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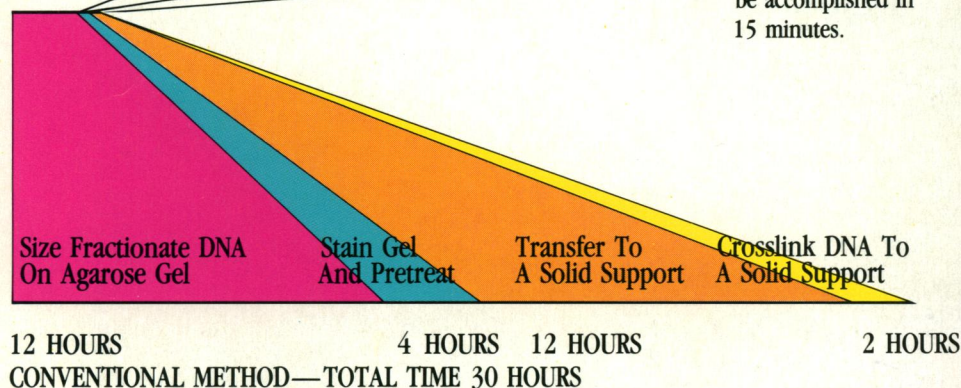
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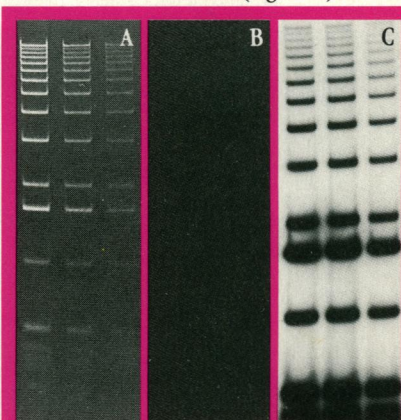
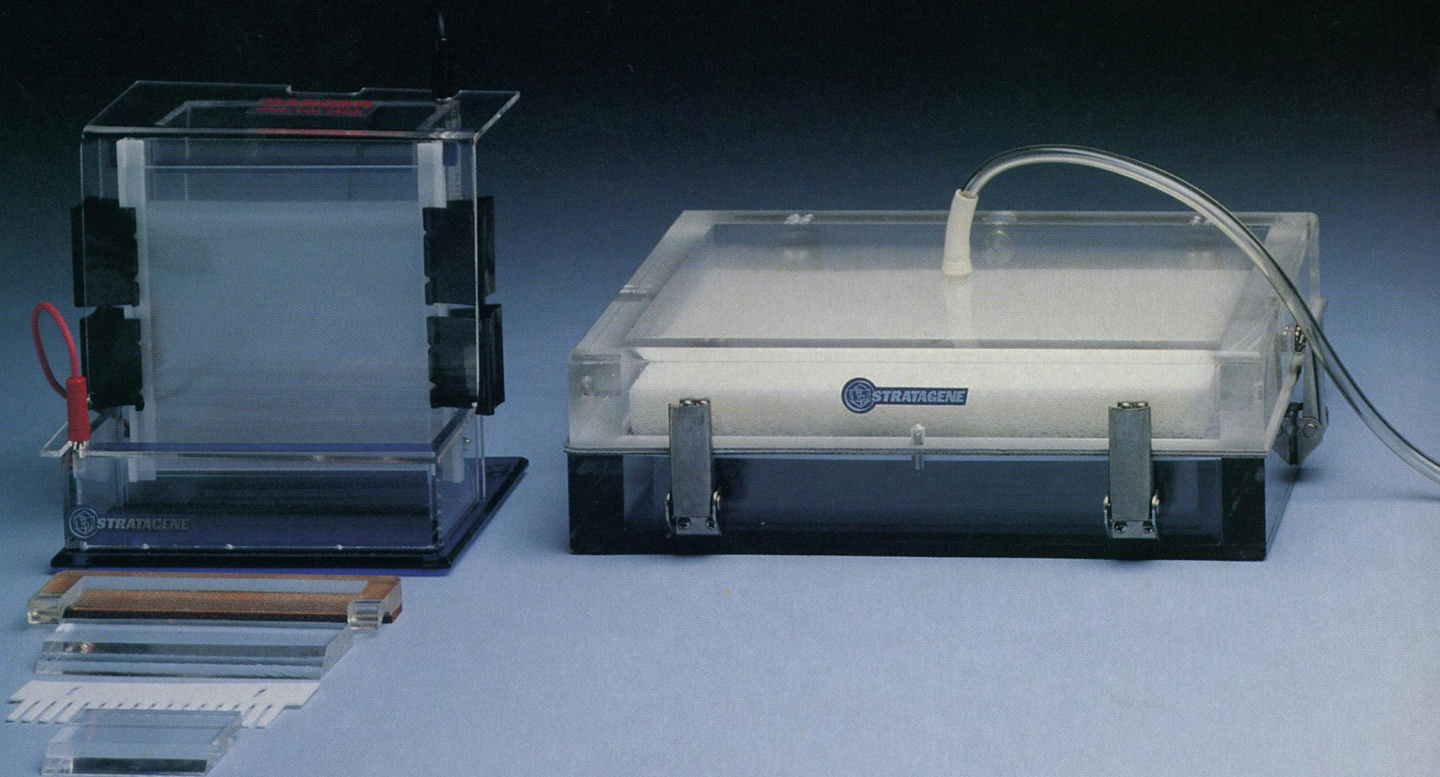


