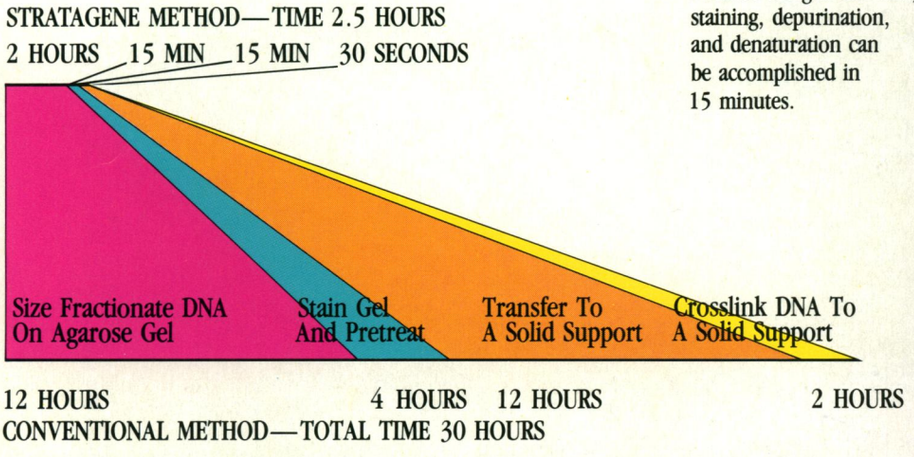
American Association for the Advancement of Science

SCIENCE

21 September 1990 $3.50
Vol. 249 ■ Pages 1349–1472

Southerns/Northerns: Electrophoresis, Blotting, and Crosslinking in 2.5 Hours Instead of 30.

Stratagene has streamlined agarose gel electrophoresis and blotting. The system decreases the time required, from sample loading to prehybridization ten fold.



VAGE™ System

The VAGE™ vertical agarose/acrylamide gel electrophoresis system allows the casting of agarose or acrylamide gels in the unit. Nucleic acids can be electrophoresed through a 3 mm, 0.8% vertical agarose gel in less than two hours with excellent resolution (Figure 1). Because the gels are thin, staining, depurination, and denaturation can be accomplished in 15 minutes.

