

VIDEO PORTRAIT SYSTEMS
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Computer art has intrigued many people over the last twenty years, and a few brave souls have even attempted to introduce it commercially. About 2½ years ago, a new variation was introduced which has opened up some very intriguing possibilities in the consumer market. The key factor involved is simply the processing of "real world" pictures by computer to produce intriguing images. In its simplest form, a small electronic portrait studio uses a standard television camera viewing a subject. The resulting signal is digitized and a minicomputer employed for picture processing. Typical output to hard copy is a line printer using 7x9 matrix characters and a special set of read-only memories to provide a simulation of grayscale.

The market for this basic type of system has expanded rapidly in the last two years, fueled, in part, by the large profits reported from some installations. Hardware costs can range from \$7500 for a low resolution "simple minded" configuration of TV camera, digitizer, controller, and line printer, up to perhaps \$50,000 or more for a moderately elaborate system with multiple capabilities.

At the retail level, the selling price of a single 12"x12" picture may range from \$.90 to \$5 with an average price of \$3. Profitability of an installation can apparently vary widely and is influenced by factors such as basic image quality, studio location, and plain old-fashioned salesmanship. Several strategies may be used, such as selecting high traffic locations in shopping centers and amusement parks, or operating a seasonal business in resort locations. Another approach is to set up at special events such as new business openings, conventions, rock concerts, etc., in which case pictures may be sold directly or, alternately, short term rental of the equipment and operator is provided with pictures being given away for promotional purposes.

A block diagram of a typical system is shown in Figure 1 and comprises lighting, CCTV camera, video disc frame store, video digitizer, TV monitor, minicomputer, and line printer. In operation, the subject is seated before the camera and a fixed lighting pattern used. The subject is posed, "frozen", and the resulting image observed to insure that a pleasing picture has been obtained. Following this, the operator sets video levels and selects an appropriate computer program to generate a printout.

The line printer then produces a picture, which is removed, shown to the customer, placed in a protective jacket, and the transaction concluded. An alternate procedure is to copy photographs or other art work, in which case the customer brings in original material which is placed under the camera and an appropriate printout made.

The simplest picture structure is the 12"x12" format containing perhaps 90x120 "points" of information. A typical example of one of these is shown in Figure 2 and uses a special symbol set to generate a pseudo grayscale. Figure 3 shows a different form of programming wherein a variable size dot structure is employed, resulting in the equivalent of a much enlarged newspaper "half tone". In either case the 7x9 matrix of the line printer gives a relatively coarse image and pictures must be viewed at some distance in order to produce a semblance of naturalness.

Reproduced picture quality is influenced by a series of factors, the first, of course, being reasonable flattering lighting. The TV camera is a key element as it will provide the initial limitation in picture quality. In most instances a high resolution camera will not be required and the important considerations will be freedom from noise and good grayscale reproduction. In connection with this, it is important to note that the standard vidicon camera employs an Antimony Trisulphide target which has semi-logarithmic characteristics, tending to compress the whiter portions of the picture. This is desirable when looking at a television monitor as it compensates for the anti-log characteristics of the CRT, but can have some negative aspects when a limited number of grayscale levels are digitized and when hard copy is generated. Camera tubes with linear characteristics are readily available, with the most common being the silicon diode target tube. This tube also has the advantages of exceptional ruggedness and freedom from accidental damage due to exposure to bright light. Estimated lifetime is approximately 10 times that of a conventional vidicon tube.

Inasmuch as the total "printing" process may take from 30 seconds to over a minute, it is highly desirable to have some means of picture storage so that the subject will not have to remain in a rigid pose for the entire process. Typical memories can include scan conversion tubes, video disc recorders, a digital field freeze, or the minicomputer memory itself, when used in a fast DMA mode. Using a memory prior to computer processing is convenient in that it allows the operator to preview the basic image and insure that a pleasing result has been obtained. This can save a considerable amount of paper and/or customer dissatisfaction.

Several approaches to digital conversion of the video signal may be made. First, a very high speed A/D may be employed doing a line by line conversion and dumping into a digital memory. Such A/Ds are not too expensive when operating in a reduced resolution, reduced grayscale, format such as 128x128x4 and, in fact, you can get a complete package including a buffer memory in the Robot Research Model 400 Ham Slow Scan TV Converter. A note of caution, however, 4 bits of grayscale, or 16 levels, will normally not give completely satisfactory quality due to a phenomenon known as "contouring" which gives a distinctly artificial appearance to the reproduced image and frequently causes a loss of important detail. A 5 bit system is preferable for naturalness.