FIGURE 1:

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

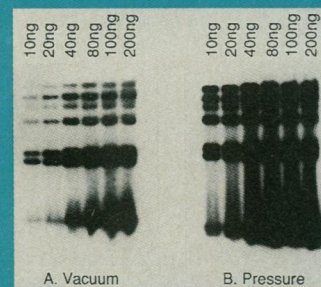


FIGURE 2:

Figure Legend: 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.

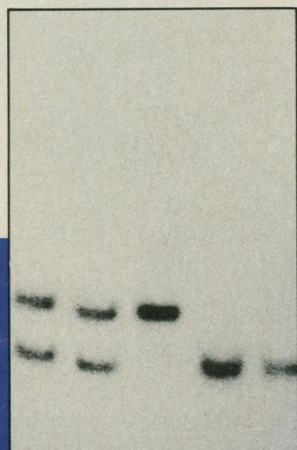


FIGURE 3:

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.

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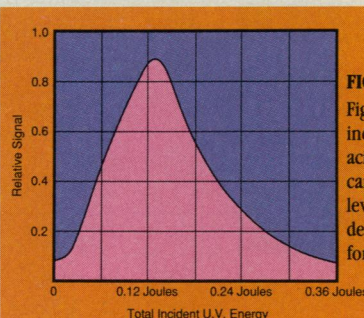


FIGURE 4:

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.

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1355 This Week in *Science*

Editorial

1357 Testing for Carcinogens with Rodents

Letters

1358 Animal Rights and Violence: J. A. HOYT AND M. L. STEPHENS ■ PNAS Paper: Rules and Standard Practice: J. ABELSON, R. C. ATKINSON, R. L. DAVIDSON, R. DULBECCO, M. E. FRIEDKIN, G. E. PALADE, J. E. SEEGRILLER, M. I. SIMON, D. STEINBERG ■ "International" Meeting: Criteria for Invitation: E. EPSTEIN ■ Human Genome Initiative: R. L. SINSHEIMER ■ Females at Work: T. H. JUKES ■ Energy from Solar Cells: K. W. J. BARNHAM ■ U. K. Physics Proposal: R. G. CHAMBERS

News & Comment

1367 Magnet Lab Decision Repels MIT
1368 Genetic Privacy Makes Strange Bedfellows
1369 OTA Peers into Cancer Therapy Fog
1370 Zebra Mussel Invasion Threatens U.S. Waters ■ Why Do Some Invasions Succeed?
1372 Massey Named to Head NSF
Gene Therapy Begins
1373 Stanford Under Investigation
Anthropology Goes Back to Ethiopia
1374 *Briefings*: NIH Adjusts Attitudes Toward Women ■ Hubble Sees a Supernova ■ Hyping Laser Angioplasty ■ Salahuddin Pleads Guilty ■ Social and Anti-Social Science ■ Richest U.S. Science Prize ■ Academy Tries No-Fault Defense

