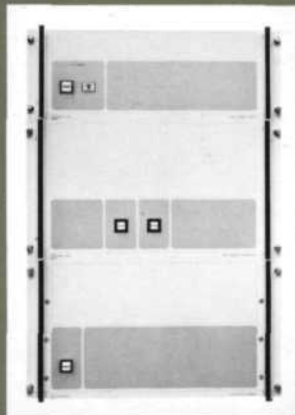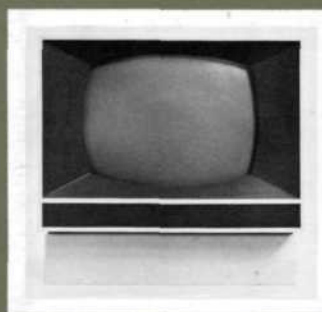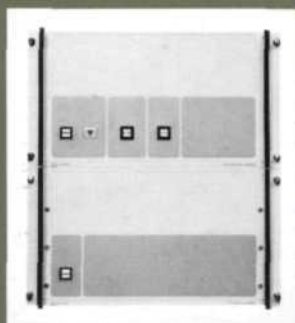# Computer Display Systems

cost effective graphics for multi-terminal applications

Numbers are for computers-pictures are for people.

The need for computer generated graphics is clearly demonstrated by the ever increasing amounts of data available from computers. It is becoming more and more difficult for people to use this increasing volume of data in any meaningful manner. Data must be reduced and portrayed in an easily assimilated format if it is to form the basis for decision making.

But systems designers have thus far been frustrated by the lack of viable hardware alternatives for computer graphics. Available hardware has either been too costly, too hard to program, too demanding of the CPU memory, or it has not been functionally suitable. Because of these restrictions, graphic terminals have often not been used in systems where they should have been.

Data Disc display systems have been designed to give the systems designer a low-cost, multi-terminal graphic display system that is easily interfaced with people.

With these systems you can generate the graphics required for efficient computer-operator communications. You can draw bar charts and complex graphs; you can annotate the picture with easily read alphanumerics in four character sizes. You can even generate mathematical symbols or foreign language characters or any other special character. You have complete control over the display. With random access to all displayed points, you can make additions or deletions at will; you can erase any rectangular area without disturbing other areas, from the entire screen to a single dot. By using multiple channels, you can preserve grid lines, coordinates, or forms while changing the data presented.

For optimum legibility in a specific application, you can display dark images on a light background or light images on a dark background. You can combine channels for gray-scale or color displays. Even the most complex graphics can be made understandable through the use of color. And you may mix color and monochrome display terminals in the same system.

To be maximally useful, a computer terminal must be located where it will be used. This often means multiple terminals. Data Disc systems are designed for such applications. A multichannel disc memory continuously refreshes low-cost, daylight viewable TV monitors. Each terminal is independent and can display a different picture. And because of the Data Disc building block approach, you can design a unique system to fit your unique requirements.
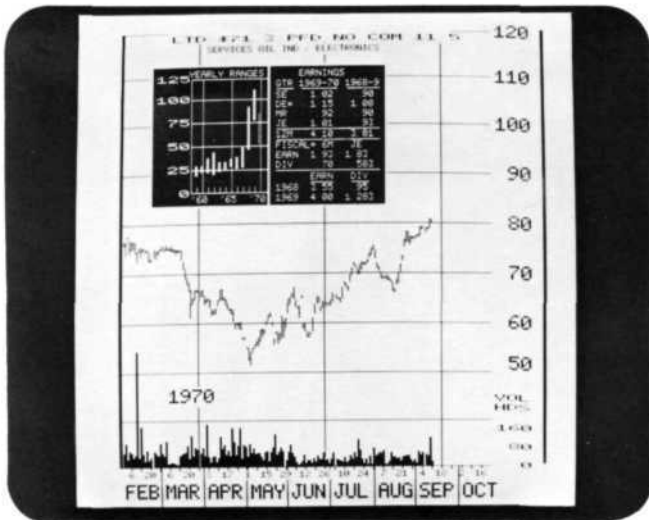
Often data is much more meaningful when presented in a graphic format. Here is a graphic presentation of over two pages of numerical data. Note how comparisons, trends, and perturbations are easily noted. Such a display can greatly increase the efficiency and accuracy of decision making.

