Enlarging the vision of man.

DatagraphiX Display Systems

"There is only one way of seeing things rightly, and that is, seeing the whole of them."
John Ruskin

In our time, there are so many things for a man to see. And so many places for him to look.

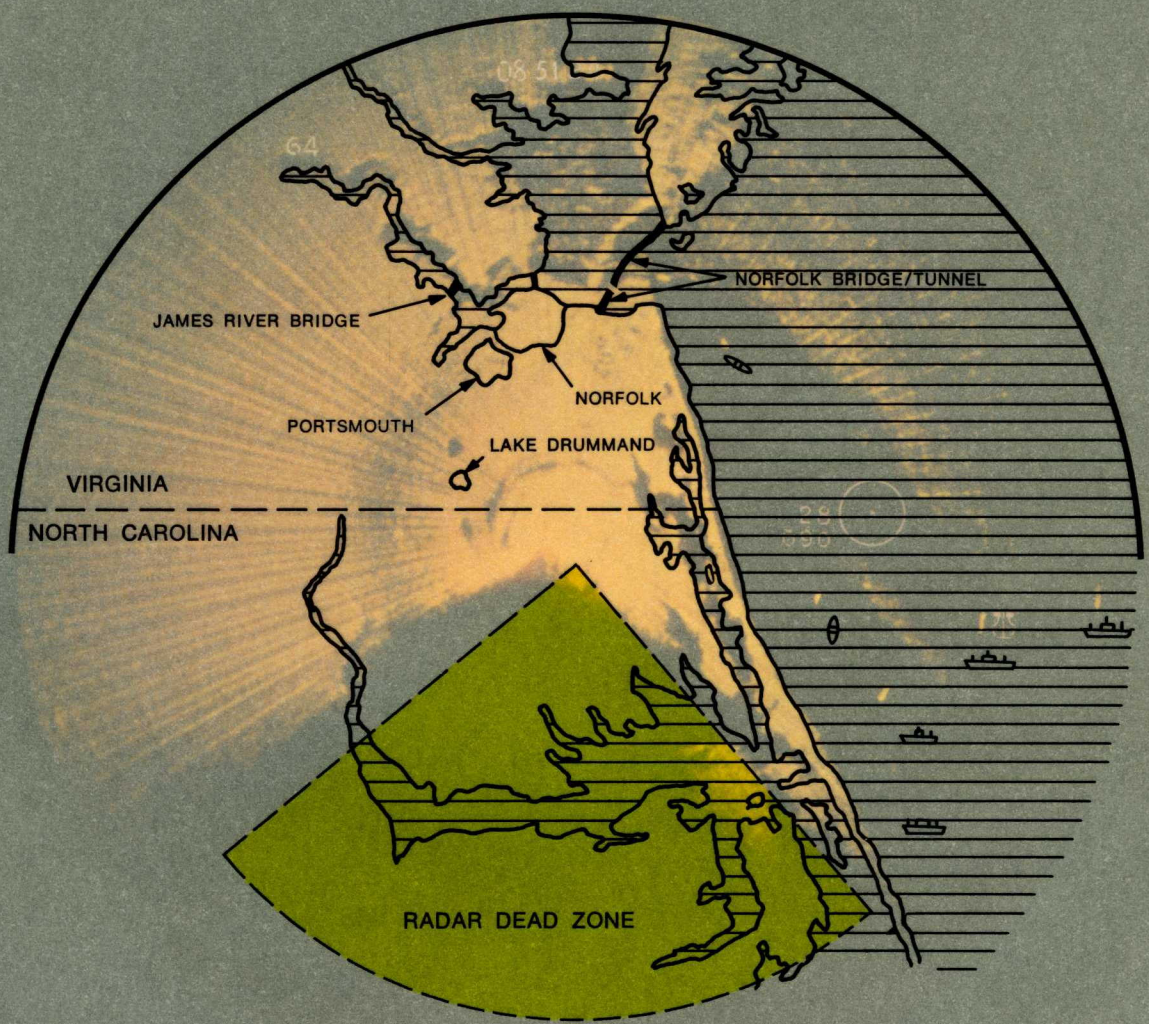
Using the computer, he can now look upon the macrocosm and microcosm of his world from any point in time, thereby gaining for himself the vision of a prophet. Using television, he can visit in an instant any place on earth, or watch from outer space the development of a cold front over Des Moines. Using electronic sensors, he can search out the dark, or trace the invisible, or uncover an enemy lurking on the bottom of the sea.

He can see through camouflage to direct fire against a threat to his security. Or extract instantly a single fact from out of a data bank containing a million facts. Or see New England for the first time as he listens to a tape recording of a Robert Frost reading.

Man is beginning to see the whole of things.

Helping in this effort is our job at Stromberg DatagraphiX. We build display systems that allow men to absorb all the new information clearly, without cluttering their vision. Display systems that allow men to interact with what they're seeing to ensure that men, not events, control situations. Display systems that reflect years of studying man/machine interfaces. And years of leadership in the display industry.

What we do then, is to help people enlarge their vision. How we do it—in the air, on land, at sea and in the society—is described on the following pages. See for yourself.


NORFOLK BRIDGE/TUNNEL
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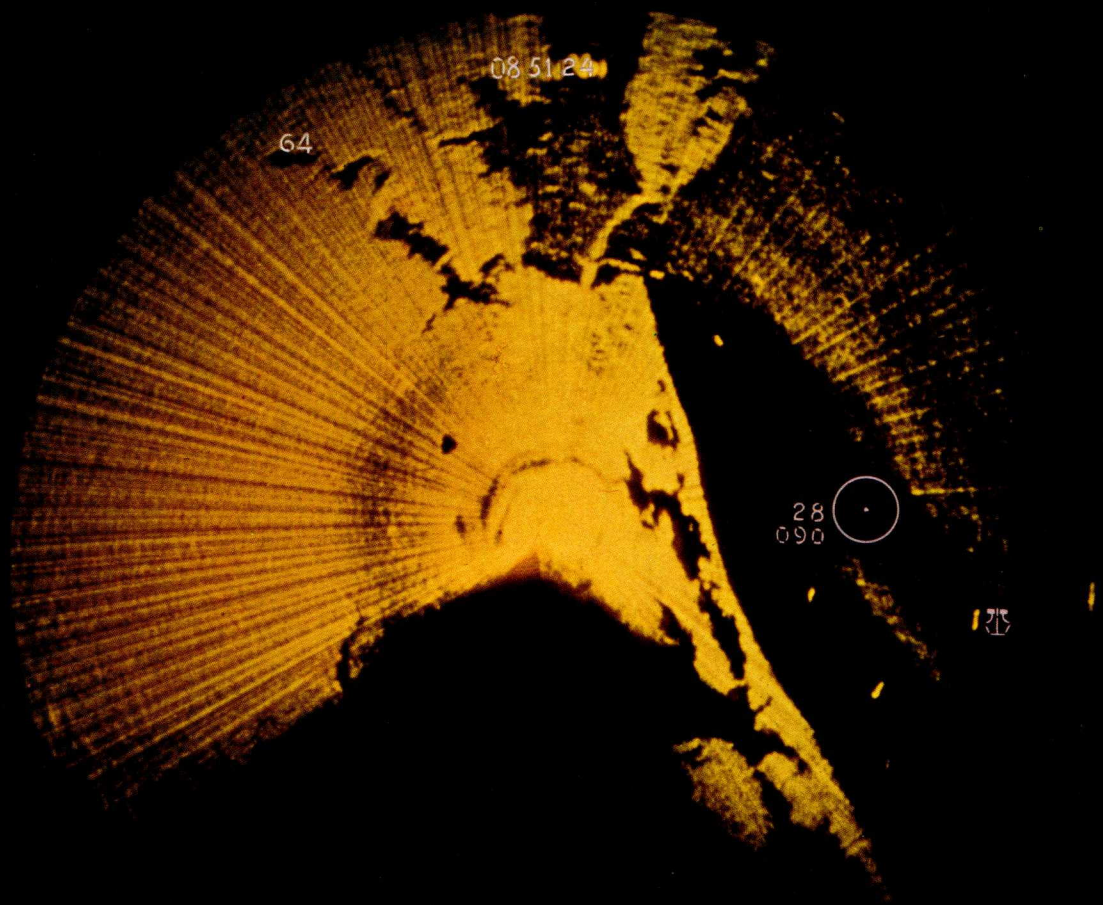
RADAR DEAD ZONE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Enlarging visions in the air.

