

ELECTRONIC AGE

Winter 1964 / 1965



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SPECTRA 70

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In little more than half a century, electronics has touched the lives of all men and created a new scale of human perception, ranging from the atomic nucleus to the frontiers of the universe. Today, electronic technology embraces almost all aspects of organized human activity—broadcasting and home entertainment, education, worldwide communication, commerce and industry, military strategy, the exploration of space, and scientific research.

As a leading contributor to this technological revolution and as an organization devoted to the concept of better communications, RCA has published this magazine for 24 years, reporting on the company's diverse activities and interpreting the significance of electronic progress. In keeping with the advance of the technology and industry, the magazine has undergone significant change. Its content differs substantially from that of former years, and in 1957 even its name was changed—from *Radio Age* to *Electronic Age*.

In the new format introduced with this issue, *Electronic Age* will continue to publish news of RCA products, services, and innovations, even as it chronicles the story of man's attempt through electronics to enhance his daily life and to master his environment on earth and in space.

—THE EDITOR

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Cover: The Spectra 70 series, first of the third generation of computers, is comprised initially of four compatible general-purpose data processors and more than 40 interchangeable peripheral devices. Two of the series are the first commercial systems to use monolithic integrated circuits. The Spectra 70 series can speak the language of other computers and is designed to meet the total information-processing requirements of science and industry well into the 1970s. For more about this newest data processing system, see page 2.

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SPECTRA 70

by Ken Kizer



On the day the very first general-purpose commercial computer was put to work in the United States, it spoke with a voice that posed no communications problem for those who used it beyond the relatively simple one of learning a new language. But over the years, as competing manufacturers vied to improve the speed, capacity, and versatility of their systems, more and more new voices were added. Today, 15 years later, the swelling chorus has grown, in this country alone, to about 20,000 general-purpose computers that assimilate and chatter out a prodigious amount of information. But in communicating this information, at one stage or another of their complex tasks, they employ more than 1,000 different languages.

The situation has been described by RCA Board Chairman David Sarnoff as a "technological Tower of Babel." He summarized the extent of variations, not only in programming language but in character codes and magnetic tape specifications, at the Fall Joint Computer Conference held in San Francisco in October, 1964:

"There are, by conservative count, more than 1,000 programming languages. And there are languages within languages — in one instance, 26 dialects, and in another, 35 dialects. There are eight computer word lengths in use. There are hundreds of character codes in being, at a ratio of one code for every two machines marketed. Four magnetic tape sizes are employed with at least 50 different tape tracks and codes."

In all fairness, this tower of confusion was built inadvertently. Because of competition among manufacturers, and also because of a natural curiosity to explore the limits of the new technological terrain, the electronics industry made giant strides in creating powerful computers to speed the flow of commerce and communications. No one questioned the urgency of advancing speed, capacity, and operating economy until the computer population began to reach its present level. Now, however, with the present rate of expansion at about 500 new systems a month, both users and makers are becoming acutely aware of the problem of compatibility.

Main control console and some of the operating equipment of the new RCA Spectra 70 family of computers. Initially, the Spectra 70 series consists of four compatible general-purpose computers.

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RCA's first third-generation computer series is designed to meet the information processing requirements of science and industry well into the 1970s.

Discrepancies among the various systems are costly. They frequently mean that programs prepared for one computer cannot be used for another without translation, or that a user cannot add a new or different brand of computer to his existing facilities without encountering problems of delay, duplication, and waste.

The computer manufacturer also pays a price because he must divert engineering and programming talents into the development of optional equipment for data input or output. Another alternative, prohibitively expensive, is to design tailor-made systems for individual customers.

These overriding economic considerations have emphasized the need for greater standardization in the computer field, and technical and professional groups have, in fact, made recommendations that could lead to a common language and to other basic standards.

Even in the absence of standards, however, computer technology is starting to move in the direction of greater compatibility. The trend is appearing coincidentally with the emergence of the third generation of systems represented by a new computer family known as the Spectra 70, introduced last December by RCA.

These computers are designed to meet the needs of individual users, while at the same time providing a real protection, through compatibility, for investment in programming costs. Such built-in protection represents about half the total dollars necessary for each operating computer installation.

The Spectra 70 series permits the user a wholly new level of operational standards in language, in growth, and in peripheral equipment. It has the ability to handle programs within its own family, with other RCA computers, and with the majority of still other computers currently installed or announced, allowing users to put Spectra 70 side by side with systems already in operation.

What is Spectra 70? A. L. Malcarney, Group Executive Vice President, describes the new family as, first, a fundamental system to provide a broad base of common computer equipment and performance demanded by the

RCA President Elmer W. Engstrom holds an integrated circuit board of the type used in the new computer series, as he answers a reporter's query at a news conference announcing the Spectra 70 system.



individual needs of the user; second, a family of computers to permit growth and enlargement for the future; third, ability to be multilingual, affording the user freedom and protection of programming investment; fourth, greater speed, reliability, and economy through the use of monolithic integrated circuitry — a third-generation machine at one of the lowest cost-performance ratios available in the industry; and, finally, a system fully competitive in price and performance.

“These are the achievements and the significance of the new Spectra 70 series — to the computer user, to RCA, and to the future of handling information,” Mr. Malcarney said.

As the name implies — a full spectrum of computing, peripheral, and communications equipment looking well into the next decade — Spectra 70 meets the full range of system and application requirements of science and industry and promises a broad utilization for the company planning to evolve to a total management information and control system.

In the final analysis, developments in the techniques of data handling follow advances in circuit design. In the 1950s, a computer circuit was comprised of discrete components hand-wired to a plug-in chassis studded with vacuum tubes. These circuits could be inserted into the computer’s main frame or removed with the help of a stirrup handle. Not only were the tubes hot and fragile, but a great amount of power was required, huge air-conditioning ducts were a necessity, and the life span of these modules was short.

The technique of building data processors about these circuits came to an abrupt end with the application of the transistor, which did away with the complex, power-consuming tube and heralded the second-generation, or solid-state, computer.

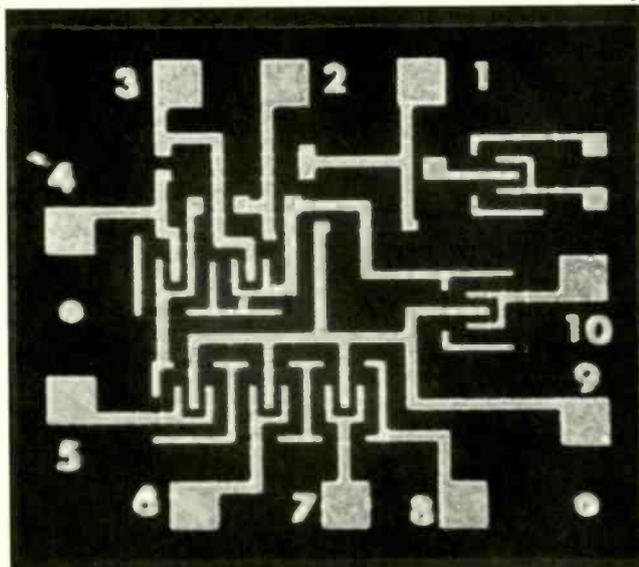
The second-generation circuit contained, and still does, about four times as many functions as the vacuum tube unit. It consumes less power, yet costs about the same. The computer industry hastened to take advantage of these transistorized circuits and refined the state of the art into



1.
3.