The effectiveness of a computer graphics system is only as good as the ease with which it is programmed. Programming with the Data Disc system is simple enough that the system can be put to use in many of the application areas now served by the computer with only an alphanumeric readout. Here you see the program required to generate one bar of the accompanying bar chart and some annotation.
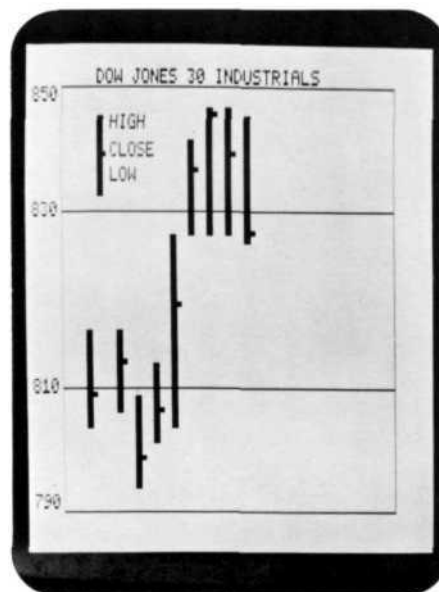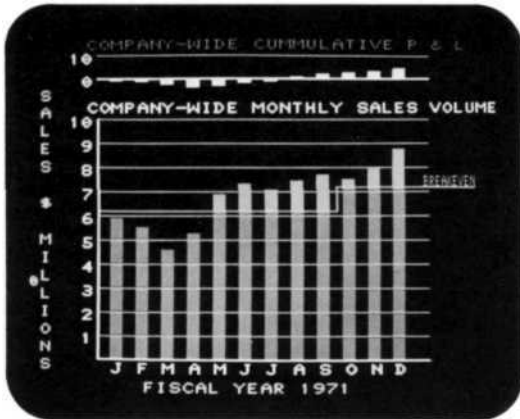
**Management Information Systems** Managers rely on current, complete information for decision making, but in many companies they are deluged by reports, forms, and statistics. Rapid access to their computer's data base will give them the information they need; a graphic display of this data will allow them to see the meaning of the data much more rapidly. A graphic display can replace many of the paper reports presently used. Because of the low cost of Data Disc systems, terminals can be located throughout the company at central decision points.
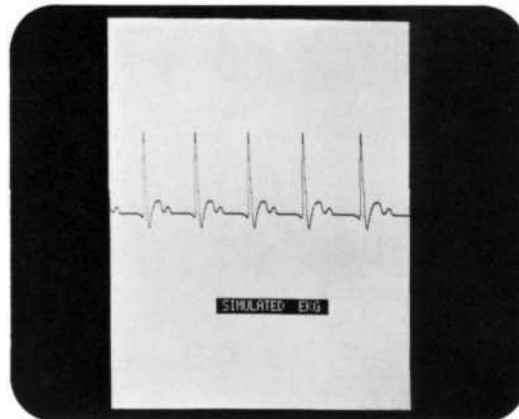

Hospital Systems Television display systems can provide a valuable extension to the present hospital information system. A display terminal can give the physician an instantaneous, up-to-date report of a patient's medical history. In the intensive care unit, displays provide continuous surveillance of data collected from the patient. Because the Data Disc system uses standard TV monitors, a hospital closed circuit TV system could provide the information right at the bedside.
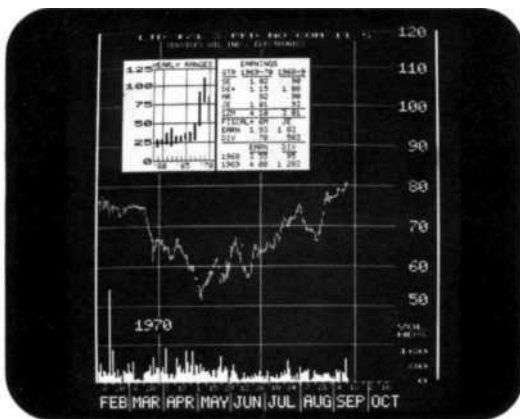