Man has frequently placed his gods on high—atop mountains, among stars, in the sun itself—because the quality common to most deities is the ability to see everything. And the best place to do that, is from above.

Searching to see more, man himself went aloft for the first time in 1783. But the view from his balloon was disappointing. So he invented the airplane, and extended his vision. Still dissatisfied, he invented radar and extended his vision further. He invented airborne sensors to penetrate the opaqueness of the ocean. And more airborne sensors to measure heat and turbulent air and fertile soil. He invented the electronic computer and took it aloft with him—so that now he sees not only things, but sees too, the relationships between them.

This is where Stromberg DatagraphiX enters the story. Formerly called the Data Products Division of Stromberg-Carlson, we've been building cathode ray tube displays for over 18 years.

In 1962, the U.S. Navy, after conducting an industry-wide survey, selected us to develop an airborne display system that would combine all of man's new information—the sensor data, the television images, the computer information—in a single display. For use in the Navy's automated anti-submarine warfare system, A-NEW.

A year later the first model was flying and the A-NEW program continues today, with new techniques and new equipment steadily evolving.

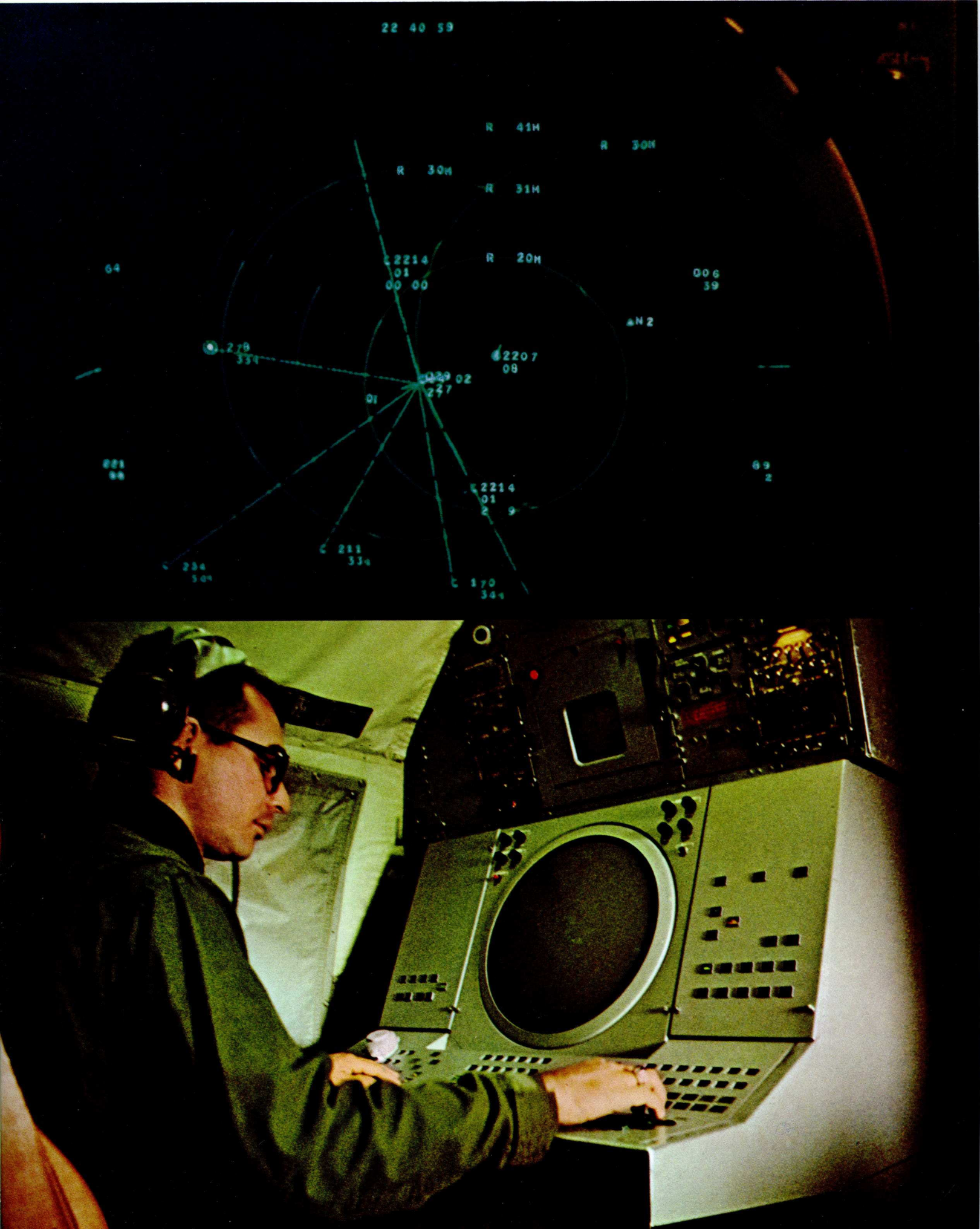
The command and control console.

We build the command and control consoles used on each airplane for the A-NEW P3C program. The consoles are able to present multiple information simultaneously from a variety of inputs. Live television and sensor information—showing ships, planes and submarines in the area—can be combined with alphanumerics and symbols generated by an airborne computer—and all of this superimposed over maps to present to men, a total view of the situation.

Console functions are under the control of computer software and man himself. A track ball and other controls permit him to superimpose circles, vectors and plotting points over the displayed action. A keyboard keeps him in continuous dialogue with the computer. He has at his fingertips an awesome assortment of options. He's able to see, evaluate and when he's ready—act.

Other A-NEW displays.

In addition to the command and control display consoles, we also produce the tabular displays used in the Navy's P3C A-NEW system. Moreover, we are developing displays for the Navy's carrier based VS A-NEW aircraft system.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A unique cathode ray tube.

The success of the DatagraphiX display systems on the A-NEW program is due in large measure to the CHARACTRON® Shaped Beam Tube we build.

