**Computer Graphics: Tektronix is leading supplier**

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Tektronix is the world's leading supplier of computer graphics. We both make and use computer graphics. Unlike the cobbler's children who had no shoes, we're one of our own best customers.

Customers are all around us, and so are computer terminals. A Tek terminal fits right in the midst of a busy insurance office, for example.

It's estimated that, in the USA, the average citizen is the subject of some computer process about 10 times daily. This compares with estimates on the USSR of once every seven days.

Computer graphics have been around for many years. However, transaction processing and similar computer applications have been the most common use of graphics.

The current trend seems to be a labor cost saving, while computer hardware costs are going down. Computer graphics can use this hardware to handle a lot of tedious hand operations that would otherwise be much more costly to do using expensive skilled labor.

Tek has led the trend to reduce the cost of computer graphics.

Applications abound. First National City Bank in New York uses a 4023 and hard copy unit to edit transactions. Good Samaritan hospital in Portland uses a 4006 in its lab to study molecular models—a study that was previously impossible before computer graphics reached today's capabilities.

In a Dartmouth physics class, a terminal helps the students visualize the plotting out of many boring handwritten computations so that students can concentrate on the meat of the subject.

Computer graphics may take many forms. A computer can draw ordinary graphs for data presentations, or a three-dimensional graph of a terrain that could be used for cartography or for data presentation. It can make line drawings such as schematics, models and IC masks. (We couldn't achieve today's miraculous developments in semiconductors without the computer's accuracy in laying out those masks.) A computer can recall numerous tone pictures, such as the ones transmitted from spaceships.

The Tektronix 4010 cut the cost of computer graphics from about $9000 to about $4000. Further developments led to the 4014, easy to use, and with a 19-inch CRT. The 4006, a smaller, lighter model, became very popular, and the 4010 continues to be a strong product.

The 4051 took the basic concept of a 4010 or 4060 and added a microprocessor, participating that microprocessor prices would drop enough to make such an instrument economically feasible. It has become a basic, stand-alone small computer.

The 4081 System goes one bigger. It has its own minicomputer, and uses magnetic disks or tapes to store data.

The 4023 uses a refreshed display instead of storage. It can do a host computer amount of graphic display, but doesn't offer the same resolution as our current models. It has the convenient editing capabilities of an alphanumeric CRT terminal.

Computer graphics can help create an etched circuit board mockup that works for the more complicated, more precise boards. It still needs a human to control the process.

A computer can help in the REDAC system do a complex board design. The ASAP (automated software) system also creates ECB design and works up the pages and drawings for the manuals.

In Tek's model shop, we use computer graphics along with an NCR machine to develop pilot models.

Making a 4651 and 4662 plotter can draw graphics of Tek's order activity.

With computer graphics, the "boomeater's children" not only have shoes, they have seven-league boots.

Pete was assisted in the presentation by Maynard Leach (ITDG, Marketing), who prepared slides and cartoons to illustrate the topic.

**Questions for Guest Speaker**

**What is computer graphics?**

**What is the purpose in computer graphics?**

**What are the major advantages of the use of computer graphics?**

Computer graphics is the use of automated picturing equipment to display the results of computing in the form of graphs or of use of the computer to assist in making maps, artwork, and drawings. The information is presented more quickly, more accurately, and at less cost than doing the drawings by hand.

**Will computer graphics be able to help in all areas of use?**

**Could every group find a use for computer graphics?**

If so, do we get ours? To what extent are computer graphics used at Tek? The use of graphics output on computer systems is a tool which has use in many areas around Tek, but not every group has a need. The most obvious applications are in those areas where drawings or artwork are being done by hand. I don't know of any applications in assembly.

What ranges are involved in the area of computer graphics? What range jobs are available in the computer graphics line and do they accept people without computer knowledge or background for these jobs?

Computer graphics, is this something that Tek can train someone to do? What educational background does one have to work in computer graphics? Because computer graphics is a tool used in many areas around the company the ranges involved relate to the specific position, not the use of graphics. The training for a position using graphics would include instruction in the use of the graphics equipment involved.

What about job displacement because of computer graphics? Computer graphics applications help perform the less interesting parts of jobs, which upgrades the position and makes it more interesting. They create a number of promotion opportunities in operation, service, and programming of the systems themselves. They also help improve Tektronix overall efficiency which helps us grow and makes more jobs of all kinds.

What instrument is involved in computer graphics? Does computer graphics involve plotters also?

Most Information Display Group products are used in the area of computer graphics. There are several types in the field. The 4006, 4010, 4014, and 4025, graphics systems such as 4651 and 4681, and hard-copy devices such as 4631 and 4662. The 4662 is a plotter.

Have microprocessors made computer graphics possible?

No, but they have helped the growth of computer graphics by lowering the cost.

Who says we are the largest supplier, or should I say leading supplier of computer graphics terminals?

If Tek is the world's leading supplier of computer graphic terminals, who are some of Tek's strongest competitors and how large a percent of the market does Tek have?

As part of our on-going market research we monitor computer graphics markets; that research indicates we are the world's leading supplier. Our competitors include computer manufacturers such as Hewlett-Packard, Digital Equipment Corporation, and producers of refreshed graphic displays such as Vector General, Inc, Megatek, and Ramtek. Tektronix is the only supplier of Direct View Bistable Storage Tubes (DVST) for computer graphics. We don't publish specific market share numbers, but last year's annual report showed Information Display Group sales of $98.7 million. This compares with some $5 million to $20 million for our competitors. Computer graphics represent only a small part of total business for Hewlett-Packard and Digital Equipment Corporation, our main competitors.

Are foreign countries buying computer graphics for educational or other uses?

A substantial portion of our sales of computer graphics equipment is sold through our international subsidiaries and distributors. We find international markets very much like our own, with differences in how advanced they are. Europe, for example, is very close to the U.S. while South America is quite far behind in all uses of computers, including graphics.

What does the future hold for computer graphics?

Continued strong growth. As the cost of graphics comes down it can be effectively applied to more and more applications.