monitor oscilloscope by forming the Laplacian of the density pattern and subtracting it from the directly reproduced pattern. The enhancement obtained is indicated for a one-dimensional pattern in the diagram of Fig. 3. The solid line in Fig. 3a shows the light amplitude, I, that would be obtained by scanning the area across the boundary between two of the steps in Fig. 2, both in the forward and the reverse directions. The solid line in Fig. 3b shows the first derivative obtained when scanning forward and the dotted line the opposite sign of differentiated light signal obtained when scanning in the reverse direction. Figure 3c shows the second derivative, whose sign is independent of the direction of scan. The dotted line in Fig. 3a shows the increased sharpness of transition obtained by subtracting a portion of the second derivative.

The effect of performing the same operation in two dimensions upon a photographic transparency is shown in the pictures of Fig. 4. Figure 4a is the direct reproduction of the picture as it appeared on a cathode-ray tube screen. Figure 4b is the negative of the second derivative as it appears on the same screen. Figure 4c shows the result of electrically adding the two signals. The definition of Fig. 4a was limited largely by the minimum scanning spot size available. The improvement in overall sharpness of the picture in Fig. 4c is readily apparent in the original photographs.

Other pictures have been degraded by increasing the scanning spot size or by reproducing the transparency in an enlarger by slightly defocusing the image. A similar improvement in sharpness was obtained in each of those cases. A mathematical analysis shows that this represents a first order restoration of a degraded function in cases when the original has been degraded by the processes mentioned above as well as by limited video pass band or by diffusion. This is a two-dimensional analogue of high-frequency compensation of an amplifier whose amplitude-frequency response decreases at higher frequencies.

This process has been repeated, or recycled, by scanning the reproduced pictures in the same manner as the originals. As expected, the direct reproduction is better when the improved picture (Fig. 4c) is used as the original. This tends to show that the two-dimensional analogue of preemphasis of the higher frequencies may be utilized to improve the reproduction of a picture by compensating for the properties of an imperfect system.

In addition to producing contour enhancement, the same equipment was used to produce a contour outlining effect, a method by which, it is believed, the visual memory extracts essential information from a pattern. By rectifying the signals shown in Fig. 3b and limiting them to a constant level, it is possible to outline the boundaries of the picture (resembling cartoon drawings) on the cathode-ray tube screen. A picture outlined in two dimensions is shown in Fig. 5. The picture shows an outline in white lines against a black background. However, it is easily possible to produce a white line picture by reversing the polarity of the rectifier.

The exploration of the properties of this system will proceed with attempts to determine the effects of other processes such as integration, modifications in the feedback circuit itself, and other matters. In addition to the potential practical values of the processes so far studied, the method of modifying two-dimensional patterns may be useful as an analogue computer for two-dimensional partial differential equations, and for studying the problem of the recognition and recollection of visual patterns.

Instrument Society of America Annual Conference and Exhibit

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THE Instrument Society of America held its Eighth National Instrument Conference and Exhibit in Chicago during the week of September 21–25. More than 11,000 persons registered to attend the large exhibit held in the Hotel Sherman or to attend the sessions of the technical program held in the Hotel Morrison. As many as six sessions were held concurrently, with 37 sessions in all, and a total of nearly 100 papers presented. In addition to sessions arranged by technical committees of the Instrument Society of America, there were also sessions arranged by cooperating societies, including the American Society of Mechanical Engineers, the Institute of Radio Engineers, and the American Institute of Electrical Engineers. As in previous years, an interesting feature of the technical program was an "Instrument Maintenance Clinic" arranged for the instruction of plant and laboratory personnel in the operation and maintenance of various basic types of instruments. Manufacturers provided instructors and demonstrated equipment for this clinic, which lasted

[1] National Secretary, Instrument Society of America.

for three days before the opening of the regular conference, and for which nearly 500 persons registered.