The alphanumerics and symbols displayed on the CHARACTRON CRT are produced by directing the electron beam through individual characters etched in a micro-matrix located within the tube. This technique stencils each character clearly into the tube face—crisp and steady—and permits intricate symbols to be displayed as sharply as the type on this page.

Pictorial information such as curves, vectors and video displays are produced by spot-writing methods and the matrix-produced alphanumerics and symbols are time-shared with the pictorial images. Thus a single display becomes multi-purpose. We have pioneered the time-sharing concept in CRT's, which accounts for our leadership today.

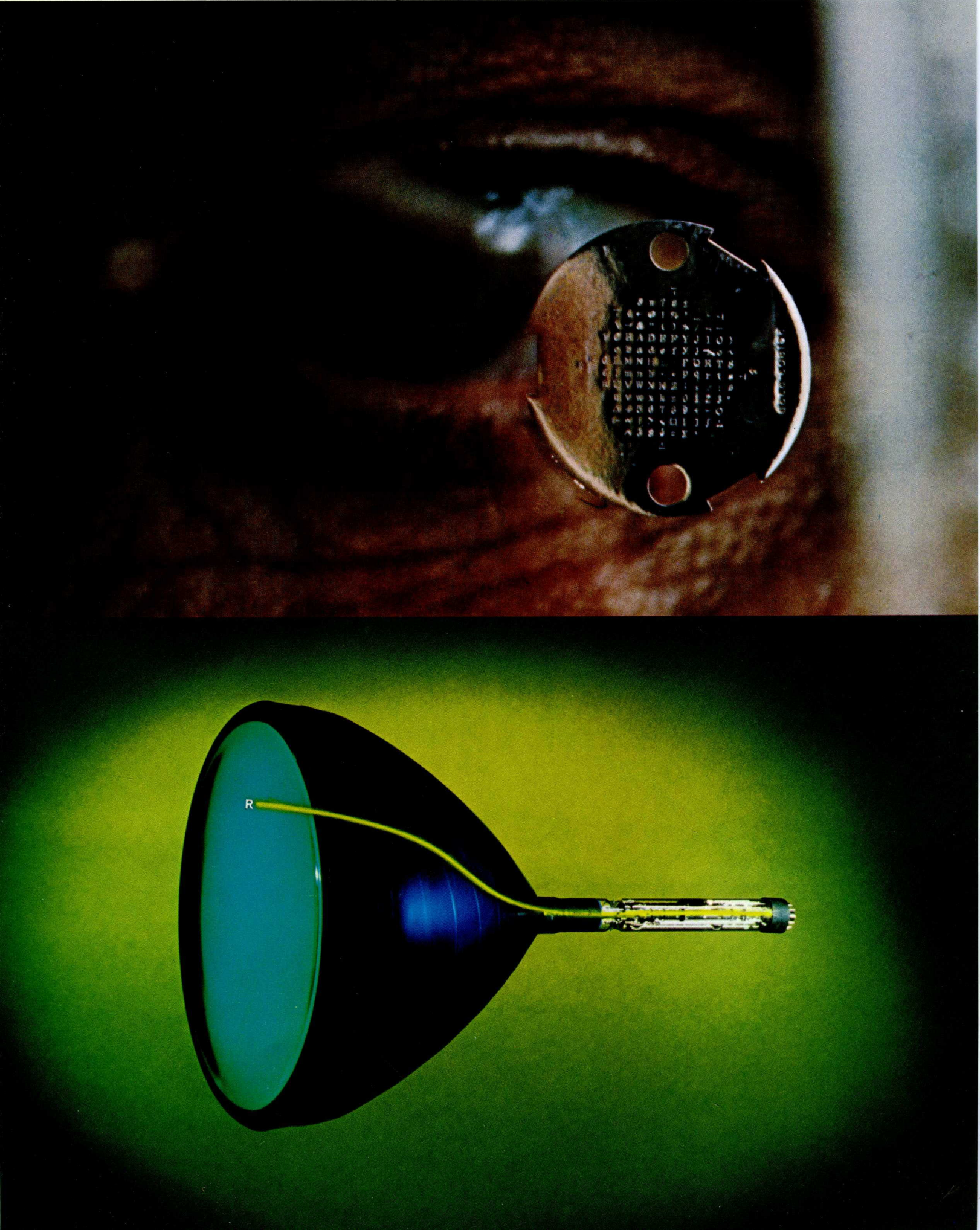
The CHARACTRON Shaped Beam Tube, with its character resolution measured at 5,000 to 8,000 lines per screen, provides higher information transfer fidelity, lower error rates and less fatigue. The clearest and easiest-to-read display available. Helping people see more through the use of multi-purpose displays is our business here at Stromberg DatagraphiX. We have more experience in multi-purpose displays than any other display manufacturer in the nation.

The growing need for airborne displays.

Increasingly, men depend upon airborne displays. To chart safe courses through the crowded sky. For reconnaissance. Close air support. Air/interdiction. Air defense. For airlift and airdrops. Air rescue. General command support. And for command and control of events on land, on sea and in the air itself.

In the 18th century man invented flight, and extended his vision. In the 20th century he invented the electronic computer, and extended his intellect. And now with airborne displays, he's combined his two mightiest inventions.

So that he can see what must be done.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Enlarging visions on land.

In the air he commands sweeping vistas; but it is on land that man lives, and it is from this vantage point that he mainly views his world. At Stromberg DatagraphiX we have an impressive history of designing and building successful ground-based display systems.

We began by developing the CHARACTRON Shaped Beam Tube. At first we used it as a simple CRT display. Its first large-scale use in this application was in the U.S. Air Force 416L Program, SAGE. However, we soon discovered the tube filled an even broader need in the high-speed readout of information generated by data processing equipment. The extraordinary clarity of its image makes the CHARACTRON tube an ideal link between people and computers. Not only as an output device, but as a means of input as well.