2.



1. Individual integrated circuit of the type used in Spectra 70 computers is a circuit on a speck that measures approximately one-twentieth of an inch on each side.

2. One integrated circuit holds two complete computer circuits, replacing functions that would be performed by 15 transistors, 13 resistors, and interconnecting wiring.

3. This pattern for an integrated circuit is first drawn in large size and then reproduced by photo-etching techniques on a wafer-thin silicon chip.



RCA IN '64

by David Sarnoff

Chairman of the Board
Radio Corporation of America

Color TV, electronic data processing, and broadcasting are major factors in making 1964 the third successive year in which profits reached an all-time high.

For the third year in succession, the Radio Corporation of America in 1964 attained the highest level of profitability in its history. This sustained profit momentum, which your management believes will continue in 1965, places RCA on the firmest footing of any time since its founding 45 years ago.

Subject to final confirmation, operating profits after taxes are expected to have risen beyond \$80,000,000, exceeding by more than 20 per cent the record profit of \$66,000,000 for 1963. Operating earnings per common share for 1964 should have increased to a new record high of approximately \$1.50, as compared with \$1.20 in 1963. (Adjusted retroactively for the 10 per cent stock dividend on common stock payable February 1, 1965, the earnings per share would be approximately \$1.36 in 1964 and \$1.09 in 1963.)

The rise in profits stemmed from increased sales in our commercial business, which more than counterbalanced the continued industry-wide decline in government sales. RCA's total sales will approximate \$1,800,000,000, compared with \$1,789,000,000 for the previous year.

In addition to RCA's operating profits, non-recurring income totaling \$11,370,000 was realized from the sale of 141,747 shares of common stock of the Whirlpool Corporation and from a federal excess profits tax refund relating to the years 1940-1944. This non-recurring income added 22 cents per share of common stock to the operating earnings in 1964, bringing the year's total to more than \$1.70 per share. (Adjusted retroactively for the 10 per cent stock dividend payable February 1, 1965, these figures would be 20 cents and \$1.56 per share, respectively.)

The company's progress was reflected on December 3, 1964, in the action of the RCA Board of Directors, which declared a special cash dividend of 10 cents per share on the common stock, a 10 per cent common stock dividend, and a regular quarterly cash dividend of 15 cents per share. At the same time, the Board authorized an offer to purchase, for retirement, the 900,824 outstanding shares of RCA \$3.50 Cumulative First Preferred stock at a price of \$90 per share.

PRINCIPAL GROWTH ELEMENTS

As the year ended, RCA initiated further steps to assure its progress in the years ahead.

One was the conclusion of patent license and technical information and sales agreements with Siemens & Halske A.G., of Germany. RCA has granted the German company patent licenses for the manufacture and sale of data processing equipment, and has received similar licenses in return. The new arrangement is expected to develop a multimillion-dollar business between the two firms, and materially strengthen the position of both companies in the expanding world-wide computer market.

Another step was negotiation for a merger of RCA and Prentice-Hall, one of the nation's leading publishers in the educational field. If the preliminary plans are ultimately approved, Prentice-Hall would become a wholly-owned subsidiary of RCA. I believe that the merger would work to the benefit of both organizations, and would advance the art of communications as a whole. I believe also that this move could open to RCA major opportunities in many fields of educational endeavor.



Production of 25-inch color television picture tubes at RCA's Lancaster, Pa., plant.

Oversized pattern of an advanced integrated circuit for use in Spectra 70 computer.



Production line at RCA's computer facility at Palm Beach Gardens, Fla.



In tabulating the progress made during 1964, many of the commercial operations of the company could post the words "record-breaking" on their year-end reports. Among the most important contributors to the corporate profit pattern were these:

1. RCA Victor Home Instruments scored a third consecutive year of record sales and achieved the highest profits in their history. Pacing the continued rise was color television, which has achieved the status of a billion-dollar industry in the 10 years since its commercial introduction by RCA.
2. Electronic Data Processing crossed into the profit column well ahead of schedule and earned a profit for the company on a full-year basis. Data processing sales surpassed the \$100-million level forecast for the end of the year.
3. The National Broadcasting Company achieved the highest sales and profits in its history, substantially ahead of last year's records.
4. Electronic Components and Devices reached an all-time sales record and the highest level of profitability in 14 years. Setting the pace was an increase of more than 25 per cent in dollar sales of color TV picture tubes as against 1963.

Sales of commercial products and services accounted for three out of every four dollars of gross revenue received last year by RCA. The company's greatest strengths today are in those areas of electronics where the growth and profit opportunities are developing most vigorously.

Compared with 38 per cent in 1961, government business has declined to one-quarter of total RCA sales and its contribution to profits after taxes is less than 10 per cent. However, RCA continues to rank among the leading industrial prime contractors to both the Department of Defense and NASA. As 1964 drew to a close, the backlog of government bookings was somewhat higher than at the end of last year, pointing to a leveling-off of the decline in government business.

HIGHLIGHTS OF PROGRESS

The extent of RCA's progress during 1964 was underscored by developments in every area of the company's business.

Consumer Products — Total factory dollar sales of RCA Victor home instruments are expected to be about 15 per cent over the previous year. Color set dollar sales have increased more than 20 per cent, with a dollar volume nearly equal to the combined total of all other RCA home instruments. Substantial gains also were made for black-and-white TV, radios, and "Victrola" phonographs.

RCA continued to supply most of the color TV picture tubes available to the industry, and anticipates that in 1965 it will manufacture approximately two-thirds of the total industry output. RCA's introduction of its 25-inch and 19-inch rectangular color tubes is expected to accelerate further the growth of the color TV industry.

The RCA Victor Record Division achieved the highest sales volume in its history. RCA Victor Records currently leads in the lucrative Broadway show album field with two of the season's greatest musical hits, "Hello, Dolly!" and "Fiddler on the Roof."

Computers — At the year's end, RCA had a total of nearly 800 electronic data processing systems installed or on order in this country and abroad. Over 140 systems were booked during 1964, an increase of about 22 per cent over the previous year in systems booked to date.

In December, RCA launched the first family of third generation computers, the Spectra 70, featuring the use of integrated circuitry. Even before the introduction of the Spectra series, orders for these new systems already had been received from companies in the banking, manufacturing, and accounting fields.

Broadcasting — All operating divisions of the National Broadcasting Company contributed to its all-time record sales and profits. The NBC-TV Network, the Owned Stations, and the Enterprises divisions each had higher earnings than in any previous year.