A similar lecture and demonstration course on complex analytical instruments was designed to appeal particularly to research workers. Representatives of eight manufacturers repeated a three-hour discussion and demonstration lecture six times for small groups of 15 to 30 persons. The companies participating in the course, and the instruments demonstrated were:

Beckman Instruments, Inc.—analytical computers
Consolidated Engineering Co.—dynamic recording systems—amplifiers, pickups, and oscillographs
Gow-Mac Instrument Co.—thermal conductivity gas analysis
Minneapolis-Honeywell Regulator Co.—analytical application of recorders
North American Philips Company—x-ray fluorescence spectograph
Process Controls, Div. of Baird Associates—non-dispersion infrared analyzers
General Electric Company—dielectric constant and turbidity
Perkin-Elmer Corporation — dispersion infrared analyzers for the laboratory and plant

Reflecting the large percentage of industrial interest in the conference, the sessions on Instrumentation for Production Processes were heavily attended. Papers were given on "Instrumentation for Statistical Quality Control," "Segmental Recorders," "Specific Gravity Measurements," "Dynamic Analysis of Heat Exchanger Systems," "Pneumatic Multiplying and Process Control," "Human Engineering in Power Plant Instrumentation," a "Flow Controller," a "Liquid Metal Magnetic Flowmeter," "Instrumentation for Radiochemical Processing-Recovery of Iodine 131," a "Catalytic Hydrogen Gas Analyzer," and a "Carbon Monoxide Gas Analyzer." The sessions on testing instrumentation were also popular. An overflow audience gathered to hear F. G. Tatnall's entertaining history of the development, performance, and application of the bonded-wire strain gages, and other more detailed papers relating to strain gaging.

There were several papers relating to aeronautical instrumentation, to geophysical instrumentation, instrumentation for transportation, and three sessions of papers on instrumentation for biology and medicine. A selection of titles indicates the range of the papers of special biological interest: "Techniques of Micro Analysis," "Recording Oximeters," "Camera Design for Radio Micrography," "Electro Magnetic Flowmeter in Industry and Biology," "Instrumentation for Vectorcardiography," "Apparatus for the Quantitation of Biological and Other Data by Photoelectric Measurement of Areas," "Measurement in Biology."

The American Society of Mechanical Engineers sponsored a symposium on Production Weighing and Control, and a number of devices for automatically determining the mass or weight of granular or liquid materials was exhibited. One of these indicates the average mass flow of granular materials from a measurement of the torque required to drive a constant speed a horizontal rotating plate on which radial guide vanes whirl the material continually outward as it is allowed to drop onto the center of the plate.

Preprints of most of the papers were available, and the complete volume of the *Proceedings* will be published within a few months.

The exhibits of industrial and scientific instruments, components, and related devices occupied 35,000 square feet on various floors, halls, rooms, nooks and crannies in the Hotel Sherman, which was somewhat cramped already because of remodelling operations in the hotel lobby. However, a persevering visitor interested in a specific exhibit could eventually locate it with the aid of a map of the exhibit area and a descriptive list of exhibits in a 48-page program and exhibit guide supplied to all registrants.

With more than 200 manufacturers exhibiting, it appears that only the cities with the largest exhibit facilities will be able to play host to the Instrument Society in future years. It is planned that next year's conference, to be held in Philadelphia, will be international in character, and will be called the First International Instrument Congress and Exposition. Porter Hart, President of the Society, reported at the annual meeting that he and Richard Rimbach, Exhibit Manager, had toured the continent this summer to stimulate interest in attendance and participation in the international meeting next year. For future years, the tentative locations are: Los Angeles in 1955, followed by Detroit, New York, and Cleveland.

The only nonindustrial technical exhibit was that from the National Bureau of Standards. In previous years other government agencies have exhibited instrument developments of considerable interest. It is recognized that it would be highly desirable to have much more space devoted to the instrument developments of universities and nonprofit institutions, as a valuable adjunct to the educational work of the Society. It is hoped that many such organizations will have exhibits in the International Exposition at Convention Hall in Philadelphia, September 14–24, 1954. Other technical societies and organizations are invited by the ISA to hold joint meetings and exhibits on measurements in their special fields at that time.