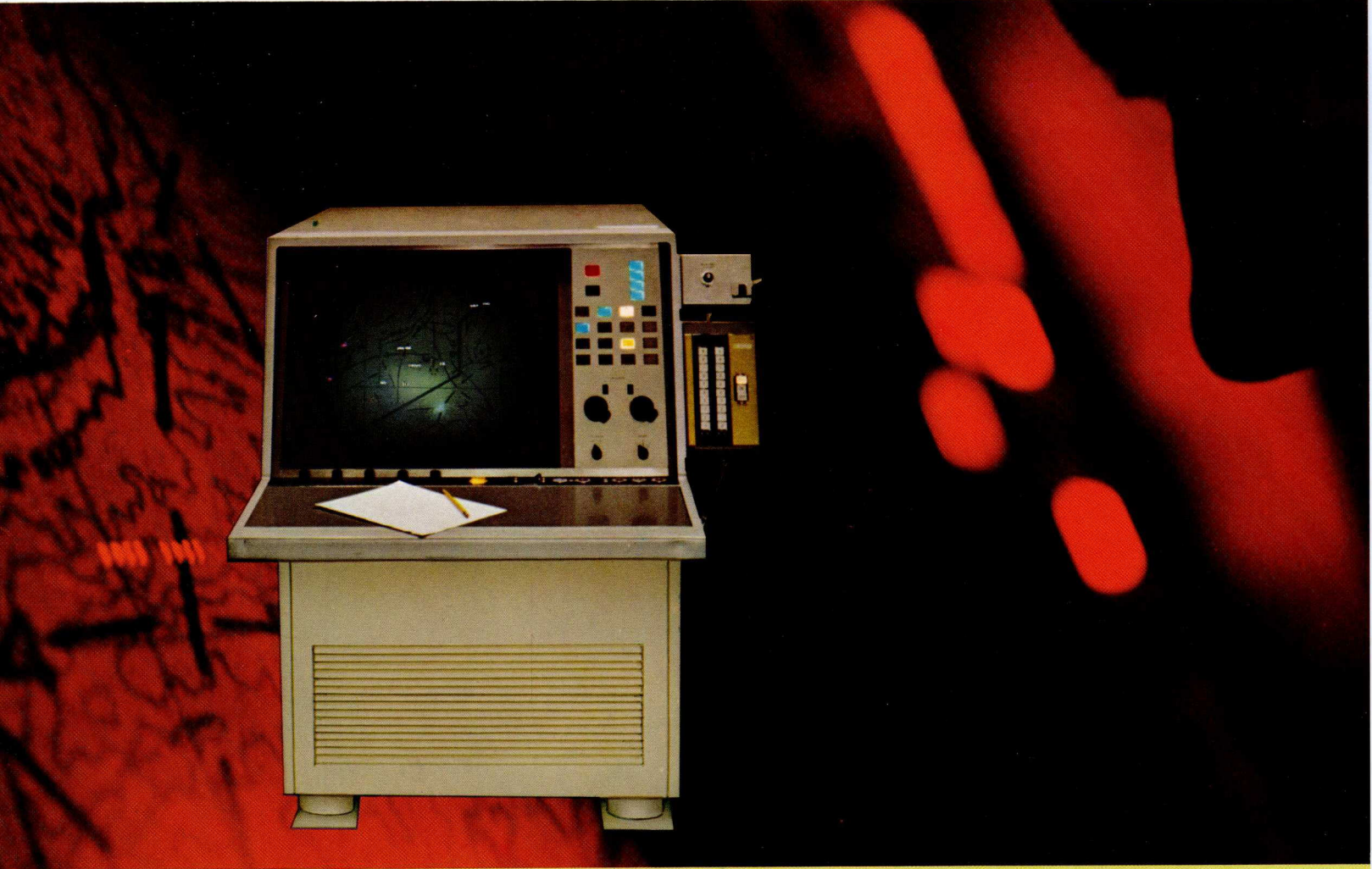
In the ensuing years our efforts have been directed toward advancing this crucial link between man and machine.

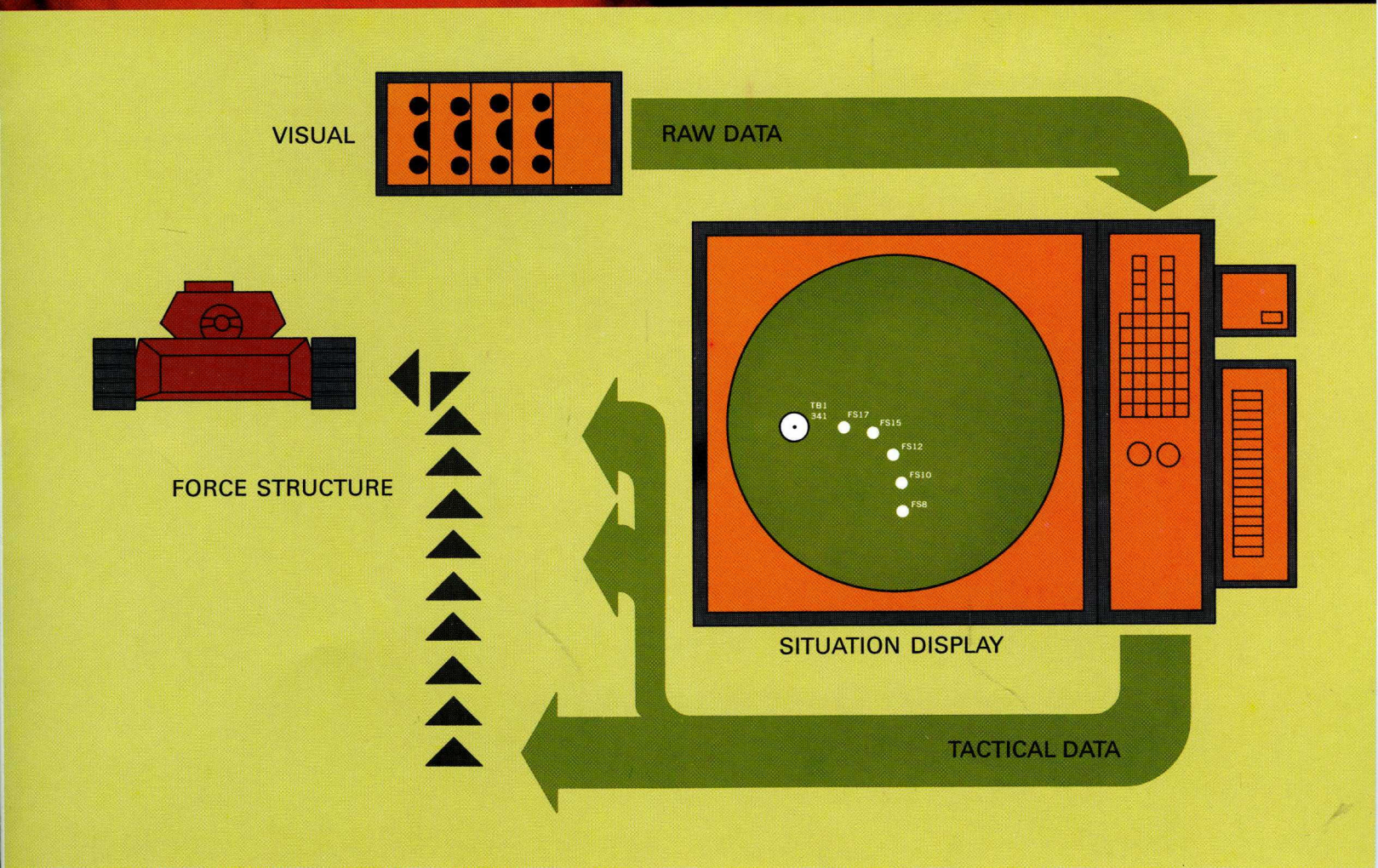
Real time battle display.

The Battle Area Surveillance and Integrated Communications Systems (BASIC), and a more portable version, the Mobile Tactical Exercise and Control System (MOTECS), were produced by us for the U.S. Marine Corps. With both systems, tactical information from forward observers is transmitted through conventional field communications channels by means of a hand-held digital data input device no larger than a walkie-talkie to a computer located at a command post. The computer-processed battle information is then superimposed over a geographical map display—created by projecting slides of the map onto the CHARACTRON tube face from a special window located at the rear of the tube—revealing the entire battle situation in a single display, on-line and in real time.

Army War Room display equipment.