NBC's News Division maintained its leadership in broadcast journalism by attracting more viewers than the two other networks combined to its 1964 convention and election coverage. Major gains also were achieved in the audience popularity of NBC's entertainment programming while NBC Sports further strengthened its position as the leader in sports programming.

With more than 70 per cent of NBC's nighttime TV network schedule in color, 30 new additional advertisers joined the roster of sponsors broadcasting commercials in color.

Space and Defense — RCA contributed importantly to space technology in 1964. The RCA-built television system aboard the Ranger VII spacecraft photographed and transmitted the first detailed close-up pictures of the moon.

NASA's Relay II communications satellite, developed by RCA, surpassed all operational requirements to an extent matching the achievement of its RCA-built predecessor. RCA provided the camera systems for the advanced Nimbus weather observation satellite. NASA's SERT vehicle, which was developed by RCA, provided the test-bed for the nation's first successful electronic rocket experiment in space.

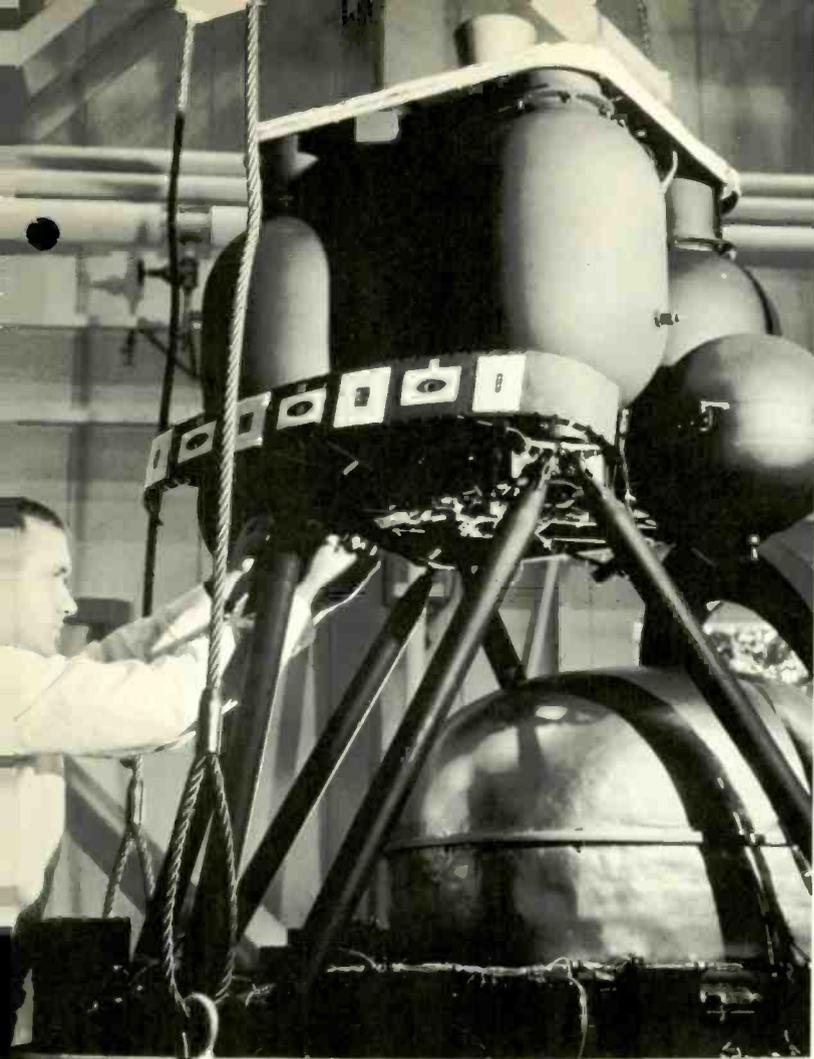
RCA's expanding role in the Apollo lunar program now comprises a complex of contracts totaling \$80 million. In addition, a contract for more than \$25 million has been received from NASA for RCA 110A computers for automatic check-out of the Saturn rocket.

Electronic Technology — RCA Laboratories probed new frontiers of electronics in basic and applied research, and gave major support to the product divisions in such diverse areas as electronic propulsion techniques for space probes, radiation resistant computer circuits, improved microwave amplification, and superconductive high-field magnets and computer memories.

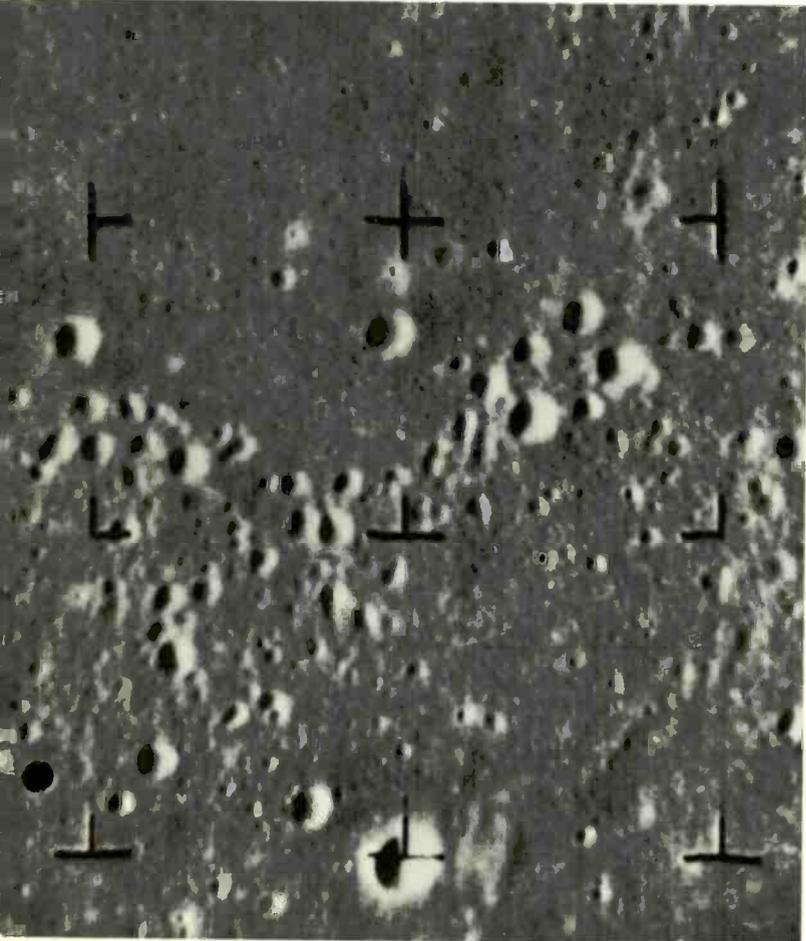
RCA Electronic Components and Devices achieved the highest unit and dollar sales volume for semiconductors since their manufacture by the company began in 1955.

The backlog of orders for television broadcast equipment increased approximately 50 per cent over the previous year to the highest level since 1953.

