

Electronics review

interest and study it in more detail. The observatory should last 12 to 15 months before its attitude-control propellants are exhausted and it begins tumbling out of control.

Data collected by Laxray will be recorded on a 220-min. tape, with data dumps to a ground station at a rate of 2.1 kilobits per second. A higher rate of 128 kb/s is available on ground command when specific sources are examined in real time.

Other experiments on the first observatory spacecraft also concern X rays. One joint project of NASA's Goddard Space Flight Center and the California Institute of Technology will determine the effect of discrete sources, such as radio and visible light rays, on measurement of the emission and absorption of

diffuse X rays in the 0.2 to 60 kiloelectronvolt range. Another project will determine the position, spectrum, time variation, intensity and other properties of hard X rays and gamma rays in the range of 10 keV to 10 million eV, an experiment undertaken by the University of California, San Diego, and Massachusetts Institute of Technology.

Should Laxray measure up to expectations, Friedman hopes that NASA will adopt his lab's proposal to use the experiment aboard the Space Shuttle. He says a second generation Laxray would, among other things, expand the depth of each counter module from 6 to 20 in. and extend the system's capability to measure X-ray sources to 60 keV from the present limit of 20 keV. □

Instruments

'Box' lens design being tried by Tektronix in experimental CRTs

Look for the relatively staid world of oscilloscope cathode-ray-tube design to be upset if a new technique for deflecting and focusing an electron beam makes it from the laboratory to production. Engineers at Tektronix Inc. in Beaverton, Ore., have built prototypes of a CRT using a new box-shaped expansion lens that promises to outperform the two most popular focusing devices now in use, the dome-shaped mesh and the electrostatic quadrupole.

According to research design engineer Conrad J. Odenthal, the new technique promises better beam-spot characteristics and linearity, higher deflection sensitivity and bandwidth, and lower distortion at much lower cost, primarily, he says, because of simplified construction.

Background. The movement of a CRT's electron beam is controlled by amplifier-driven deflection plates. But the impedance of the beam deflection plates, which precede the dome mesh or quadrupoles, is inversely proportional to the signal frequency, so that the amplifier that drives them must function over a

wide range of loads. As a result, amplifiers for large-bandwidth oscilloscopes (above 300 MHz) are very difficult to design.

For these reasons, conventional plate systems are not viable beyond 150 megahertz for dome-mesh tubes or 250 to 300 MHz for quadrupole-lens tubes, which have shorter deflection plates and therefore less plate-to-plate capacitance. For frequencies higher than these, transmission-line systems are used which substitute a series of short plates for

the standard one-piece and relatively long deflection plate.

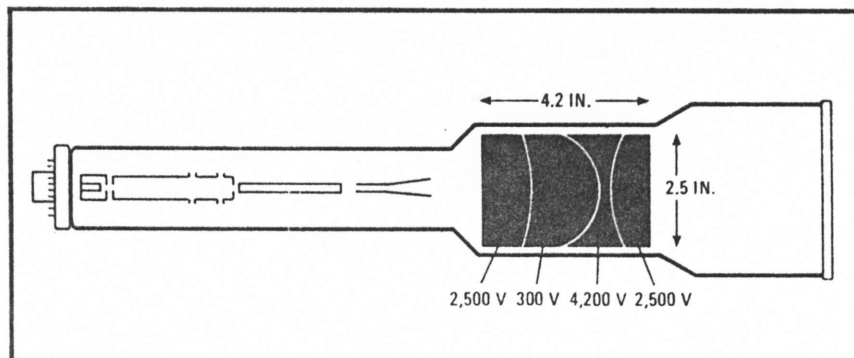
Tektronix engineers have replaced the dome-mesh and quadrupole-lens schemes with a simple, four-electrode, box-shaped lens measuring 2.5 by 4.2 by 1 inch. Each of the four lens elements is shaped in alternating convergent and divergent geometries. Each also has a biasing voltage of 2,500, 3,000, or 4,200 volts (see drawing) placed on it to correct for such tube alignment defects as distortion, vertical line bowing, and variations in horizontal sensitivity.

The dimensions and operating voltages of the lens are such that, when incorporated into a conventional electrostatic deflection CRT, it magnifies the scan 4.5 times vertically and 4 times horizontally to produce an 8-by-10-centimeter display. Focusing is done with the conventional focus ring and astigmatism controls of 150-to-200-MHz tubes, but bandwidth is about three to four times better, about 500 MHz.

Better beam. With deflection sensitivities and scan size equalized, a CRT using a box-shaped lens for scan magnification shows better beam current and trace width characteristics than one using a dome mesh. With a phosphor-screen voltage of 24 kilovolts, a 3-v-per-division vertical deflection, a 7-v-per-division horizontal deflection, and a beam current of 60 microamperes, the box lens produces a trace width of only 20 to 22 mils, while a mesh lens produces one 30% larger.