Instrumentation is one facet of science which is common to all technical fields, and it is therefore both appropriate and sensible that the Instrument Society cooperate with other scientific and technical groups in joint meetings devoted to measurements and instruments of common interest. Together with the Institute of Aeronautical Sciences, the American Institute of Electrical Engineers, and the Institute of Radio Engineers, the ISA sponsored a National Telemetering Conference in Chicago last May; 250 persons attended the 3-day conference. Telemetering and equipment for data reduction were displayed by 15 manufacturers. The Telemetering Conference will be repeated next year. Another cooperative conference (AIEE, IRE, ISA) on Electronic Instrumentation and Nucleonics in

Medicine will be held in New York, November 19 and 20, 1953 (SCIENCE, p. 3, Oct. 16).

The membership of the Instrument Society is drawn as much from the users as from the manufacturers of instruments. Industrial firms, whose business depends on the efficient performance of modern instruments, especially those in the chemical, petroleum, utilities, and other process industries, are particularly interested in the activities of the Society and the work of the Society committees concerned with recommended practices for instrument specifications, installation, and standardization. Corporate membership is now available to corporations and organizations interested in the work of the Society, with dues of $250 per year. Manufacturers who exhibit at the annual conference are to be given corporate membership at no additional cost.

Officers of the Society for 1954 will be:

President, W. A. Wildhack, National Bureau of Standards, Washington, D. C.

Vice-Presidents, Warren H. Brand, Carbide and Carbon Chemicals Co., Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Delmas C. Little, Army Medical Research Laboratories, Fort Knox, Kentucky.

Axel H. Petersen, Mellon Institute, Pittsburgh, Pa.

Hans B. Freeman, Economy Equipment Co., St. Louis, Mo.

Secretary, Robert Sheen, Milton Roy Co., Philadelphia, Pa.

Treasurer, J. T. Vollbrecht, Energy Control Co., New York.

The Society Manager is P. V. Jones, and the Exhibit Manager is Richard Rimbach. Society headquarters are at 1319 Allegheny Avenue, Pittsburgh 33, Pa.

At the annual meeting of the Council, the governing body of the Society, approval was given to a proposal recommended by the Executive Board that the Society undertake the publication of its own journal within the next year. Thus, there will be available a more adequate vehicle for carrying the news of the Society and its activities, as well as a larger number of technical papers than the Society can publish in the present Journal of the ISA as a small section of the magazine *Instruments*. Prospective authors are urged to submit titles and abstracts for next year's conference, or for the new *ISA Journal*, as soon as possible, to permit adequate time for editorial review by appropriate committees, and for preprinting.

All readers are cordially invited to plan to attend next year's conference and exhibit in Philadelphia, to attend meetings of any of the 66 Sections of ISA throughout the country, and to affiliate with the Society if their work or interests require that they keep abreast of the broad and expanding field of instrumentation in their own branch of science or industry.

News and Notes

Fifth Annual Oak Ridge Summer Symposium

THE Oak Ridge Summer Symposium was held this year August 24–29, and was devoted to the subject, "Topics of Modern Physics." These summer symposia are offered jointly by the Oak Ridge National Laboratory and the Oak Ridge Institute of Nuclear Studies and are intended to provide a broad view of modern developments in various scientific fields. An attempt is made to arrange a program at each symposium with a broader coverage, both in subject matter and period of time, than is normally provided in meetings of professional societies. The symposia are scheduled each year at the end of the summer so as to coincide as nearly as possible with the period following the close of summer school sessions. The first symposia were devoted consecutively to the subjects of physics, chemistry, nuclear engineering, and the use of radioactive isotopes in agricultural research. Thus the symposium this year, in returning to the consideration of topics in modern physics, initiated a new cycle of annual offerings.

The total registration for the symposium was 248, of which 175 were local and 73 were from outside Oak Ridge. Among the latter, 36 universities and 25 states were represented. Two major fields of recent research in physics were covered in the symposium; namely, ultra-high energy particle phenomena and developments in spectroscopy throughout the range of the electromagnetic spectrum.

J. Steinberger of Columbia University presented a series of four lectures on mesons. Research on π-mesons was reviewed historically and the key experiments were described in some detail. Special emphasis was given to the concept of isotopic spin and the consequences of charge independence in nuclear interactions. The final lecture consisted of a brief review of experimental evidence relating to higher mass mesons and V-particles.

The remaining lectures in the field of ultra-high energy phenomena were given by M. S. Livingston of Massachusetts Institute of Technology. In his first lecture he described a detailed design, which has recently been completed by a group at Cambridge working