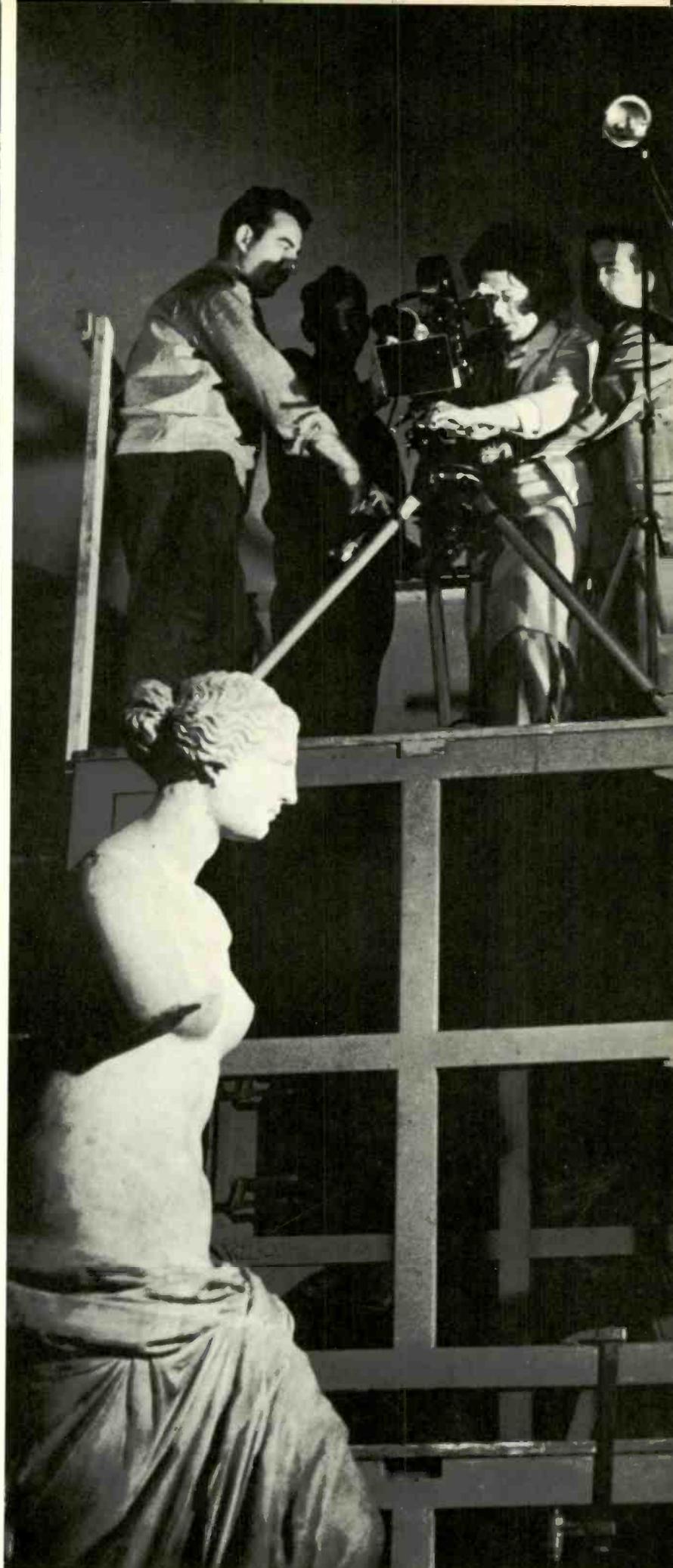
World Trade, Communications, and Service — Sales by RCA Communications, Inc., increased for the eleventh consecutive year, rising to a new record high in 1964. RCA



RCA furnishes power supply and electronic subsystems for Lunar Orbiter, a spacecraft that will map the moon's surface.



Man's first close-up photographs of the moon were returned by RCA television cameras aboard Ranger 7.



The Venus de Milo poses for filming during production of the NBC Television special program on the Louvre.



RCA IN '64

Communications continues to maintain its position as the leading U.S. international telegraph carrier.

The RCA Service Company increased its profits to a record high for the third successive year.

Internationally, RCA's Canadian and Australian subsidiaries achieved their highest dollar sales volume.

THE OUTLOOK FOR 1965

The major indices of economic activity continue to point toward further business growth during 1965. As an important element of the economy, the electronics industry is expected to contribute to and benefit from this growth.

Computers, for example, will strengthen the pace of economic progress. In turn, they should benefit from an increase of approximately 15 per cent in the industry's volume of equipment sales and rentals in 1965.

Color television has become one of the nation's most powerful marketing forces as well as a leading beneficiary of increased consumer spending. In 1965, color set sales should surpass 2 million units, compared with 1964's 1.3 million sets.

In 1964, RCA made these significant provisions for the future:

It expanded production facilities and introduced significant product innovations to strengthen RCA leadership in the swiftly expanding color television market.

It introduced the most advanced electronic computers on the market.

It undertook advanced programs of engineering and manufacturing expansion in basic electronics, including the integrated circuits that will become the key elements in tomorrow's consumer, industrial, and government systems.

Your management looks with confidence to the future. We expect in 1965 to achieve our fourth consecutive year of record sales and profits. ■



New four-channel color TV camera (top) is calibrated in tests at RCA's Camden, N.J., plant.

RCA Victor records span a broad spectrum of musical tastes.



The phone on the left connects the U.S. Weather Bureau's National Weather Satellite Center in Suitland, Md., with the Central Forecasting Institute in Moscow.

International Weather Line

by Patty Cavin

A recently established communications link between Washington and Moscow gives meteorologists quicker access to world weather information.

The young meteorologist in the noisy communications room on the third floor of the U.S. Weather Bureau's National Weather Satellite Center in Suitland, Md., squinted nervously at the clock above the compact bank of electronic machines. It was two minutes after 10 A.M. The shiny red phone in his hand emitted a high-pitched squeak.

Behind him lights flashed above a row of somber black telephones, direct lines to Cape Kennedy, Fla.; Fairbanks, Alaska; the National Hurricane Center in Miami; and NASA headquarters in Washington, D.C. Around him a serious group of men checked the electronic scanner machines steadily rolling off weather maps, while facsimile specialists scanned the keys of their machines, preparing for instant action.

Suddenly it came.

"Hello, Washington . . . hello, Washington. . . . This is Moscow. Professor Bugaev is here."

As the crackling tones of a Russian interpreter 5,000 miles away in the Central Forecasting Institute in Moscow faded through the speaker, the U.S. Weather Bureau's sandy-haired Arthur W. Johnson, Manager of the Operations Division of the National Weather Satellite Center, picked up the receiver and began what undoubtedly is the longest "person-to-person" conversation held regularly these days between Washington and Moscow.

The voice at the other end of the line belonged to his Russian counterpart, stocky, white-haired Victor Bugaev, Director of Russia's Central Forecasting Institute, a four-

story yellow stone building on the grounds of the Academy of Sciences in the heart of Moscow. Since last November, these two men have talked every 10 days for periods of 15 to 40 minutes on the widely varied scientific topics involved in modern weather analysis.