The U.S. Army War Room at the Pentagon is equipped with Stromberg DatagraphiX display consoles. These consoles display both tabular and graphic information. They have built-in line printers for the production of paper copies of the displayed material. A keyboard, joy stick, and other function controls permit the instantaneous, two-way exchange of information between men and computers—accelerating decision making, and helping provide the U.S. Army with its incomparable flexibility and control, emulated by every ground fighting force in the world.




VISUAL
RAW DATA
TB1
341
FS17
FS15
FS12
FS10
FS8
SITUATION DISPLAY
FORCE STRUCTURE
TACTICAL DATA

The Rear-Window Tube

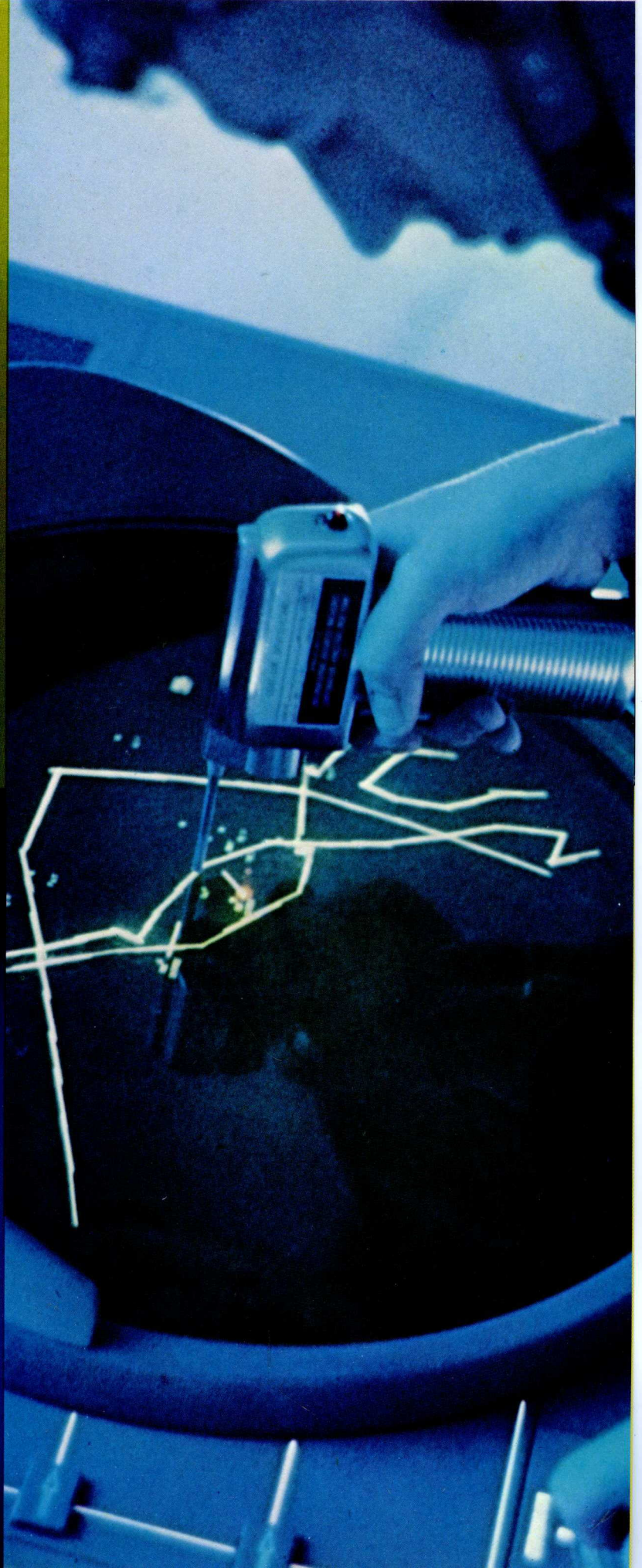
In some display applications, such as in the MOTECS example, it is necessary to maintain certain static data, such as a map—while other data, such as target information, continuously changes. Generating these two types of information both electronically puts a burden on the computer. To avoid this, we developed the Rear-Window Tube. It works this way: a random-access slide projector is installed at a rear optical port in the tube. The static data is prepared on slides and projected onto the tube face. As the area under surveillance changes, the operator, or the computer, selects another slide. Through use of a half-silvered mirror, photographs may be taken of the tube face—from the rear port—while the display is simultaneously being observed from the front.

The Two-Gun Tube.

Still another example of Stromberg DatagraphiX' leadership in multi-purpose displays is the Two-Gun Tube. In radar systems requiring high rotation speeds (25 revolutions per minute or more) and many hits to build an image, there may not be sufficient time to form alphanumeric and symbol characters. For such applications we build the Two-Gun Tube. One gun produces computer-generated information, while the other generates high resolution video images. We recently built and installed a Three-Gun Tube Display unit being used for simulation purposes. We even built a Five-Gun rear-window Tube, which allows the simultaneous presentation of six separate images—five electronic and one optical—in a single display. The point is, we can take the superior performance of the CHARACTRON tube and apply it to just about any need.

The Sequential Stroke Generator.

We build complete information handling display systems, including those which are compatible with conventional CRTs. Case in point: our remarkably versatile Sequential Stroke Generator which utilizes an efficient new stroke-writing technique. It can generate as many strokes per character as needed: 14, 16, 24, 32 or more. Lightweight, it only weighs 2 lbs. Compact, you can carry it in a cigar box. Rugged, the U.S. Navy is using it in the VS A-NEW carrier-based developmental system. Fast, it produces complete alphanumeric characters in 2 microseconds. Flexible, you can add or delete characters in minutes, or change a complete character repertoire, by merely inserting simple-pre-wired code strips. Economical, a version is currently being used in commercial data processing equipment. It can be used separately and in combination with CHARACTRON tube systems as best fits the application.



The 1200 System

We designed the CRT Display Generation System presently in use in NASA's Apollo Mission Control Center in Houston. The task assigned us was to devise a means of making available dozens of computer data channels to scores of operator locations simultaneously—in the most efficient, easiest-to-read method possible—while permitting each operator to receive, in addition to computer readout, video information. Our solution: the 1200 System.

The heart of the 1200 System is a series of CHARACTRON Shaped Beam Tubes upon which the computer output is generated, one tube unit for each data channel desired. This output is then picked up by video cameras and distributed throughout the Center on a high resolution closed circuit television system. This design allows the men at the consoles to choose the appropriate computer data, or choose television images generated on the ground, or video transmissions from the spacecraft itself—plus they can call up fixed information prepared on literally thousands of slides, such as maps, charts, scales, reference documents, etc., which they can view separately, or if they choose, can superimpose over the computer and video information.