Investment Analysis Current and historical market information can be instantly available to the investment analyst in graphical as well as numerical form. The analyst can have access to summary high, low, and close data; he can call for a graphic history of a series of selected transactions; he can review moving averages of stock prices over long periods; he can get detailed financial information on hundreds of selected companies. The ease of programming the simple graphics used in financial analysis makes Data Disc systems ideal for investment analysis applications.
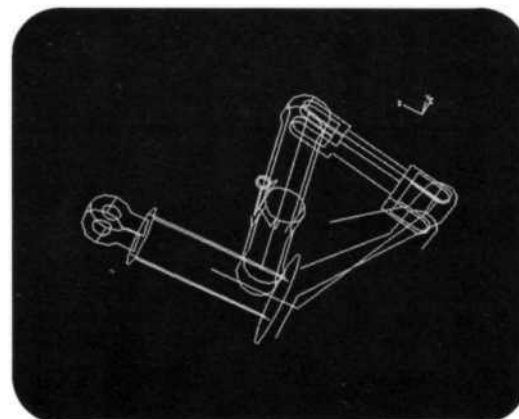
Computer-aided Design Graphic displays help the designer by giving him greater insight to the problem. Parameters can be varied, and the performance of the model can be optimized. Alternative designs can be efficiently evaluated. Circuit diagrams and mechanical drawings can be stored in memory and modified as required; when recalled, they are complete with all modifications incorporated. The multi-terminal design of the Data Disc system allows efficient use of the CPU through time sharing.
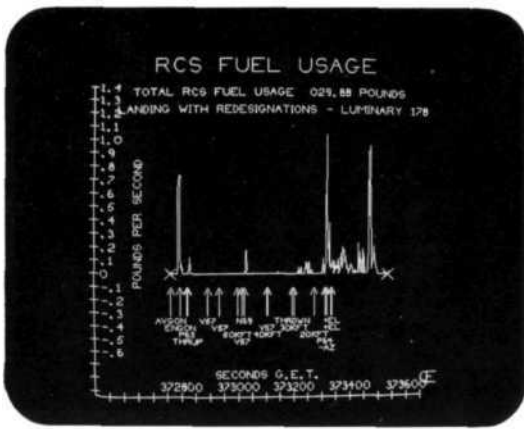
Process Control   A flow chart of the entire system can indicate the status of any control point. Data Disc color displays are especially helpful to separate processes or materials on the chart. A coded display point can be programmed to indicate an alarm condition. With such a system, faulty operation is detected and corrected sooner, and the controller has instant access to information necessary to optimize the operation.
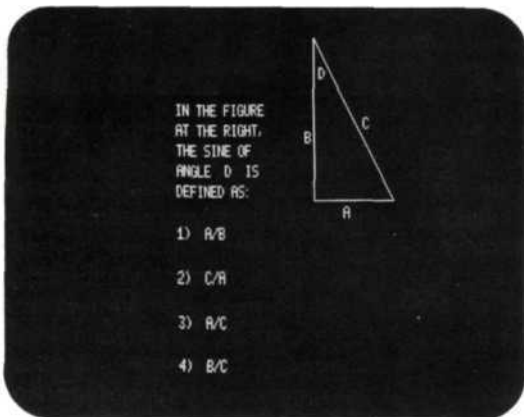
**Automated Instruction**   The high cost of competent personal instruction will make some form of automated instruction necessary in the future. Because the Data Disc system is ideally suited to clustered displays, it offers student input/output units at the lowest cost per student. The graphic capability provides the educational advantages of pictures over words.
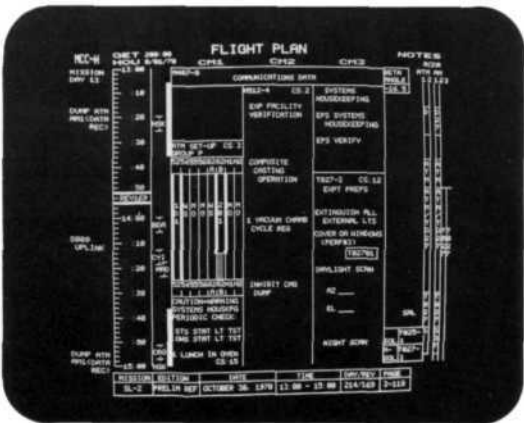

Command Control   The military and other governmental agencies (e.g., FAA, police, fire, and civil defense) have a need for centralized control centers to coordinate the activities of many independent units.