Both principals in these conversations were technical negotiators who took part in the talks leading to the establishment of the recently completed U.S.-Soviet direct weather circuit.

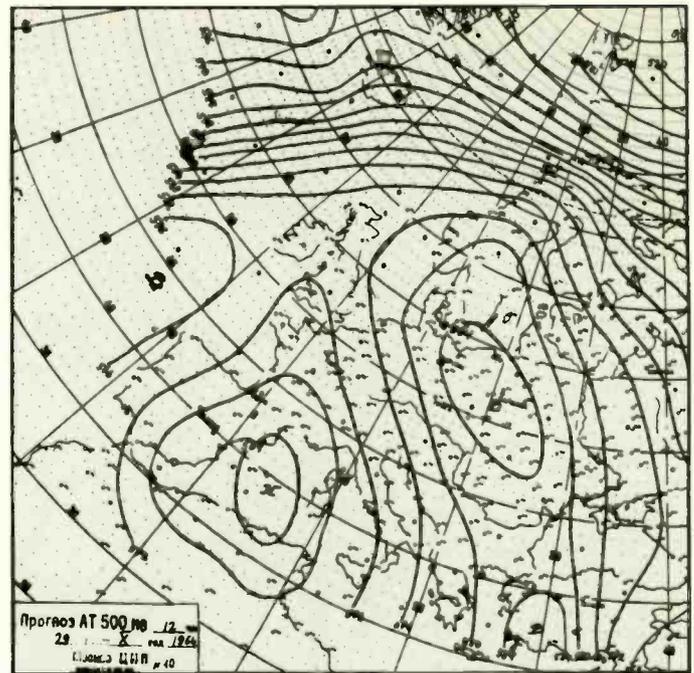
It is no common telephone line through which this international "weatherese" flows three times a month. Instead, Johnson and Bugaev talk directly through a series of interconnected wireline and cable channels operating 24 hours a day from the U.S. Weather Bureau's national nerve center in Suitland through London, Frankfurt, Berlin, Warsaw, and on to the Central Forecasting Institute.

Most Americans are aware of the Pentagon-White House Hot Line to Moscow designed, in cases of dire emergency, to keep the President in quick touch with the Soviet Premier in case of emergency. Few, however, realize that a weather line exists. An important step forward in the United Nations' three-year-old master plan to strengthen world weather service and research, the line itself has been an actuality since October 1, 1964, when RCA Communications, Inc., prime contractor in establishing the circuit, turned it over in working condition to the U.S. Weather Bureau.

Although the Johnson-Bugaev conversations are mere



Dr. Robert M. White, Chief of the U.S. Weather Bureau, and Dr. J. Herbert Hollomon, Assistant Secretary of Commerce for Science and Technology.



Russian weather map received at the U.S. Weather Bureau's center in Suitland, Md., via weather circuit provided by RCA Communications, Inc.

preliminary checkups on the international exchange, weather information has been steadily flowing over the line since October 25. It is transmitted by four different modes — voice, facsimile, photograph, and telegraph. Thus, the most technical cloud-cap data and maps, charted courtesy of the U.S. family of TIROS weather satellites, could be speedily flashed to Russia within minutes of their reception at the Satellite Center in Suitland.

As of December, the line has worked smoothly, but only conventional weather data have been reciprocally exchanged on the regular daily schedules. It is hoped that satellite information will flow back and forth in the near future, according to Dr. J. Herbert Hollomon, Assistant Secretary of Commerce for Science and Technology.

Dr. Hollomon, 46, like his Chief of the U.S. Weather Bureau, Dr. Robert M. White, 42, is one of the new breed of young scientist-engineer-administrators currently holding key posts in government. Since joining the Bureau on October 1, 1963, Dr. White has been serving as Permanent Representative of the United States to the World Meteorological Organization, a specialized U.N. agency. Both he and Dr. Hollomon lent official enthusiasm and administrative know-how in the final stages of the U.S.-Soviet agreement.

Top credit for negotiations, however, belongs to the distinguished American scientist Dr. Hugh L. Dryden, Deputy Administrator of the National Aeronautics and Space Administration, whose continued persuasiveness as technical adviser to the U.S. representative on the U.N.'s broadly based 28-nation Outer Space Committee finally convinced Russia's shrewd academician Professor Anatoli Blagonravov that the Soviet Union should hook up to the weather line.

Dr. Dryden gladly shares credit for initiating the project with Dr. Francis W. Reichelderfer, retired Chief of the Weather Bureau. Dr. Reichelderfer, with the late Dr. Harry Wexler, pioneered the initial idea on the Amer-

ican side with his chief of research. NASA's capable Arnold Frutkin, Assistant Administrator for International Programs, also played a major part in the long-range negotiations.

Both Dr. Hollomon and Dr. White agree that the most difficult part of the negotiations was reaching agreement for the payment of the weather line. Both countries share equally the expenses that are approximately \$26,500 a month.

All principals on the American side share President Johnson's initial hope that other member nations of the World Meteorological Organization will eventually receive data transmitted over the new weather link.

The President gave the first official word of the new exchange at a spontaneous Saturday afternoon press conference at the White House on October 24, 1964.

"I am happy to be able to announce that we have reached an agreement with the Soviet Union for the exchange of weather information between Moscow and Washington," Johnson commented.

"... We know," the President continued, "that the new link, when in operation, will be a substantial step forward in speeding the transmission of valuable weather data in both directions. The American weathermen and the American public will immediately benefit from these improvements."

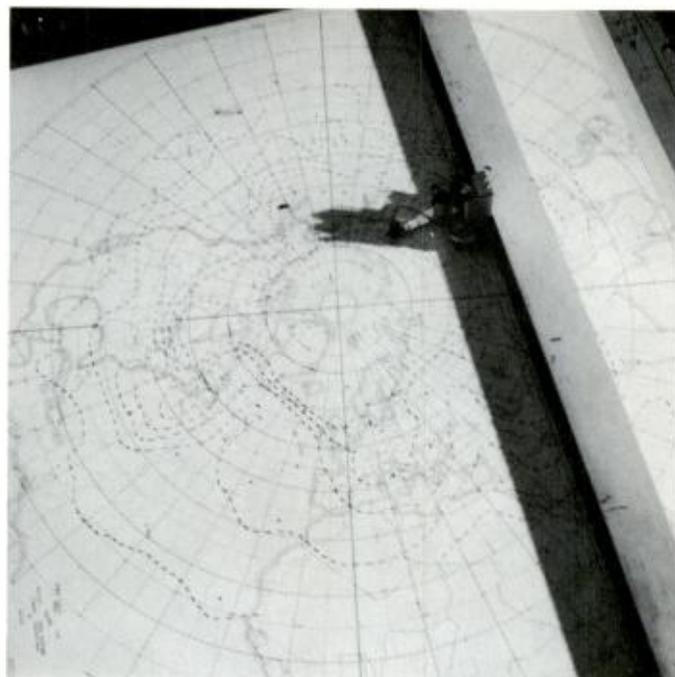
Since the President's October announcement, the benefits have been largely those of time.