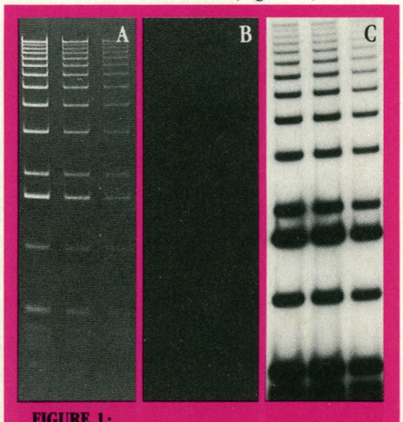
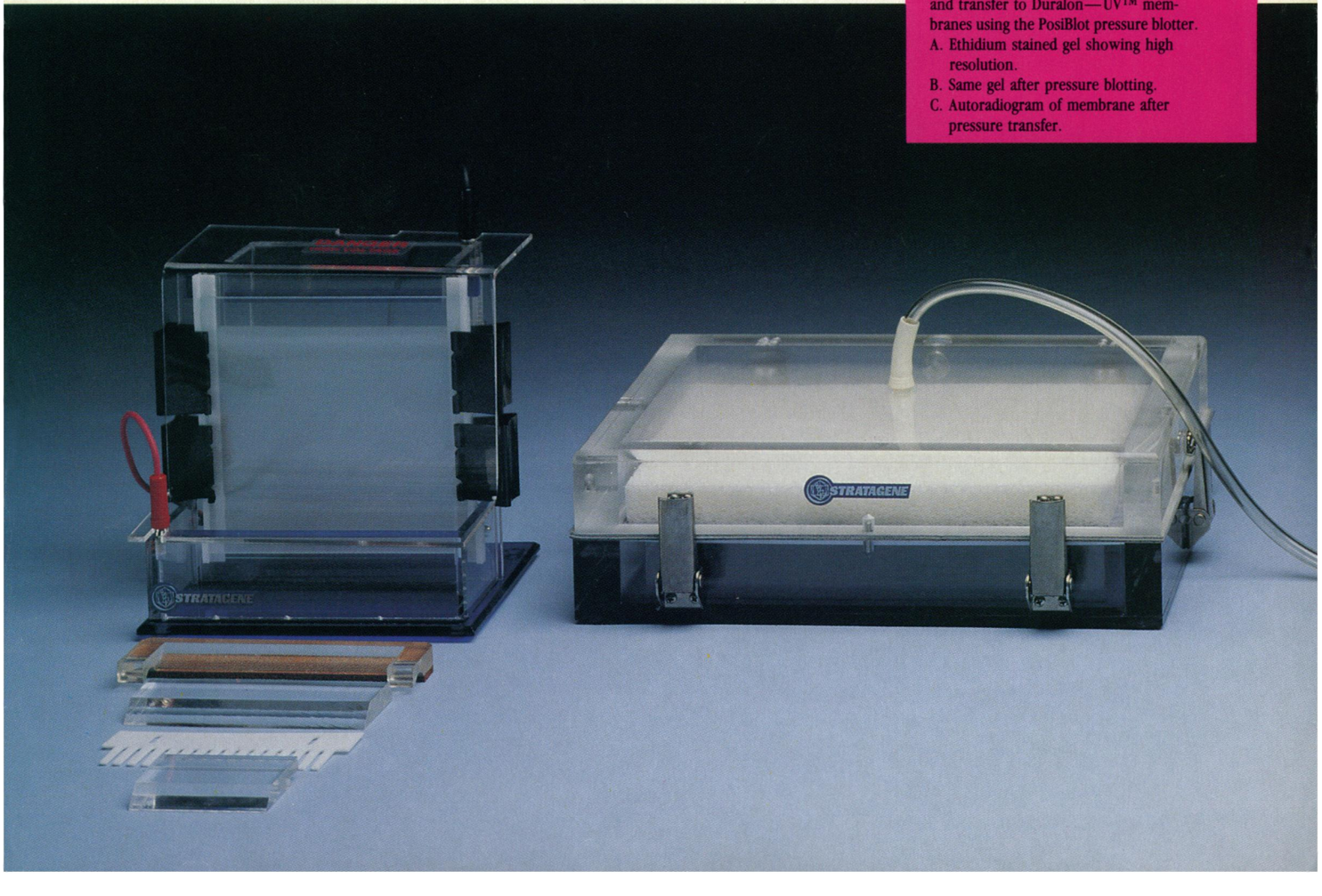


FIGURE 1:
Figure Legend: Fractionation of end labeled DNA markers on 3mm thick 0.8% agarose by the VAGE apparatus and transfer to Duralon—UV™ membranes using the PosiBlot pressure blotter.
A. Ethidium stained gel showing high resolution.
B. Same gel after pressure blotting.
C. Autoradiogram of membrane after pressure transfer.



PosiBlot™ * Pressure Blotter

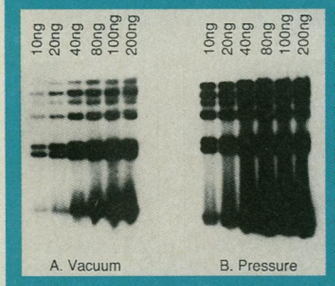


FIGURE 2:
Figure Lengend: ^{32}P end-labeled lambda Hind III markers were electrophoresed in 0.8% agarose. The DNA was then transferred to a nylon membrane with a vacuum blotter at 30mm Hg below atmospheric or with the PosiBlot pressure blotter at 100mm Hg above atmospheric. Both transfers were carried out for 15 minutes. As can be seen, pressure blotting transferred significantly more DNA in the same period of time, especially in the higher molecular weight range (largest band is 23 kilobases).