Research News

1376 Oncogenes Evoke New Cancer Therapies
1377 Bombesin Receptor Gene Cloned
1378 Electromagnetic Fields: The Biological Evidence
1379 Face to Face with EMFs
1381 Computer Viruses—Eternal Plague

Articles

1382 Atmospheric Carbon Dioxide Levels Over Phanerozoic Time: R. A. BERNER
1387 State- and Bond-Selected Unimolecular Reactions: F. F. CRIM

Research Articles

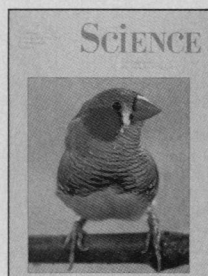
1393 Simple Dynamical Models of Neptune's Great Dark Spot: L. M. POLVANI, J. WISDOM, E. DEJONG, A. P. INGERSOLL
1398 Structure of Ribonuclease H Phased at 2 Å Resolution by MAD Analysis of the Selenomethionyl Protein: W. YANG, W. A. HENDRICKSON, R. J. CROUCH, Y. SATOW

Reports

1406 Time-Resolved X-ray Diffraction Study of Solid Combustion Reactions: J. WONG, E. M. LARSON, J. B. HOLT, P. A. WAIDE, B. RUPP, R. FRAHM

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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]

- 1409 Rapid Determination of the Critical Temperature in Simulated Annealing Inversion: A. BASU AND L. N. FRAZER
- 1412 Forecasting Damaging Earthquakes in the Central and Eastern United States: S. P. NISHENKO AND G. A. BOLLINGER
- 1416 No Excess of Homozygosity at Loci Used for DNA Fingerprinting: B. DEVLIN, N. RISCH, K. ROEDER
- 1420 Detection of *Borrelia burgdorferi* DNA in Museum Specimens of *Ixodes dammini* Ticks: D. H. PERSING, S. R. TELFORD III, P. N. RYS, D. E. DODGE, T. J. WHITE, S. E. MALAWISTA, A. SPIELMAN
- 1423 An Insertion in the Human Thyrotropin Receptor Critical for High Affinity Hormone Binding: H. L. WADSWORTH, G. D. CHAZENBALK, Y. NAGAYAMA, D. RUSSO, B. RAPOPORT
- 1425 Anatomy of a Conformational Change: Hinged "Lid" Motion of the Triosephosphate Isomerase Loop: D. JOSEPH, G. A. PETSKO, M. KARPLUS
- 1429 Structure and Function of Lipopolysaccharide Binding Protein: R. R. SCHUMANN, S. R. LEONG, G. W. FLAGGS, P. W. GRAY, S. D. WRIGHT, J. C. MATHISON, P. S. TOBIAS, R. J. ULEVITCH
- 1431 CD14, a Receptor for Complexes of Lipopolysaccharide (LPS) and LPS Binding Protein: S. D. WRIGHT, R. A. RAMOS, P. S. TOBIAS, R. J. ULEVITCH, J. C. MATHISON
- 1433 Acceleration of Diabetes in Young NOD Mice with a CD4⁺ Islet-Specific T Cell Clone: K. HASKINS AND M. MCDUFFIE
- 1436 Reversal of Experimental Parkinsonism by Lesions of the Subthalamic Nucleus: H. BERGMAN, T. WICHMANN, M. R. DELONG
- 1438 *Xotch*, the *Xenopus* Homolog of *Drosophila Notch*: C. COFFMAN, W. HARRIS, C. KINTNER
- 1441 Calmodulin Activation of Calcium-Dependent Sodium Channels in Excised Membrane Patches of *Paramecium*: Y. SAIMI AND K.-Y. LING
- 1444 Birth of Projection Neurons in Adult Avian Brain May Be Related to Perceptual or Motor Learning: A. ALVAREZ-BUYLLA, J. R. KIRN, F. NOTTEBOHM

Book Reviews

- 1447 Reflections on Liquid Helium, *reviewed by* D. L. GOODSTEIN ■ The Mathematics of Projectiles in Sport, P. J. BRANCAZIO ■ Dynamics of Dense Stellar Systems, L. M. OZERNOY ■ The Ecology of Bird Communities, B. A. MAURER ■ Books Received

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This Week in SCIENCE

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 Parkin-

son'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.