"We are presently achieving an active speed-up of raw facts from one to five hours," says Dr. White of the Weather Bureau. "All weather forces depend on data from large geographical areas. Meteorology is the international science par excellence. The weather affecting one part of the world today affects the other part tomorrow. Everybody needs all the information. The sooner we get this information, the better are our prognosis maps."

Dr. Hollomon, who made a trip to Russia after the



U.S. Weather Bureau employee checks voice conditions on Washington-Moscow weather line.



Information received at the National Weather Satellite Center in Suitland is electronically drawn on world weather map.

line was activated, reports that the American weather maps received on the Soviet side are extremely clear and detailed. While in Moscow, he visited the Central Forecasting Institute, now designated as the first World Weather Center.

"Tremendous excitement was exhibited by Russian weathermen I met about the speed with which information is transmitted on the line," explains Dr. Hollomon. "They have many more people on their weather staff than we. Thus, many of their maps are drawn by hand, while ours are done by computers. The Russians are very capable people. Technologically, they can do anything we can do."

Anyone who has followed the chain of events leading up to the new U.S.-Soviet weather line and the international plan for a World Weather System might well agree with Dr. Hollomon.

Both ideas have piqued the imaginations and spurred into action not only Russian diplomats but also three American Presidents — Eisenhower, Kennedy, and Johnson. Speaking to the United Nations, late in his term of office, President Eisenhower proposed that ". . . we press forward with a program of international cooperation for constructive peaceful uses of outer space under the United Nations. Better weather forecasts, improved world-wide communications . . . are but a few of the benefits of such cooperation."

President-elect John F. Kennedy, in November of 1960, also began to think about the weather and what he could personally do about it. His State of the Union message reflected his personal enthusiasm for the first two TIROS weather satellites orbiting the earth and sending back helpful photographic data.

"I now invite all nations . . . including the Soviet Union . . . to join with us in developing a weather prediction program," he said.

John Kennedy's hopes for international cooperation in meteorology became a growing plan 11 months later when,

in December, 1961, the U.N. General Assembly unanimously approved Resolution 1721, embodying a Kennedy-proposed four-point program of space cooperation. It was this resolution that sent the World Meteorological Organization into immediate action.

The WMO's first report in June of 1962 recommended the creation of a World Weather System, which itself became a working blueprint in the spring of 1963. Long-range studies to bring improved weather services to all nations of the world were started at that time. A special research and development fund for improvement of facilities, education, and training was established. The system was planned to focus on three World Weather Centers, one to be located in Moscow, another in Washington, and a third in the Southern Hemisphere.

In addition to gathering, processing, and disseminating global weather observations from satellites and other sources, the Centers would also train meteorologists, study large-scale weather systems, and archive weather information for research purposes.

Now, two years after WMO's first report, Russia has the first Center, and a new weather line links Moscow to Washington. Thus, the Northern Hemisphere benefits daily from very high-speed facsimile communications over the new 5,000-mile transcontinental circuit. Photos are also received and transmitted at twice the speed usually used on international circuits.

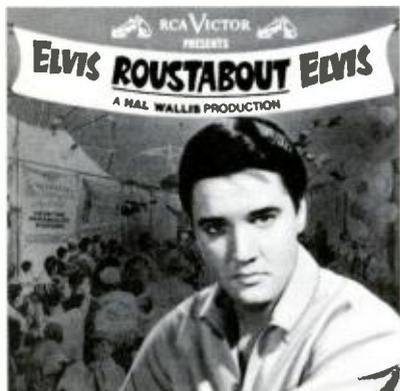
While Moscow and Suitland are the only two transmitting points on this first link, plans are being made to offer the weather data on a receive-only basis to countries that may wish to participate by payment of a proportional share of the cost.

On December 31, 1964, the Weather Bureau's Suitland operation was officially named the second World Weather Center. Although Drs. Hollomon and White refuse to name the third, informed sources in Washington wager that it will be in Australia — and by 1968. ■

ELVIS!

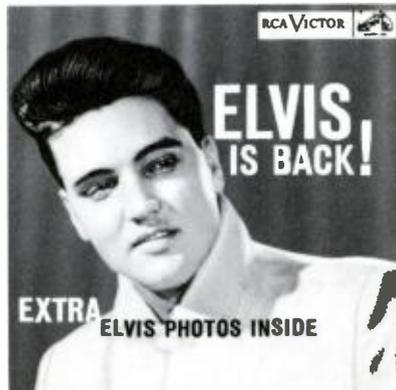
A Decade of Elvis Presley. One of the great all-time stars ...he has changed the shape of popular music and opened the way for almost every new trend that has zoomed to popularity since his debut.

by Robert Kotlowitz



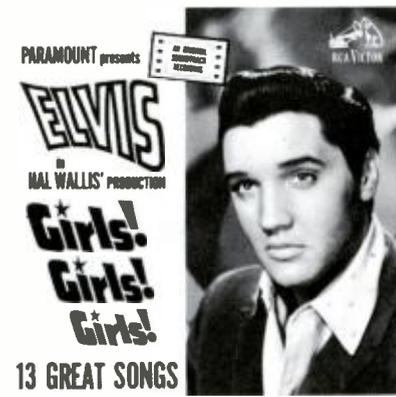
In 1965, a tall, rangy, handsome, fabulously rich, and gifted singer-actor-performer will have marked two anniversaries: his 30th birthday on January 8 and his 10th year as an RCA Victor recording artist.

His name is Elvis Presley and, because of the evocative magic of those four simple syllables, the birthday alone took on a special emotional as well as astonishing statistical meaning for millions of Americans, both teenage and adult, who would otherwise accept a 30th birthday as just another in the regular course of human events. The emotions included nostalgia among those who were barely into their teens when the Presley career began, amazement among those who had observed the career with a good deal of wide-eyed pleasure from their vantage point as young adults, and not a little rue, mixed with humor, from those who were most aghast at the Presley performance at first, only to succumb to it, eventually. One of them, Hedda Hopper, who was among the most vociferous anti-Presley columnists in the beginning, was heard breaking into wild laughter the first time she did the Twist on the dance floor. Miss Hopper, it turned out, had the good sense to realize — suddenly and in public — that the gyrations she was mastering would never have become an accepted part of Americana if Elvis Presley had not prepared us for them.