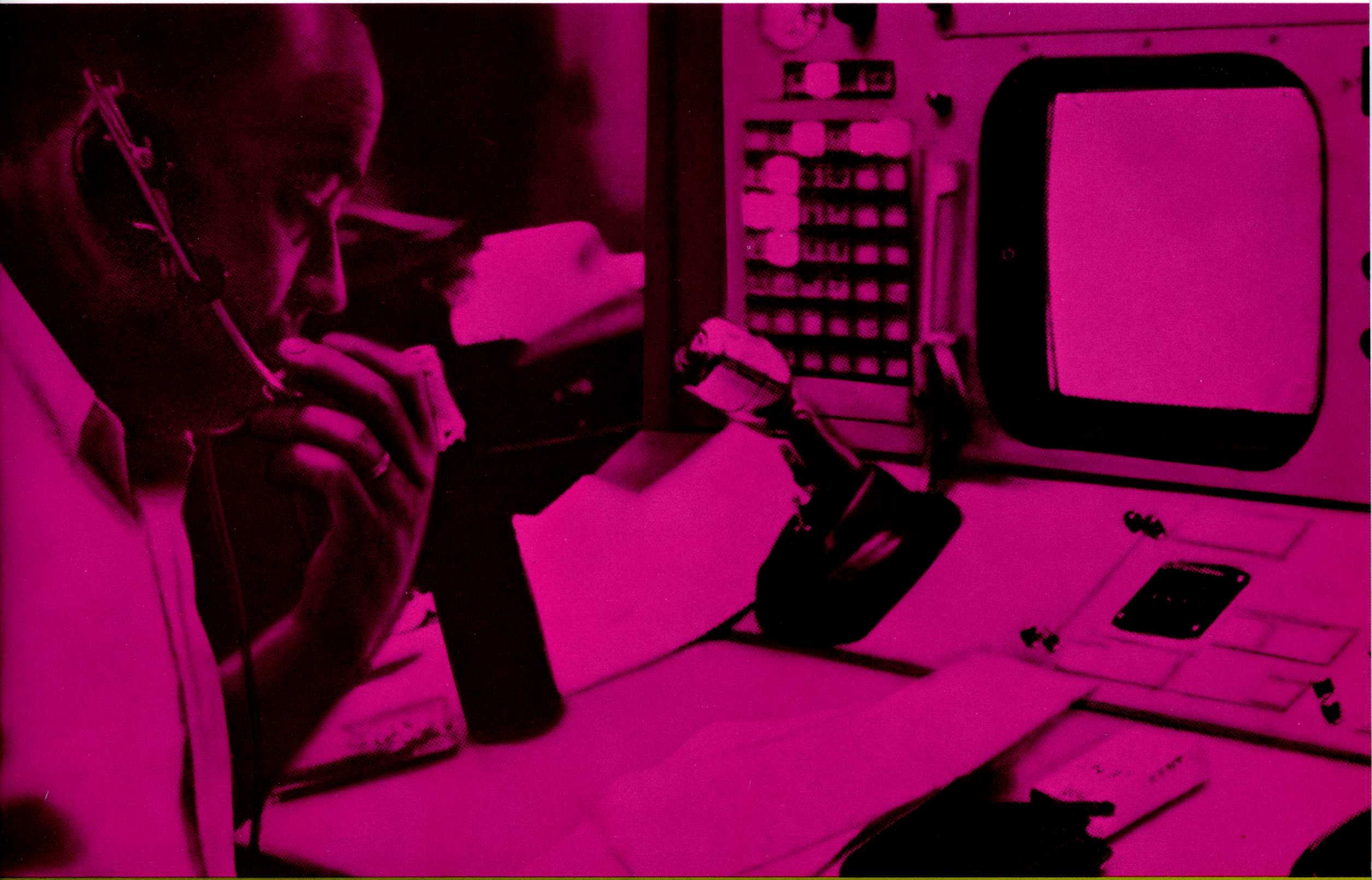
Mercury Program

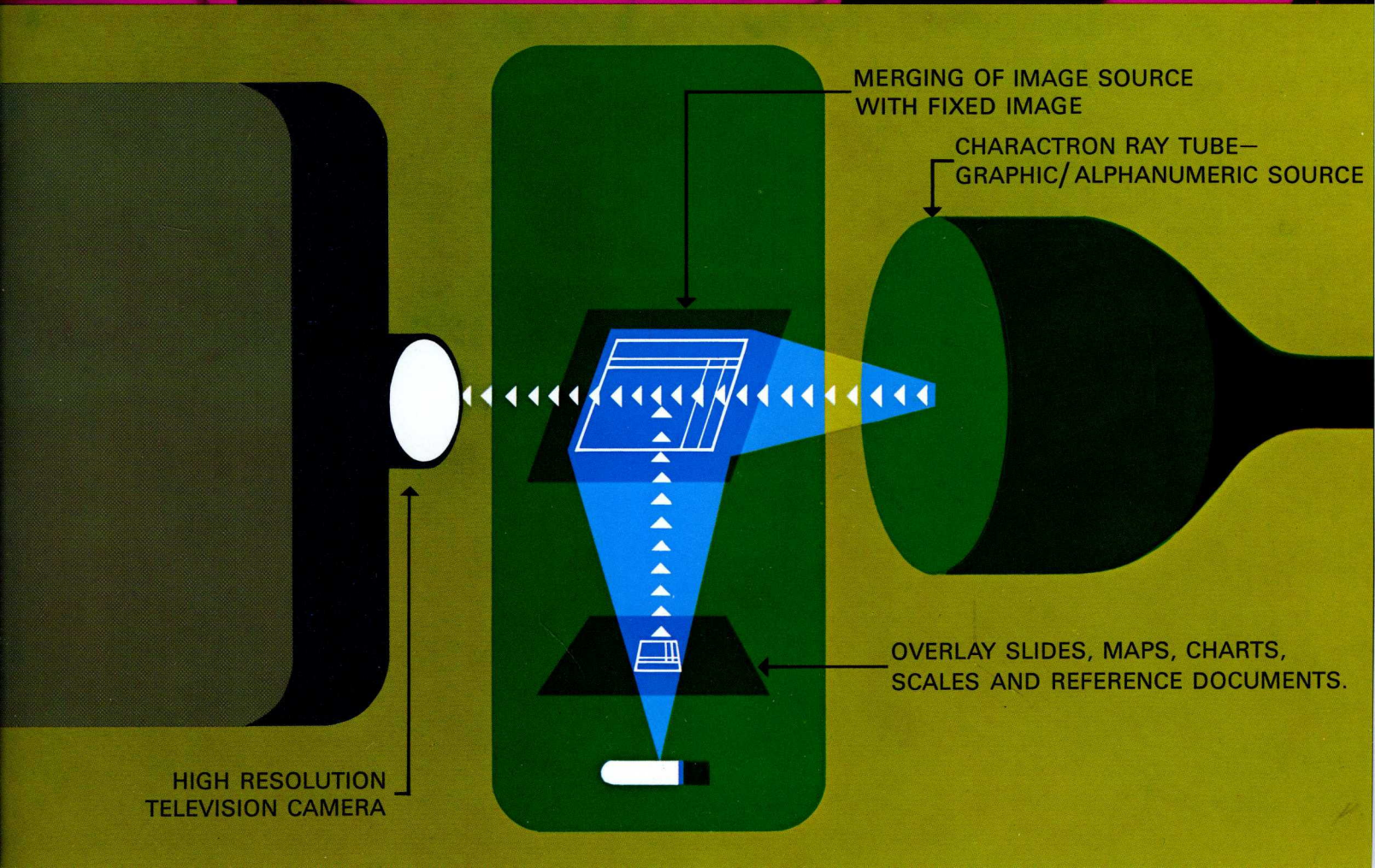
In addition, we designed the Mission Control Centers at Cape Kennedy and Bermuda for the Mercury Program. This included not only the design and layout of the rooms themselves, but the development of the display equipment used inside—including the very familiar large scale earth orbit display.