There are two reasons for this

In focus. Box-shaped, four-electrode lens is being tried out by Tektronix in research CRTs. Bias voltages on electrodes are there to correct for defects in tube alignment.



improvement, Odenthal says. The beam intercept and spot defocus caused by the mesh are eliminated, and the box lens is operated at a higher magnification ratio, 4.5 times vs 2.5 times for the dome mesh.

To top things off, the technique appears capable of shortening the CRT by 60%. Also, because it does away with hard-to-manufacture meshes and expensive multi-plate deflection schemes, tube costs would be reduced, particularly at higher bandwidths. However, the company has not announced plans to use the approach in any products. □

Companies

Optel comeback based on displays

Its innovative founder is gone, its gross sales have been clipped sharply, and five years of losses totalled almost \$20 million. But Optel Inc., the company that in 1971 was the first to announce an electronic watch with a liquid-crystal display, is still in business and, according to its president Jerry Heller, is to emerge next month from the protection of Chapter XI of the Federal Bankruptcy Act.

The 39-year-old Heller, who took the reins of the Princeton, N. J., company in February 1976, says the key to recovery was simple—he got Optel out of the watch business and back to what he regards as its basic expertise: display technology. "Our strength is in the chemical end of the electronics business," he says.

European trip. Within days of joining Optel, Heller was off to Switzerland and Germany to terminate contracts with case and parts suppliers, beginning the process of reducing the company's level of watch production. It was some of these contracts, at prices that proved too high to yield a reasonable profit, that contributed to Optel's undoing. Also playing a role were the problems to be expected when any new technology is introduced into a product. In the process of pulling things

News briefs

Japan agrees to limit color TV exports to U.S. to 1.75 million a year

The proposed White House trade agreement with Japan will limit to 1.75 million the number of Japanese color TV receivers that may enter the U.S. annually for the three years beginning in July. The figure "is not the 1.3 million quota we wanted," concedes one AFL-CIO official in Washington, "but it's a better compromise than we expected" to be offered. The 1.75 million level—62.5% of Japan's 1976 shipments to the U.S.—will include 1.56 million complete receivers plus 190,000 unassembled sets. Total U.S. color TV imports from all countries last year were a record near-3.3 million sets, setting in motion a variety of petitions for relief by U.S. manufacturers and organized labor before the International Trade Commission and in the courts [*Electronics*, April 28, p. 90].

Prime offers time-sharing system

Prime Computer Inc., the Framingham, Mass., minicomputer manufacturer, has unveiled a time-sharing system built around the firm's Prime 500 central processor. The system can accommodate up to 63 users simultaneously, a capability usually associated with much larger mainframe systems. There are five levels of software packages available with the system, all of which support the Primos V operating system. The packages are not available without the Prime 500 processor, and they range from a computational time-sharing package to an interactive data-processing package that includes Cobol and RPG II. A system that would accommodate the full 63 computational and graphics users sells for \$570,000, substantially less than a comparable System 2050 from Digital Equipment Corp.

ECD Corp. wins personal-computer contract

ECD Corp., the Cambridge, Mass., manufacturer of the MicroMind II personal computer [*Electronics*, Feb. 17, p. 38], has won a nice prize in the microcomputer sweepstakes. Avakian Systems Corp., Glastonbury, Conn., has ordered 1,000 of the machines to use as the basic building block in systems it is developing for use in public schools. The contract is worth \$1.3 million to ECD, a company less than two and a half years old, and deliveries will begin in June. MicroMind II is a fully packaged microcomputer built with the 6512A microprocessor from MOS Technology, it includes analog input/output, vector interrupt, memory mapping and 16,000 bytes of memory.

TI's LCD watches glow with tritium

As expected, Texas Instruments has introduced a line of liquid-crystal display watches but, something of a surprise, the 15 new mens' models all feature constant backlights made of tritium/phosphorus low-level-radiation tubes. The prices range from \$25.95 to \$48.95. TI's line will have both one- and two-tube tritium ampules: phosphorus-coated tubes of Pyrex glass with the radiation material sealed inside to excite the coating and create a glow in the dark. TI has at the same time introduced 45 LED watches.

Data General introduces small-business system

Last week, minicomputer maker Data General Corp. of Southboro, Mass., introduced its CS/40, which is the first small-business system to use interactive Cobol language. The three models in the series are expected to compete with such other machines as IBM's System 32 and 34, the Burroughs 1700, and Digital Equipment Corp.'s small-business systems. Cobol is important because it is probably the primary language used in business data processing and till now has been available only on more expensive machines. The least expensive offering in the Data General series is the C1 with one data entry and display station and various other peripherals for \$33,415. The top-of-the-line C5 can accommodate up to nine data entry and display terminals and sells for \$82,100. All three models use the Data General Nova 3 processor.