The PosiBlot™ positive pressure blotter permits the transfer of nucleic acids in 1/3 the time of vacuum blotters and 1/50 the time of capillary blotting (Figure 2). Pressure blotting does not dehydrate gels as do other methods. This allows the use of substantially higher pressure differentials, compared with vacuum blotting, without gel collapse. The PosiBlot apparatus reduces blotting time to 15 minutes.

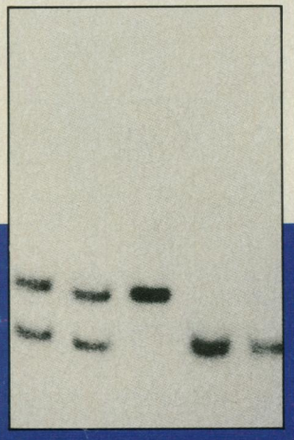


FIGURE 3:
Figure Legend: Autoradiogram showing the resolution of 2.8 and 1.3 Kb Msp I RFLP alleles revealed by a cystic fibrosis human DNA probe using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

Stratalinker™ * UV Crosslinker

The Stratalinker™ UV Crosslinker fixes nucleic acids to solid supports such as nitrocellulose or nylon membranes, in less than one minute. This compares favorably to vacuum baking, which requires 2 hours. The Stratalinker actually monitors the ultra violet energy flux and deactivates the light source upon reaching the user-programmed energy level (Figure 4). Figure 3 shows an autoradiogram of a human genomic Southern blot performed using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

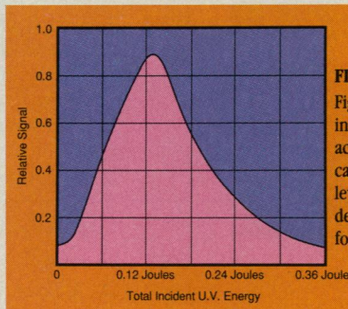
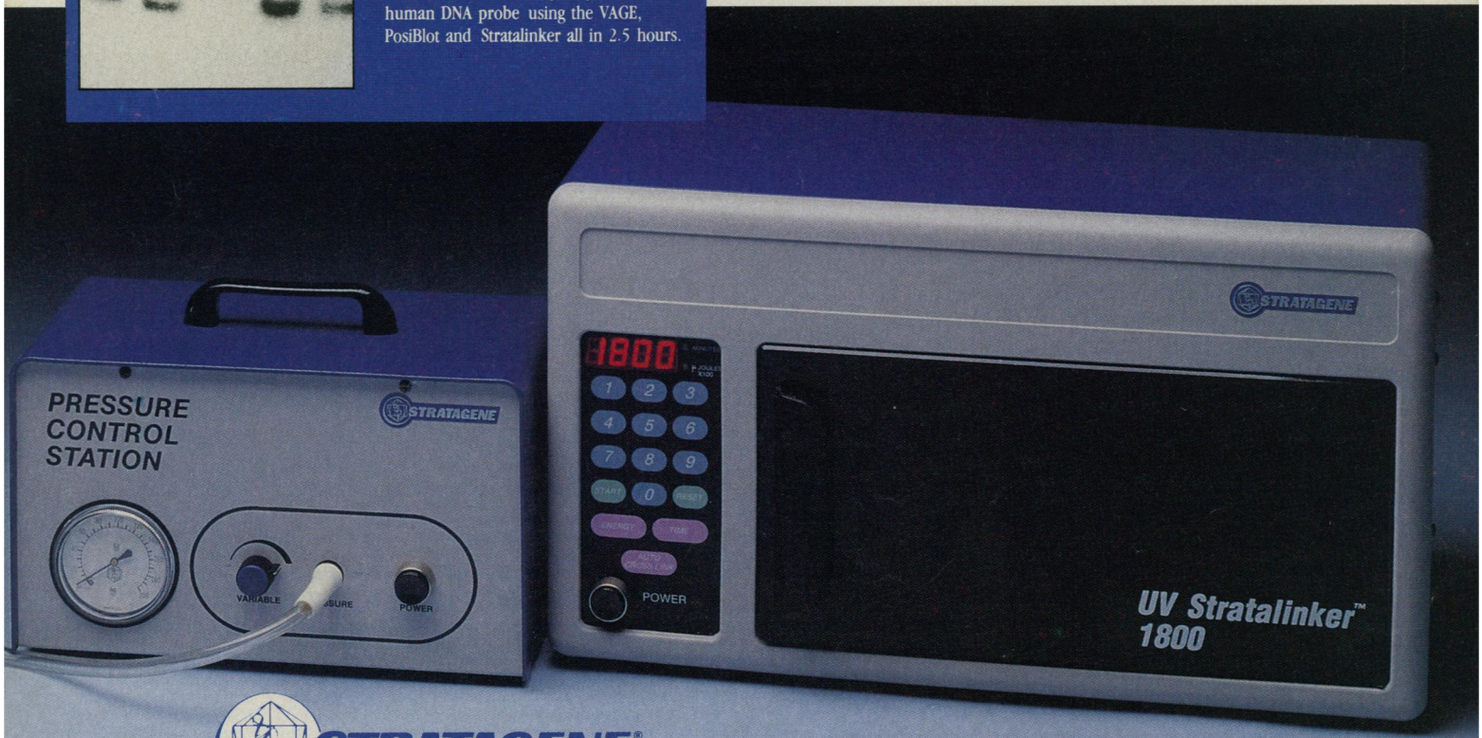