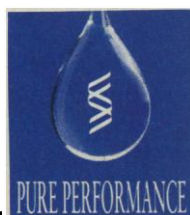
Cell fate determination

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

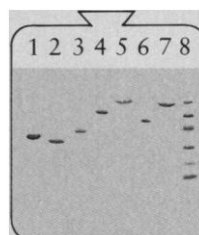


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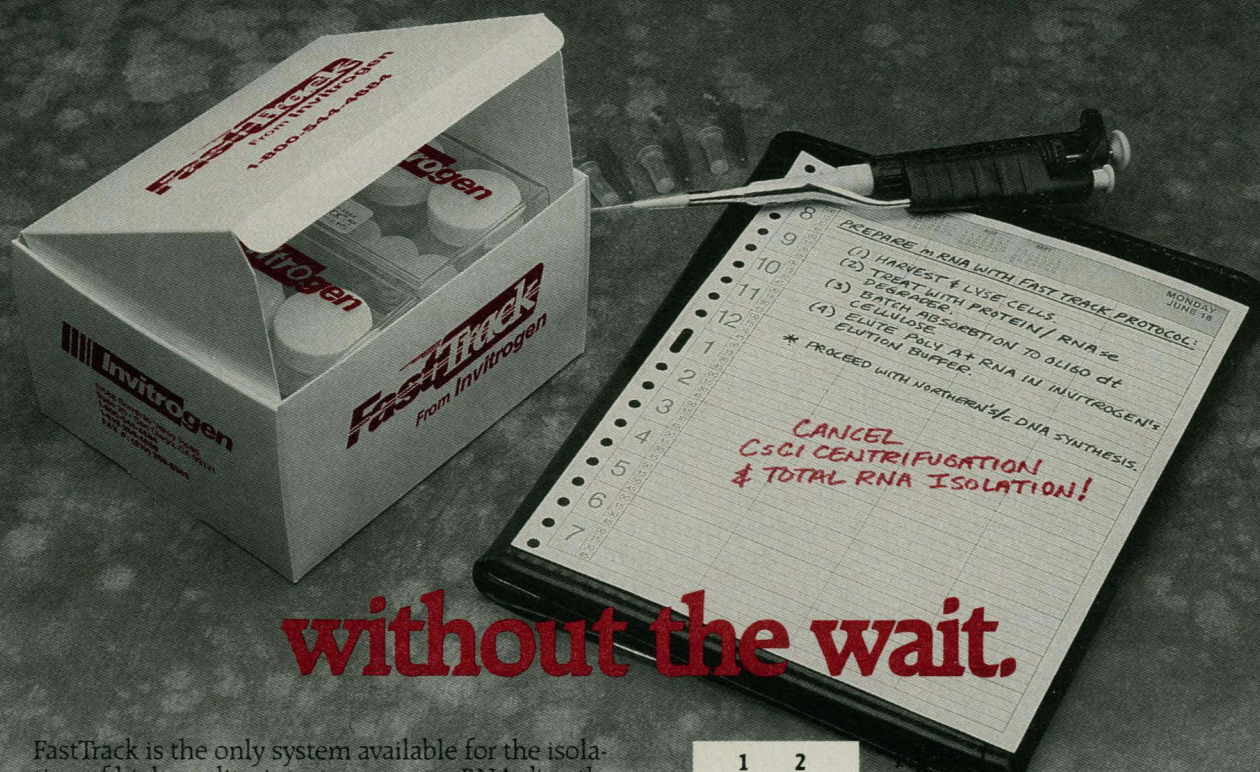
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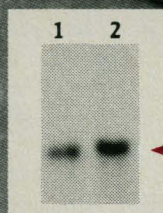