With Our Feet On the Ground

Stromberg DatagraphiX has designed and built many other display installations for use on the ground: the DAISY Program for the U.S. Air Force. Air Traffic Control displays for the FAA. Large-group displays for the U.S. Air Force. High speed printers for the Jet Propulsion Laboratory. And more.

Man looks upward to the stars as a new frontier to explore; and downward to the bottom of the sea as a new frontier to settle; and here at Stromberg DatagraphiX, we're looking too. But, we haven't lost perspective: the view, as always, is from land.




MERGING OF IMAGE SOURCE
WITH FIXED IMAGE
CHARACTRON RAY TUBE—
GRAPHIC/ALPHANUMERIC SOURCE
OVERLAY SLIDES, MAPS, CHARTS,
SCALES AND REFERENCE DOCUMENTS.
HIGH RESOLUTION
TELEVISION CAMERA

Enlarging visions at sea.

We are each of us islanders, living on one of the great continental divisions of land that partition the earth, each of us separated from the majority of our kind by vast distances of ocean. We stay in touch through radio, television and flight—but we stay connected through the exchange of raw materials and finished goods, by ship.

Ships remain the vital links that connect our island world, and coalesce the scattered family of man. Which is why other ships, painted grey and bristling armament, must continue to sail the seas to protect the sovereignty of nations—and ensure safe passage of their goods.

Helping the military sea captain and his subordinates better command and control is another of our functions at Stromberg DatagraphiX.

The Fighting Control System Laboratory.

In a General Dynamics Research Building at Pomona, California, a laboratory has been built to simulate the functions of a Combat Information Center aboard an Ocean Escort (DE 1052) class of U.S. Navy ship. The laboratory has been used as an engineering tool for the development of software and hardware components for information management systems—particularly for weapon systems command and control.

The two functional areas of the laboratory were the "Ship's Fighting Center" and the "Unit Commander's Room." In both areas we designed, built and installed the Fighting Console displays—man/machine interfaces that put at the fingertips of a single man the experience of thousands, that allow him to see the environment, including his own ship, in real time—yet allow him simultaneously to move backward through time to study antecedents or forward through time to game options, that allow him to control the complete system, including weapon deployment, with two simple actions—the pressing of buttons and the rotation of a recessed ball. That allow him access to radar and sonar, information from lookouts and remote vehicles, analog data, television video, reference grids, maps, overlays—portraying all the information required, in a single display.

The computer processes the operator's decisions and initiates the action. Weapons available to him are TARTAR (Surface-to-Air and Surface-to-Surface) and ASROC (Rocket Thrown Torpedo and Depth Charge). Displays generated on a CHARACTRON tube are projected on large screens in the Unit Commander's Room.

A significant contribution to the success of the Fighting Console display is the experience we gained in building the Sea Surveillance Tactical Display for the Navy a few years back.

Now we're going to put our experience to work with the Fighting Control System Laboratory, in command and control throughout the world.

Next time you sit down at a tactical display console, look for the manufacturer's name. We probably built it.


ASSIGN TRACK TYPE
0. AIR ENEMY
1. AIR UNKNOWN
2. AIR FRIENDLY
3. SURFACE ENEMY
4. SURFACE UNKNOWN
5. SURFACE FRIENDLY
6. SUBSURFACE ENEMY
7. SUBSURFACE UNKNOWN
8. SUBSURFACE FRIENDLY
9. DROP TRACK
TRACK
PRIORITY
COURSE
SPEED
ALTITUDE
CURSOR
KEYBOARD

Enlarging visions in a free society.

It is fashionable today in the popular press to refer to a particular kind of a problem as a "gap." We have the "Generation Gap," and other gaps of varying size and content. But there is another gap today, not nearly so well publicized, that concerns us markedly here at Stromberg DatagraphiX. This is the gap between information and knowledge—the gap between the many things there are to know, and knowing them.

SD 1110 CHARACTRON Display System.

On the previous pages we've described some of the methods we employ to narrow that gap, using for the most part CRT displays as the basis to design systems that handle large amounts of information, on-line and in real time. Another such method is our DatagraphiX 1110 CHARACTRON Display System, designed to handle the prodigious input and output capabilities of third-generation data processing systems.

Each DatagraphiX 1110 Display Terminal contains extensive built-in control features which give the unit unprecedented flexibility. We market DatagraphiX 1110 Display Terminals by themselves—as stand-alone units—or with controllers which operate multiple terminals. In either case, the terminals are compatible with nearly all on-line computer systems without the need for program or hardware modifications.

Micromation.

But not all information systems applications require the speed and functional capabilities of on-line CRT displays; much of the output processed by computers can be handled off-line. For this purpose, we have created a method called Micromation. Micromation systems print computer output on microfilm at extremely high speeds—far faster than printing the information on paper. The smaller bulk of microfilm makes it less expensive to distribute than paper. And retrieval time, using automated Micromation Inquiry Stations, is at least three times faster than paper methods. An optional high-speed production hardcopy printer produces paper copies when needed.

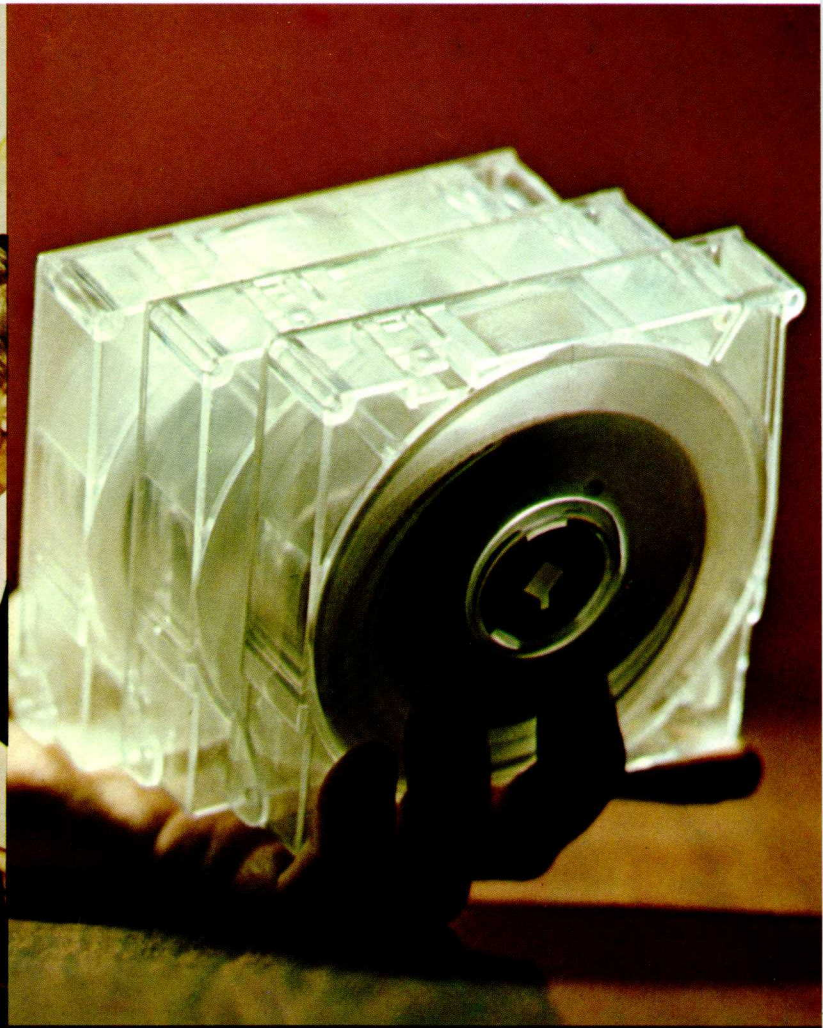
Large Screen Displays

We're very involved in large screen displays. Currently we're developing pin-matrix light valves and projection systems to improve the reliability and resolution of large, theater-size displays. The application of laser beam technology to this field is also being investigated.