FIGURE 4:
Figure Legend: The effects of altering the incident energy for crosslinking nucleic acids to nylon membranes. The significant drop in signal intensity at energy levels below and above 0.12 Joules demonstrates the limited optimal range for UV treatment.

Stratagene offers a full selection of nitrocellulose, reinforced nitrocellulose and nylon membranes. Each membrane is stringently lot tested to ensure consistency when performing Northern and Southern blotting. Please call Technical Services for detailed information on Stratagene's time saving blotting systems and membranes.



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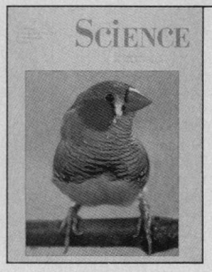

COVER In adult zebra finches (a male is shown here) and canaries, new projection neurons are formed in the high vocal center, a region of the brain. Species differences in the number of projection neurons added and the time when these additions occur suggest that these new neurons are involved in perceptual and motor song learning. See page 1444. [Photograph by A. Alvarez-Buylla]

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Carbon cycling

THE greenhouse mechanism, by which carbon dioxide and other atmospheric gases trap radiation and lead to warming of the climate, has been a force in climate control for hundreds of millions of years; exactly how important a factor it has been remains at issue, awaiting estimates of levels of greenhouse gases in past atmospheres. Berner describes a mathematical model with which long-term changes (changes much slower than those occurring today) in atmospheric carbon dioxide levels during the past 570 million years can be estimated (page 1382). Several processes are considered—the burial of organic matter and carbonates in sediments, degassing of carbon dioxide during volcanic activity and metamorphism, and weathering of silicates, carbonates, and organic forms of carbon. Predictions regarding the timing of ancient high carbon dioxide periods and low ones are in general accord with estimates of paleoclimate conditions and indicate that, at several times in the past, carbon dioxide levels may have been considerably higher than they are today. Construction of the model has shown that much more needs to be learned about certain parameters—especially rates of degassing and the role of plants in weathering.

The Great Dark Spot

NEPTUNE'S Great Dark Spot is a huge weather system that is approximately the size of Earth. Like the Great Red Spot on Jupiter, it is a coherent and persistent feature of the planetary atmosphere; unlike the Great Red Spot, it undergoes dramatic changes in shape. The Great Dark Spot acts as an anticyclonic, wobbling, oscillating vortex. Polvani *et al.* have developed models to account for the dynamic behavior of the Great Dark Spot (page 1393); the models adequately describe the dramatic oscillations recorded in time-lapse photographs by the Voyager 2 spacecraft in August 1989. The models also appear to be relevant to the dynamic behavior of the Great Red Spot and other vortices recorded at Jupiter. In one model enormous zones of chaotic motion have been identified; these zones may participate in the mixing taking place in Neptune's atmosphere.