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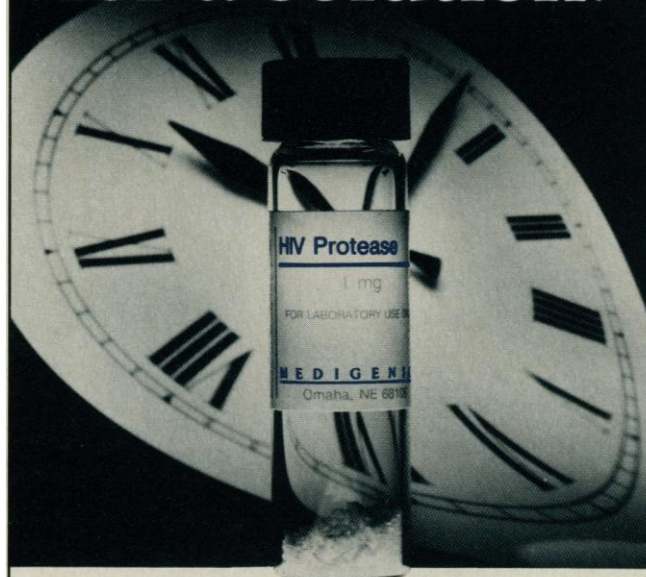
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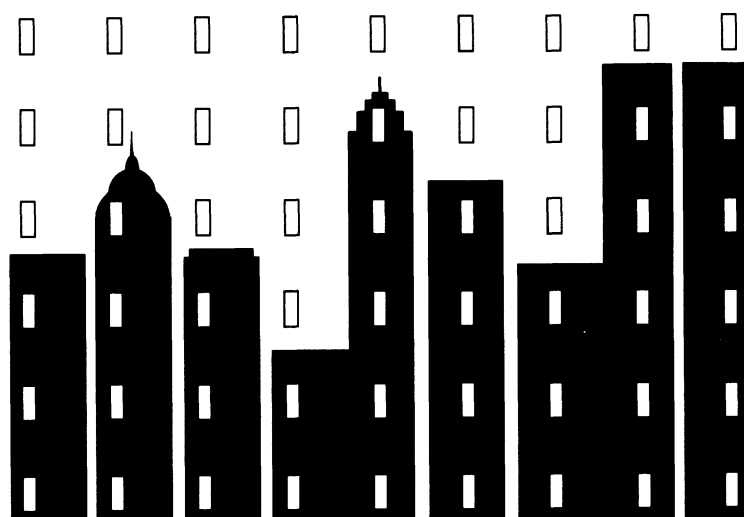


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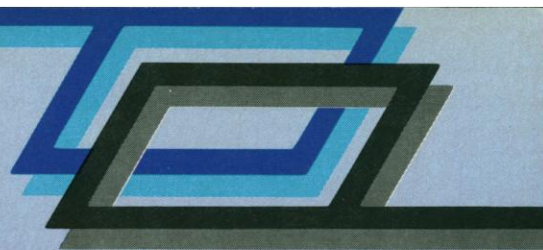


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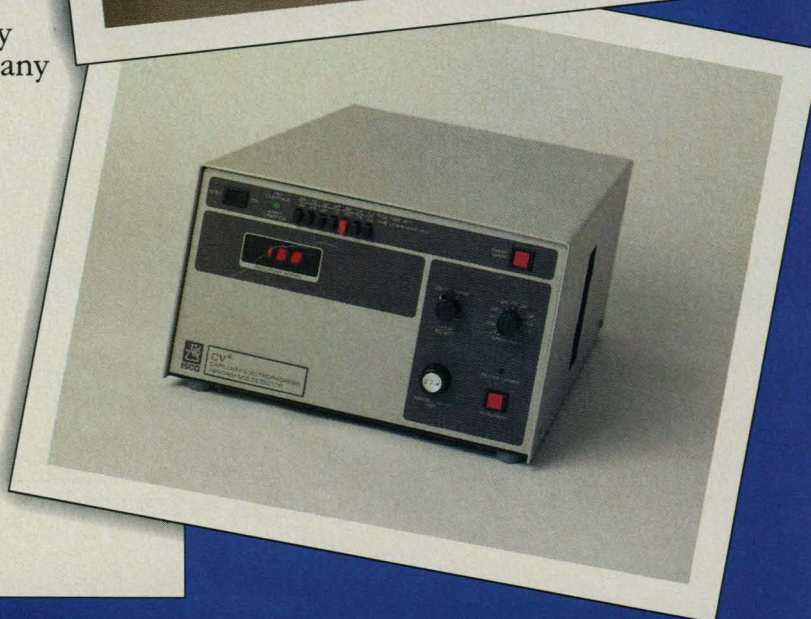
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