A second form of A/D conversion uses relatively slow speed sampling, essentially taking one sample per TV line which allows approximately 60 microseconds to make an A/D conversion. This is a very effective and economical approach to achieve both high resolution and extended grayscale.

With an actual minicomputer based system, a wide range of programming variations may be used to alter the end picture product. For example, pictures may be individually titled and dated, with perhaps a few pertinent comments added. One system uses a computer generated border, and other variations include multiple images, strip pictures, giant pictures (made by gluing two or more strips together), and deliberate tone reduction or "posterization" which reproduces an image having from two to four shades of gray.

Most systems in the field appear to employ conventional line printers such as manufactured by Centronics and Printronix, frequently with slight modifications to achieve closer character spacing. A variety of papers and ribbons are available for use with this type of printer, including sublimating inks for heat transfer processing. More expensive units such as the electrostatic printer-plotters can produce appreciably higher resolution images for a given paper area. It is also feasible to use direct CRT/hard copy output devices but, unfortunately, the dry silver paper used in this process has some disadvantages, namely limited size, high expense, and a fugitive image quality when exposed to intense illumination such as direct sunlight.

As in any computer based system, a large number of variations may be anticipated. These include not only ingenious programs but the use of accessories such as floppy disc memories for reference picture storage or customer reorders. Two or more TV cameras may be used with combined signals and special effects equipment to expand graphic input capabilities. For the serious operator, picture output may be produced photographically in

terms of slides or prints, allowing the use of full color for a wide range of effects.

In conclusion it should be noted that the video portrait field is very much in its infancy and system installations, for the most part, are producing relatively crude and unsophisticated pictures for the walk-in consumer trade. It is, however, a personalized and distinctive product.

In the near future we may expect very substantial improvements in quality and techniques and an increase in professional and semi-professional services. Perhaps the 1890s photo studio, currently undergoing a surge of popularity, will face stiff competition from the computerized system which provides an endless number of variations in imagery.

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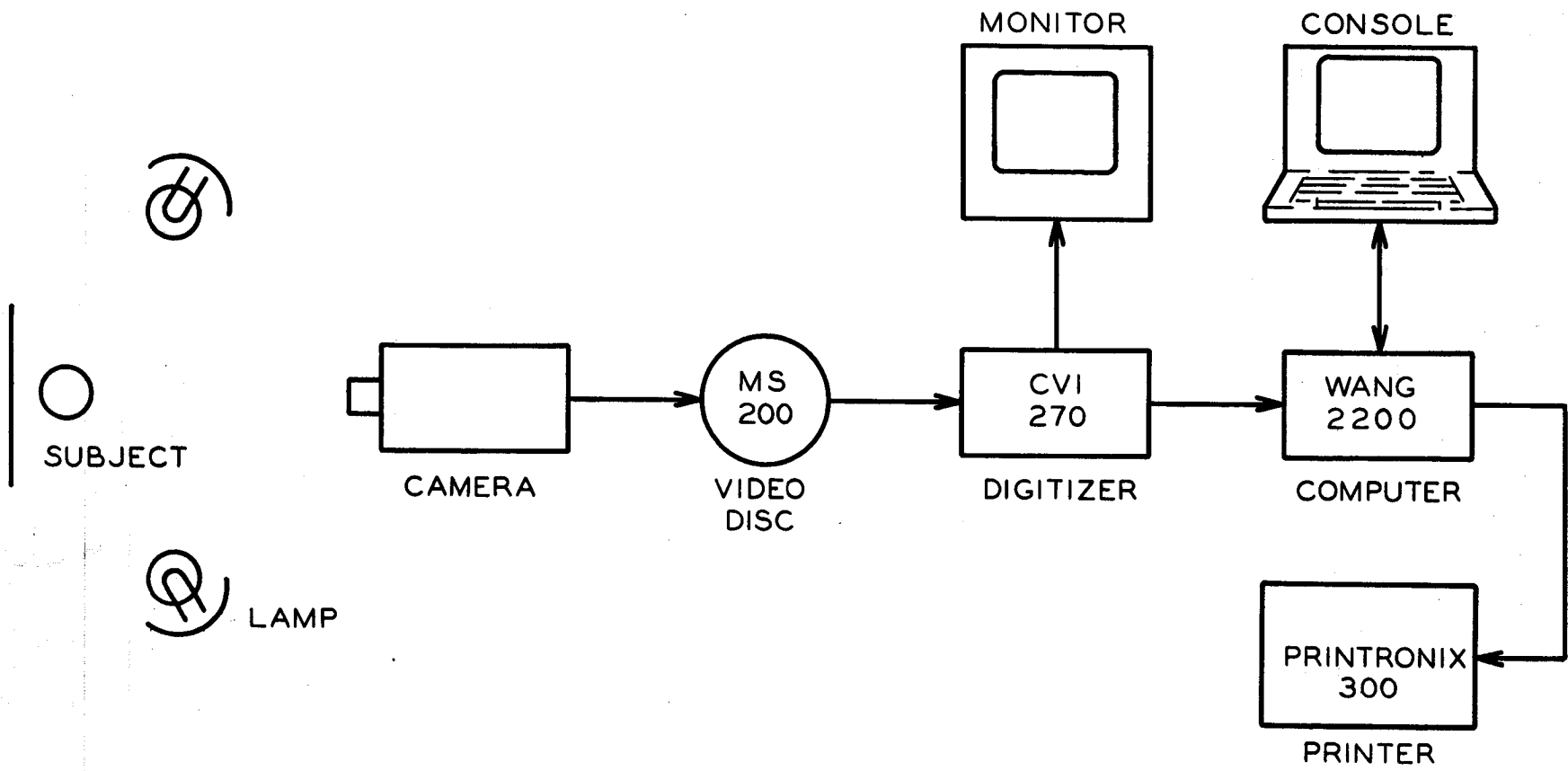