Earthquake hazards

WHENEVER the possibility is raised that a large devastating earthquake will hit somewhere in the United States, the state of California immediately comes to mind; however, the eastern and central parts of the country are also at risk. Estimates by Nishenko and Bollinger indicate that the likelihood that a major damaging earthquake will occur east of the Rocky Mountains in the next 30 years is about two-thirds the likelihood that one will occur in California (page 1412). The predictions are based on three types of data—regional seismographic data, catalogs of earthquakes that have occurred in the eastern part of North America since the mid 1600s, and paleoseismic (carbon-14) data from a few discrete locations. Seven large earthquakes have occurred east of the Rockies since 1727: five of these occurred in the 1800s; four rocked New Madrid, Missouri, and one hit Charleston, South Carolina. Most fault zones in the east and central United States are buried and much less is known about them than about the more exposed zones in the west, but estimates are that a major earthquake in the east could be every bit as devastating as one in the west.

Relieving parkinsonian symptoms

THE major motor symptoms of Parkinson's disease—impaired movement (akinesia), muscular rigidity, and tremors—can be induced in experimental animals and later relieved by altering the activity of nerve cells in the subthalamic nucleus of the brain (page 1436). Bergman *et al.* used the drug MPTP to induce the Parkinson's-like disease in monkeys; then, through direct injections of the chemical ibotenic acid into the subthalamic nucleus, movement was restored almost immediately in the limb contralateral to the site of injection and rigidity and tremors were also lessened. The return to near normal motor function implies that, for all three types of motor activity, there was aberrant (excessive) neuronal activity in the subthalamic nucleus rather than permanent loss of function by neurons. For patients with Parkinson's disease or parkinsonian symptoms, it might someday be possible to alleviate some of the severe motor disabilities through similar directed chemical attack on or focused surgery in the brain.

Cell fate determination

WHAT makes eye cells develop into eyes and muscle cells develop into muscles in developing organisms? This is one of the central questions in developmental biology. In fruit flies, a gene called *Notch* mediates some of the determinative interactions between cells, and similar genes have been identified in nematodes. Coffman *et al.* have now found a vertebrate homolog of *Notch* (page 1438): using the fruit fly's *Notch* DNA, they screened complementary DNA made from frog embryos and found a gene, called *Xotch*, that was not only similar in sequence and organization to *Notch* but was expressed in the embryos in a pattern that was similar to the expression pattern for *Notch*. For example, *Xotch* was fairly uniformly expressed in early embryos; later, expression was enriched at regions, such as the nervous system, where cell determination was occurring. The finding of *otch*-type developmental genes in both vertebrates and invertebrates suggests that this type of gene has been conserved in evolution. Exactly how the gene helps in determining cell fate is unknown; it may work through the actions of its products that, at cell surfaces, may transduce signals between cells.

■ RUTH LEVY GUYER

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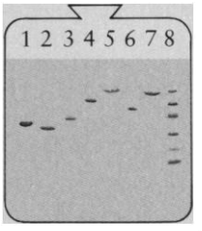

SDS-PAGE of FPLC*pure*® cloned modifying enzymes. Analyzed using PhastSystem™ and a PhastGel® Gradient 8-25. (1) Gene 32 Protein; (2) Polynucleotide Kinase; (3) T4 RNA Ligase; (4) Klenow Fragment; (5) T7 RNA Polymerase; (6) T4 DNA Ligase; (7) T4 DNA Polymerase; and (8) Low Molecular Weight Markers.