The optimum display is often multi-color with both alphanumeric and graphic readout. The versatility of the Data Disc hardware makes it an ideal choice for many of these systems.
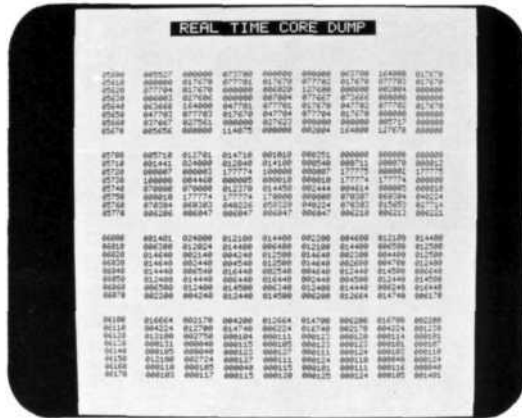
High Speed, Soft Copy Readout   A high speed, high density alphanumeric display can provide the programmer with the means to "page through" the core memory of a large computer system very rapidly. Flow charts and programs can be written, checked, and edited without waiting for a paper printout. With a multi-channel Data Disc system, each programmer in a large organization can have an interactive display as **a** programming aid.
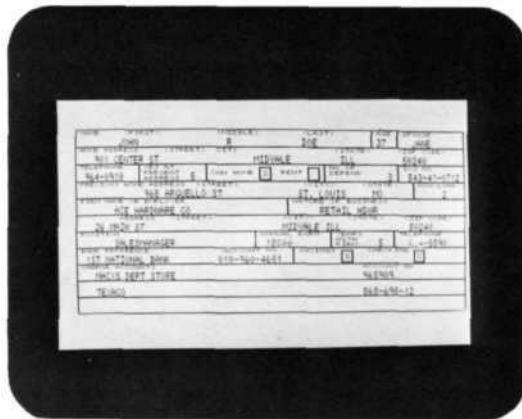
High Efficiency, Routine Computer Input The efficiency of many routine computer input operations can be improved by generation of a form on the CRT to be filled in by the operator. The Data Disc system is ideal for such applications because the form can be generated on one channel and the data entered on another; the displays are superimposed on the CRT. The data can be typed, checked, edited, and entered over and over again, while the form remains as a reference.

A system designed for maximum versatility.

Because of the versatile building-block approach, you can use Data Disc equipment to design an "off-the-shelf" system with capability to match your unique requirements. The primary advantage of Data Disc systems will be found in multi-terminal systems or multi-channel color systems where you can take full advantage of the disc refresh approach.

Display Only System   This system provides CRT monitors to display computer generated information. It is useful in applications where direct operator interaction is not desired, or where the operator input already exists as an independent system. Even though this system has minimum capability, it can still provide complex graphics and high density alphanumerics. Each channel can carry independent information, and channels can be combined for color or gray-scale displays.