FIGURE 1
BLOCK DIAGRAM
BASIC CVI DIGITAL
PORTRAIT SYSTEM



Figure 2

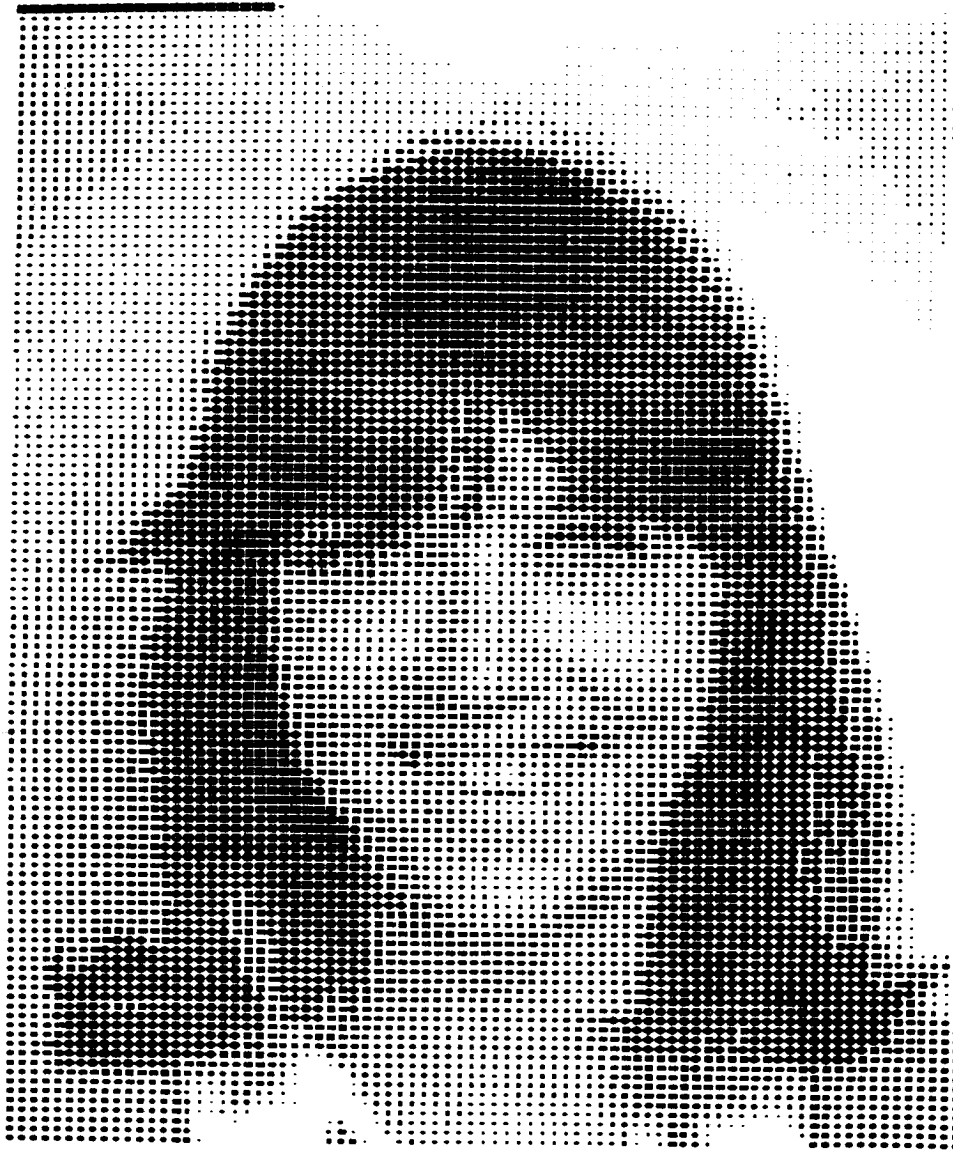


Figure 3

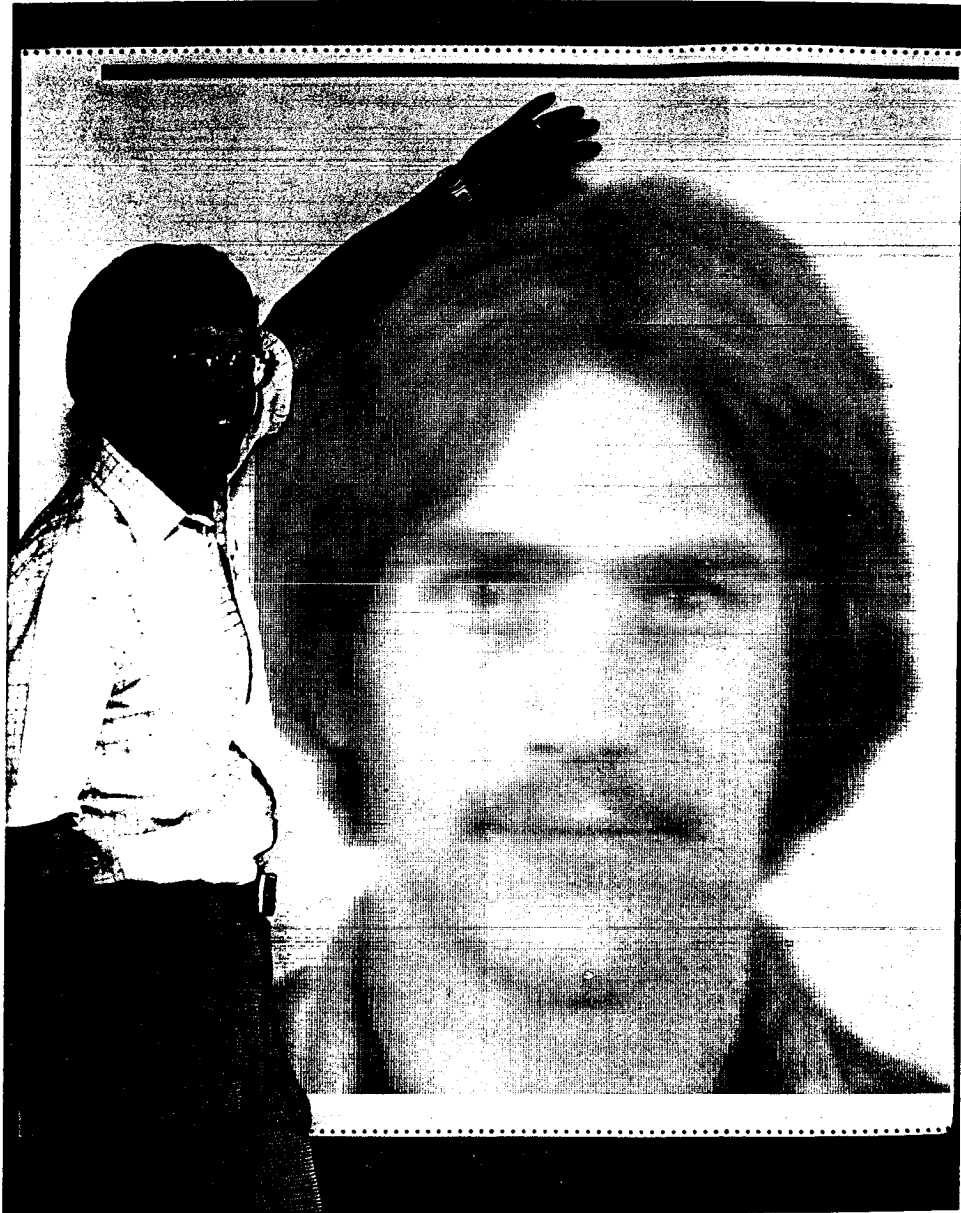


Figure 4