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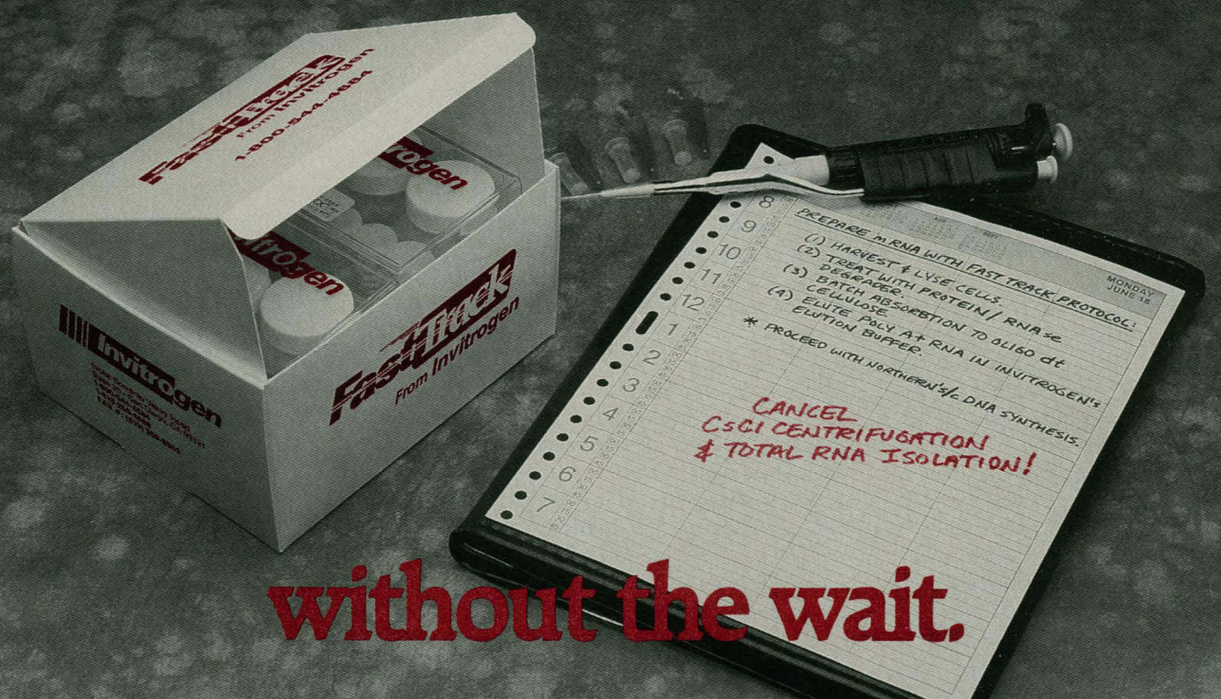

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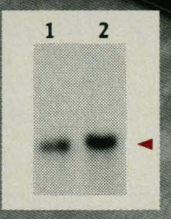

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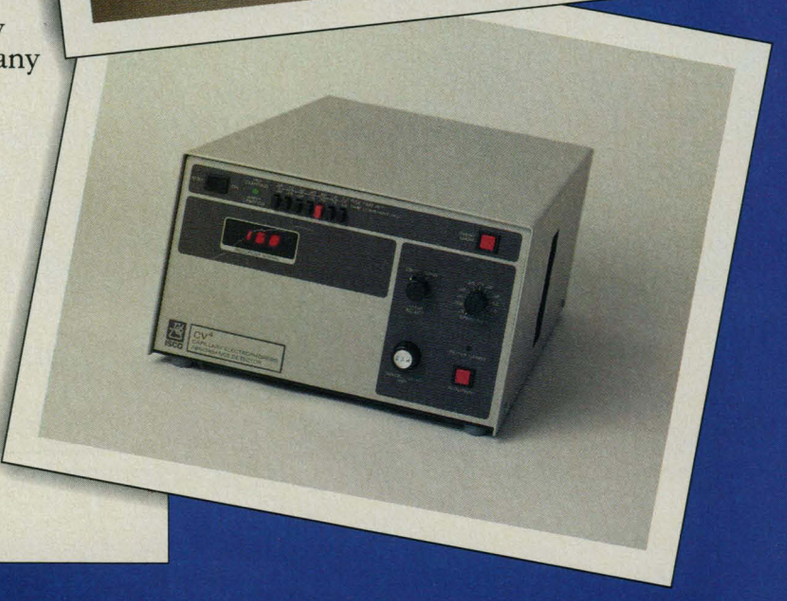

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