An optimum cost/performance ratio.

We manufacture a complete spectrum of computer input/output devices—from real time CRT systems to on-time computer printers that print on microfilm. Therefore in each instance, we can provide a balanced information system based on the optimum cost/performance ratio for any given situation.


AMERICA
SD 1110



Enlarging visions in the future.

We do much research at Stromberg DatagraphiX—in optics, in human factors, in systems engineering, in feasibility studies. We've been granted 90 patents in just cathode ray tube technology alone.

We're advancing the art of laser displays. Laser technology presages a whole new era in information-handling, with displays assuming even greater significance.

We're continually probing new concepts in fiber-optic cathode ray tubes, searching out new applications for this remarkable technique.

Research and development on new methods of data entry, Input Technique Series Light Gun, Electric Pencil, Joystick, Trackball and Zone Sketch and Tablet are in a continuing program here at Stromberg DatagraphiX.

Our scribe system makes it feasible to integrate 3 discrete levels of dynamic information in one display. A stylus etches a moving trace on the opaque side of a slide, so that low-speed vehicles such as ships, or slowly changing situations such as weather, can be combined (in color) with time-shared inputs of both digital information, and information from television, radar and other detectors.

Electroluminescence continues to be a promising area of study at Stromberg DatagraphiX.

We're able to build CRT's in the shape of complete spheres so that global maps can now display the world—as it really is, this very instant.

We're deeply involved in developing new technology for color displays.

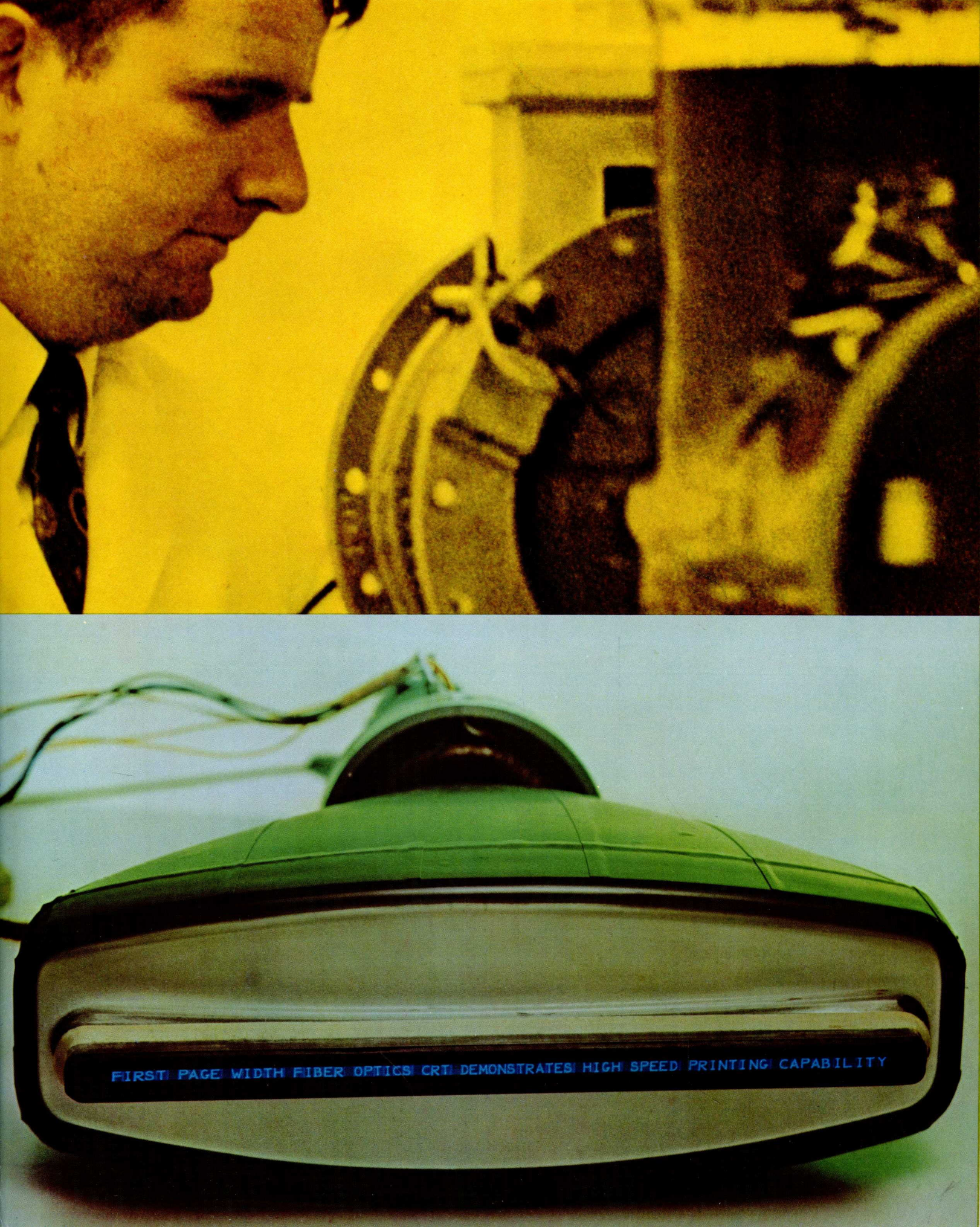
And computer-designed electron optics; high-speed deflection rates; and microminiaturization of display modules.

Technology and man.

At Stromberg DatagraphiX, we're dedicated to the field of displaying and recording information. This is our whole business. Out of this dedication comes our skill to build machines that give men, in the shortest possible time, the best possible look at a thing. Machines that display multiple views simultaneously in real time, that reveal how a thing looked in the past and how it's likely to look in the future, machines that can process and display information in seconds that a man, working alone, could not discover in a lifetime.

But machines by themselves are blind. Sight is what man brings to the man/machine interface. And what he sees, how well he sees it, depends upon his intelligence, his training, and his freedom of choice.

And so it is that by defending freedom, man is helping man... to better see the whole of things.


FIRST PAGE WIDTH FIBER OPTICS CRT DEMONSTRATES HIGH SPEED PRINTING CAPABILITY

DatagraphiX

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