front of the projector lamp for display on the image screen. The company reports that the units are capable of displaying any standard or custom message, in any language, that can be photographically placed on film.

Circle Reader Service Card No. 11

Video Amplifier

Gould Inc., Data Systems Div., Newton, Mass., introduces an all-silicon, solid-state video amplifier for use in cathode ray tube and storage

display systems that require video modulation up to a bandwidth of 10 Mc. Two models are available, model VA2548 has a linear output vs input characteristic. Output is expressed as E_O=KEin. It accepts positive-going input signals, and provides positive-going output signals superimposed on a variable dc level (G_1 bias) for complete electronic beam control. Model VA2549 has a similar feature and it incorporates gamma correction to yield a linear light output vs input video signal characteristic.

Circle Reader Service Card No. 12

Television Projector

General Electric, Syracuse, N.Y., introduces a light valve, large-screen color TV projector, model PJ500. According to G.E., by using the light valve which operates with a single electron beam and optical path, the unit provides registration of colors, while offering contrast and resolution. The projector operates with a maximum of 8000 V, eliminating the possibility of x-ray emission from the system. The unit accepts either RGB or NTSC encoded video signals.

Circle Reader Service Card No. 14

Laser System

RCA, New York, N.Y., has released an advanced laser image transmission system that both transmits and receives images from a variety of sensing devices as well as original photographic copy. The device can transmit and reproduce, almost instantaneously, images from photographic film and such sensors as high-resolution TV cameras, multispectral scanners and laser scanners, with more than 25,000 lines resolution on a five-by-five-in. format, reports the company. The system can be used to transmit and record pictures from the wide range of sensing devices such as those carried on satellites and aircraft as well as those used in ground stations. The system is designed to transmit up to 7500 lines per s. Images may be transmitted one frame at a time or in a continuous strip. Operators can adjust the resolution, film size and scan rate of the laser image transmission system to make it compatible with other systems which have narrower bandwidths and slower transmission speeds.

Circle Reader Service Card No. 15

Photo-Optical Analyzer

An updated version of the L-2 224-A 16 mm photo-optical data analyzer has been introduced by L-W Photo Inc., Van Nuys, Calif. The

company reports that speeds of 1-2-3-4-6-8-12, plus 16 and 24 frames per second, are provided. The data reduction screen is a replaceable sheet with numbered x-y coordinates and circle degree calibration for frame-by-frame plotting of selected image information. Plots and calculations may be made directly on the screen and stored with the film for future study. Reverse side of screen is clear matte white for normal viewing.

Circle Reader Service Card No. 16

Storage Tubes

Thomson-CSF, Paris, France, has made available a TH 8803 storage tube which is a single-ended design in a 2-in.-diameter vidicon configuration, that provides a limiting resolution performance of 4300 TV lines per diameter. It can store 16 millions of bits in the digital form,

or the equivalent in the full TV gray-scale image form, for more than 20 min under continuous readout scanning operation, according to the company. The tube has an erasing capability by means of a gun design (Thomson-CSF patent). Two TV frames are sufficient to erase the whole surface down to the noise level of a good amplifier. Because the display function is separated from the storage system, the user can selectively edit the stored image or zoom in on any portion of the image.

Circle Reader Service Card No. 18

Display/Memory Units

Owens-Illinois Inc., Toledo, Ohio, is presenting a display device called the Digivue display/memory unit. The unit is capable of providing

computer or keyboard-driven illuminated displays of any combination of letters, numbers, graphics and symbols. Installed in business offices, the basic functions of the devices are to display sections of given materials on file in computer-based mass storage or to enter new materials, letters, documents or reports. According to OI, the materials could be circulated electronically for approvals and enable the typist or her boss to check the displayed text for factual and typographical correctness and style.

Circle Reader Service Card No. 19

LED Indicator

TEC Inc., Tucson, Ariz., announces a LED indicator, designated the L-1031 series. According to the company, the unit is suited for use on closely-spaced circuit boards. The black, glass-filled nylon holder has two gold-flashed brass terminals that solder directly to the PCB. Molded standoffs on the holder permit flux washing of PCBs without trapping dirt. The unit has low-current circuitry and was designed to resist shock, vibration and extreme temperature changes.

Circle Reader Service Card No. 20

CRTs and Components

Amperex Electronic Corp., Hauppauge, N.Y., a subsidiary of North American Philips Corp., N.Y., has announced a series of matched sets of CRTs and associated deflection components for use in video terminals. The matched sets consist of the CRT, a deflection coil, a horizontal output transformer and a linearity control. Typical of the matched sets available is the one engineered around the 12VANP4, a 12-in. diagonal, 110° deflection CRT having a white phosphor in a rim-bond-reinforced bulb. According to Amperex, the matching deflection coil, horizontal output transformer and linearity control are available as a single package to support this CRT.

Circle Reader Service Card No. 21

Panel-Mount Socket

A panel-mount socket is now available from Data Display Products, Los Angeles, Calif. According to DDP, the socket is designed for use with

the fan-in series panel lights and may also be used with their line of LEDs, incandescent, and neon ¼ in. diam panel indicators. The socket terminals are .025 in. sq, gold-plated, wire-wrap posts. The socket can be mounted in the panel as closely as ½ in. centers by using a push-on retaining nut and by using a neoprene washer between the panel and retaining ring to avoid rotation of the unit in the hole. ■

Circle Reader Service Card No. 22

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