And what of those astonishing statistics? Well, hold on:

- More than 100 million copies of Elvis Presley records have been sold all over the world.
- Elvis Presley's second recording for RCA Victor, "Hound Dog," alone sold 6,485,366 copies since it was first released in 1956.
- Seventeen motion pictures starring Elvis Presley have been released to date and their total combined gross is more than \$130 million.
- The highest fee ever paid for a single guest appearance on television, \$125,000, went to Elvis Presley in 1960 on the Frank Sinatra show.
- Forty-four RCA Victor single recordings of Elvis Presley have sold more than 1 million copies each worldwide.
- One Elvis Presley RCA Victor LP alone, "Blue Hawaii," has sold more than 2 million copies, followed by "G.I. Blues," which to date is over the 1.5 million mark, while "Elvis' Christmas Album" has sold over 1 million copies.
- It is acknowledged further that the recorded voice of Elvis Presley has been heard by more people in the world than that of any other performing artist in the history of the recording industry.



Still, astonishing statistics are only a part of the Presley story. In the decade during which he has continued to be one of the great all-time stars, he has done more than set records. He changed the shape of American pop music, influenced the personal and entertainment tastes of teenagers in this country, and opened the way for almost every new teen-age craze that has zoomed to popularity since 1955.

He proved all his early critics wrong, moreover, not only by acting as a positive force in the entertainment world but as a strong and highly dignified influence on his audience over the years. Few Hollywood stars, in the history of that frenzied city, have behaved with as much quiet and sincere poise as has Elvis Presley. And he has

continued one of the earliest traditions he established as a performer, that of offering his services and/or his own money to a long list of charities, most of which operate in his own home town of Memphis, Tenn.; it is done without much publicity, but there has never been a break in either his interest or participation in these organizations' activities.

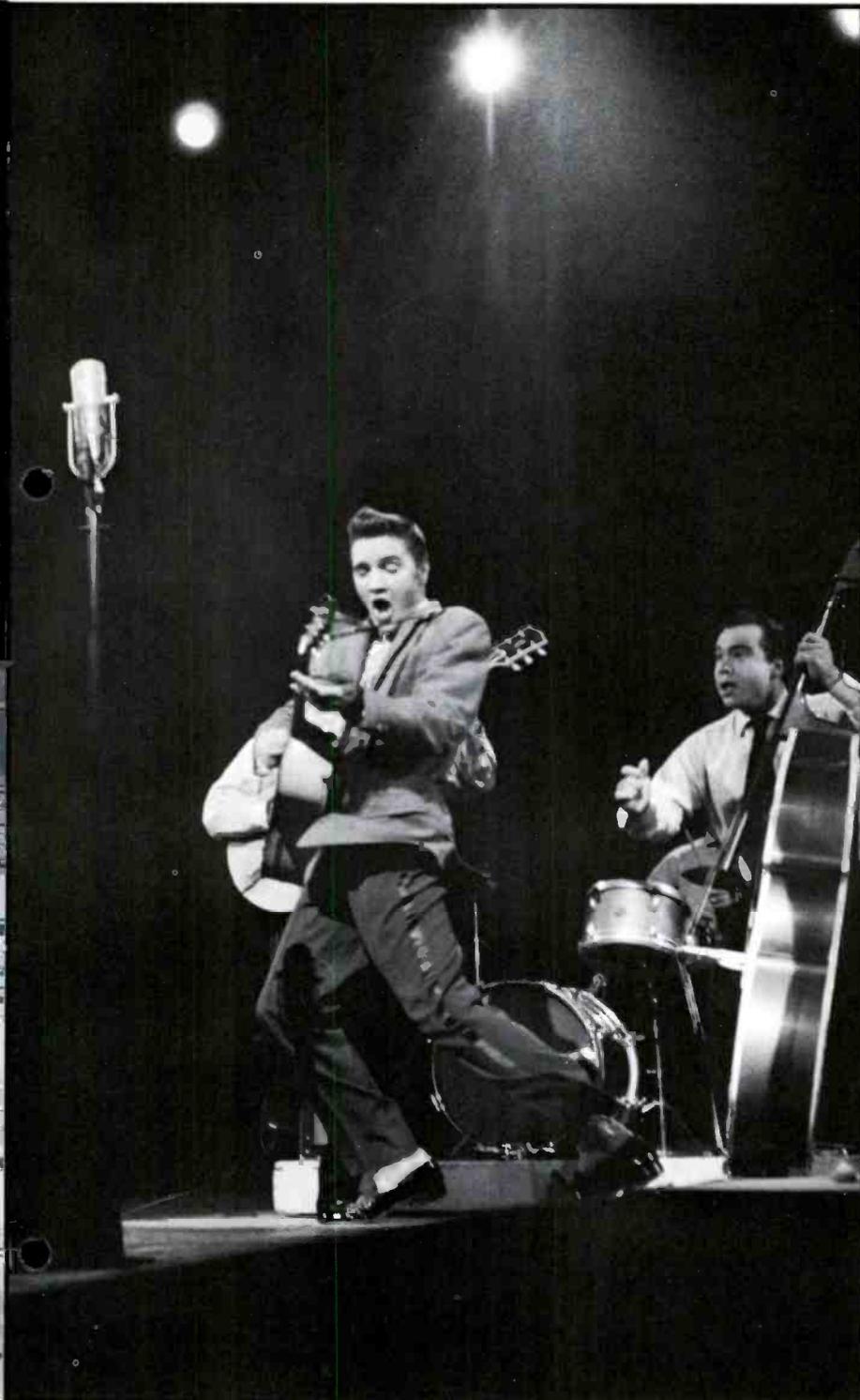
The story of the Presley decade is a high-powered one, filled with the fireworks of sudden, startling success, the shock of an ever-increasing and almost incredible amount of money, and the noise and tumult of public controversy, which surrounded Presley, at least for a while, like a hurricane. Almost everything about him was out of the ordinary, including the fact that at birth he was the surviving member of a set of twins named Jesse Garon and Elvis Aron. As a young boy in Tupelo, Miss., Presley often sang in church and later became known as the third member of a trio, which also included his mother and father, that sang at camp meetings, revivals, and church conventions. When the boy won a music contest at a local fair by singing "Old Shep," his parents bought him his first guitar. It cost \$12.98 and it was put to good use in front of the radio or the phonograph as day by day the young Elvis picked out tunes he heard coming over either of the two machines.

In 1953, a recent high school graduate and a \$35-a-week-truck driver for the Crown Electric Company in Memphis, Presley wandered into the Sun Record Company to make a solo recording for himself. One year later, he was asked to make a record for Sun as a professional. On the basis of that record, called "That's Alright, Mama," he was taken under the direction of Colonel Tom Parker, who has remained his manager to this day and, on his own, also remains one of the great originals in American show-business history.