Display only system direct coupled to computer
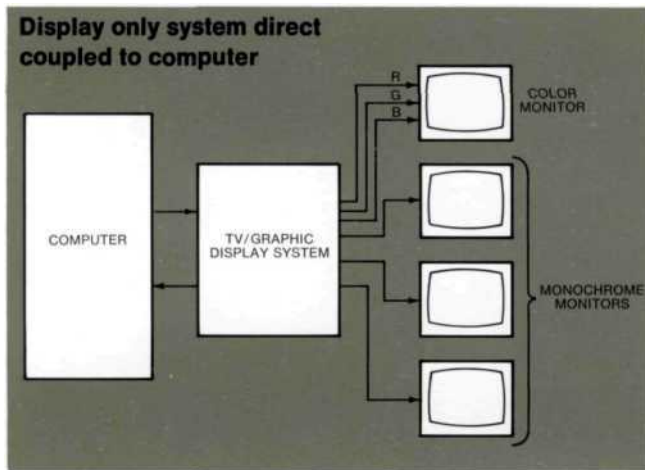
Interactive Display System   In this system, the operator interacts with the display through the key-board. A graphic display can be altered by a series of programmed instructions and a display cursor. These systems are ideal in multi-user or dedicated time-share systems. The basic system may be field expanded to the full capacity of the display generator and disc memory, 16 or 32 terminals.


Interactive display system direct coupled to computer
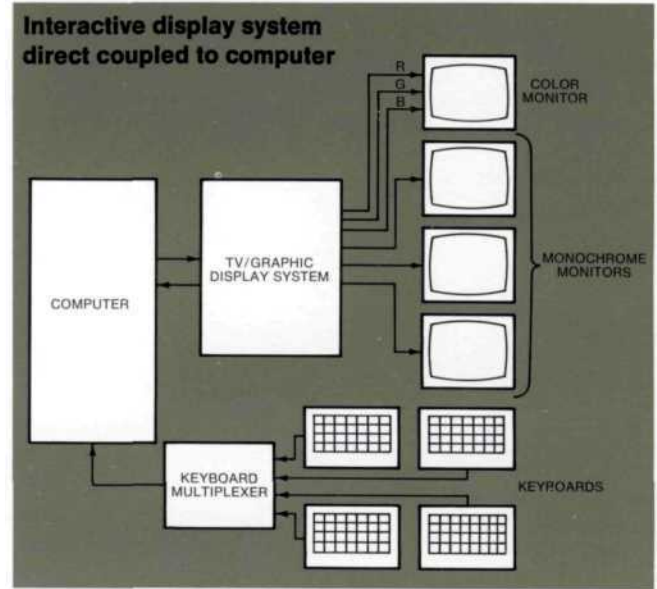
Full Capacity Interactive Display System   This system brings the full power of interactive graphics to your computer installation. Graphic inputs can be made directly via a graphic trackball, or indirectly via the keyboard; a hard copy printer provides a permanent record of selected displays; a video disc file makes reference to previous displays easy; a TV camera can even be integrated into the system as an area monitor or an input for your computer. You can even combine channels for color or gray scale displays. The dedicated display processor takes most of the load off the CPU to maximize system efficiency.
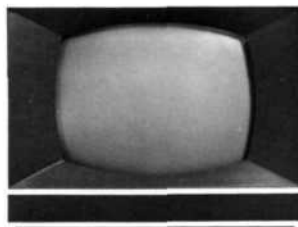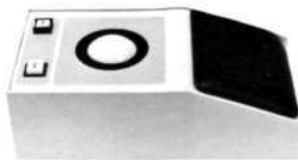

Full capacity interactive display system for large computer installations
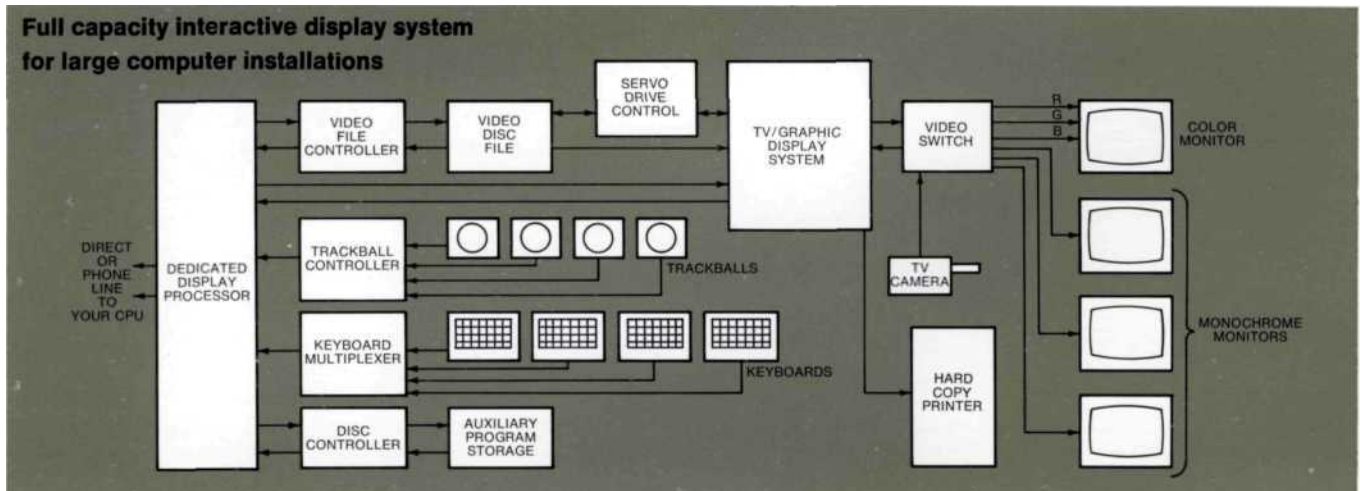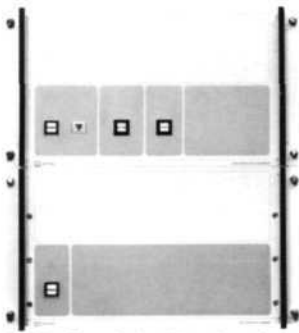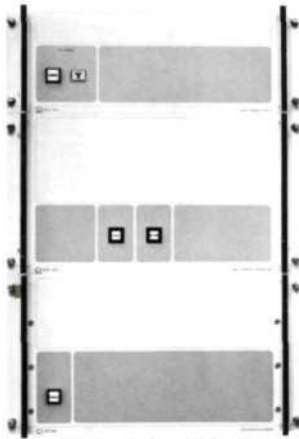
6500 Graphic Display System

6612 Display Monitor

6611 Display Keyboard

6514 Trackball

6600 Television Display System

6648 Electrostatic Printer

The System Building Blocks Data Disc systems are built around one of two central time-shared units: the 6500 Graphic Display System or the 6600 Television Display System. These units contain the computer interface, the display generator, and the dedicated disc memory. The independent display monitors are driven from these central units; keyboards and trackballs input directly into your computer through a multiplexer.

The 6500 Graphic Display System offers you comprehensive graphic and alphanumeric capability at a very low cost per display. It will drive up to 16 high-resolution display terminals or 32 medium-resolution display terminals simultaneously. The character entry rate is 2550 cps with an on-screen capacity of 4335 characters. There are 262,144 individually addressable graphic points (512x512), and the graphic entry rate is one single valued function per frame period.

The 6600 Television Display System will be used for applications requiring high performance and extreme speed. The graphics entry rate is one page of unlimited complexity every two or more frame periods (depending upon the computer's speed); the alphanumerics entry rate is 30 pages per second. Display capacity is 3200 characters; there are 307,200 (640x480) individually addressable display points. The system will drive up to 16 independent display terminals simultaneously. Channels can be combined for color and gray-scale displays.

The 6612 Display Monitor is designed for use with either the 6500 or the 6600 system. It has a high quality 14" monochrome CRT with P-39 phosphor. The terminal is housed in an attractive stand-alone cabinet.

The 6611 Display Keyboard is design compatible with the display monitor; it is connected to the display unit by an umbilical cord so it can be positioned independently. The keyboard uses 95 standard character ASCII codes and there are several ASCII-coded function keys. Multiplexers and interfaces are available for most popular computers.

The 6514 Trackball provides an operator controlled cursor for direct graphic input on any channel. The programmable cursor appears on the screen as a maximum white spot. The computer may position the cursor or may determine the cursor position selected by the operator.

The 6648 **Electrostatic Printer** provides an exact hard copy of the display. The copy is clean and as detailed as the display; both alphanumerics and graphics are reproduced.

Interface Options: Data Disc has standard interface systems for most popular computers.

DATA DISC

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