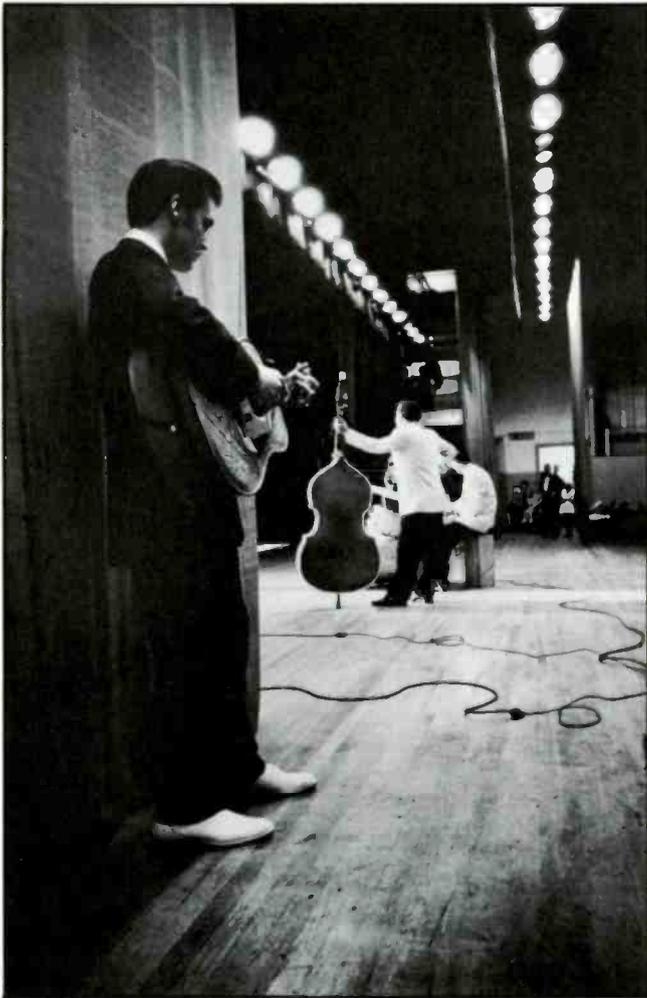
In the fall of 1955, RCA Victor bid for the young performer's contract and got it for \$35,000, a then unheard-of price for a virtually untried artist.

RCA Victor produced its first Presley recording in January, 1956. It was called "Heartbreak Hotel," and, within a few short months, the Presley performance of it was to shake up the record business as well as the entire entertainment industry as they hadn't been shaken in years. First, Elvis made an appearance on the Jackie Gleason TV "Stage Show," singing "Heartbreak Hotel" with Tommy and Jimmy Dorsey. Then he returned to the Gleason show five more times, singing "Heartbreak Hotel" at two of those appearances. By then, the recording — and other early Presley recordings — were smash hits, and the dynamic, easy-smiling young man was the overnight sensation of show business. At that point, he was booked for "The Milton Berle Show" and for three appearances on "The Ed Sullivan Show"; simultaneously, he signed a seven-year movie contract with Hal Wallis.

Today, of course, it is fun to recall the controversy that engulfed Elvis Presley in that first year as an international star. Almost all of it was generated by the uninhibited physical gyrations he went through during each song and, secondarily, by the equally uninhibited response of his audience, which was made up almost entirely of teen-agers. Girls wept at the sight of him. His home in Memphis was watched day and night by little bands of adolescent girls eager for a glimpse of their idol. It was



Elvis Presley, onstage, in action.



Presley waiting to go onstage in the early days of his career.



Presley with friends during Army stint.

a phenomenon that had happened before in America (and would happen again), but it had never before reached precisely the Presley point of sheer mania.

Just as he was being voted the most promising Country and Western artist of the year, the press everywhere embarked on a saturation campaign of Presley copy, most of it unfavorable. Columnists filled their daily columns with anecdotes and criticism. Hedda Hopper, for one, became one of the chief anti-Presleyites in the country, although she was later drastically to revise her opinion of him both as a performer and an individual and become one of his chief boosters in Hollywood. One magazine ran an editorial headed "Beware of Elvis Presley." Even the Communist press got into the act. When East German teen-agers joined together to form "The Presley Band," the Communist newspaper *Young World* claimed that the singer was a "weapon in the American psychological war" and that his secret function was to recruit youths with "nuclear political views."

Perhaps the Presleymania that hit the United States in 1956 was best summed up by a report from the St. Petersburg, Fla., *Evening Independent* in the summer of that year. This is how it read, in part: "The Pied Piper of rock n' roll, a swivel-hipped, leg-lashing entertainment bomb, blasted the downtown area into chaos all day yesterday. Screaming, fainting teen-agers lined the streets early

to catch a glimpse of Elvis Presley, a rock-billy gyrating singer who's shattered show business with his sultry style. He hit St. Petersburg with the effect of a small H-bomb, sending fans into mass hysteria and receiving an ovation rarely seen on the Suncoast." That is how it went, in city after city.

Single hit followed hit: "I Want You, I Need You, I Love You," "Hound Dog," "Love Me Tender," "Too Much," "All Shook Up," "Loving You," "Jailhouse Rock," "Don't," "Hard-Hearted Woman," "I Got Stung," "A Fool Such As I," "A Big Hunk O'Love." The EPs had just as big a success: "Elvis, Volume I," "Elvis, Volume II," "Elvis Sings Christmas Songs," "King Creole," "Peace in the Valley," among many others. And the smash LPs: "Elvis Presley," "Elvis," "Loving You," "Elvis' Christmas Album," "His Hand in Mine," and others. At the same time, his first movies were released, and they set box-office standards for Presley himself to break with each new film: "Love Me Tender," "Loving You," "Jailhouse Rock," "King Creole."

Then, in March of 1958, the comet threatened to burn out. Presley, like millions of his countrymen before him, was drafted into the U.S. Army and found himself serving with an armored division in Germany where he was eventually to reach the rank of sergeant. The country reacted to the news in various ways. A press release put out by Hal Wallis Productions said that "the high decibel shock wave which ensued was variously attributed to the wails of millions of youngsters, desolate at his departure and/or their parents' sighs of relief." From a critic: "The Elvis virus has at long last been isolated. Before Presley learns how to salute properly his public will have forgotten him."

As is common among critics of all varieties, it was simply wishful thinking. When Presley was released from the Army early in 1960, in the midst of one of the worst blizzards Fort Dix, N.J., had ever seen, he was greeted by an avalanche of newspaper, radio, and TV reporters as well as wistful and loyal teen-age fans who had stood for hours in deep snow and bitter cold to catch



This crowd was typical of the many that welcomed Presley after his discharge from the U.S. Army.

the merest sight of Sergeant Presley in uniform. By this time, there was a feeling that the press had subtly swung to Presley's side, and, if not quite ardent fans of the singer, were impressed by the dignified and quite natural way with which he had handled his Army stretch. His totally relaxed and cordial stance at the Fort Dix press conference added to the picture of a maturing personality, and it is no exaggeration to say that Presley won a mighty victory both at Fort Dix and at his press conferences on the way home to Memphis by remaining — of all peculiar things in show business — himself.

Within six months, one fact was already clear: the Presley career was bigger than ever. His first film, "G.I. Blues," broke all his own box-office records, and his first post-Army recordings all became gold records with sales of a million or more. Once again, the Presley hit-after-hit pattern: "Stuck on You," "It's Now or Never," "Are You Lonesome, Tonight?" (all released in 1960 and all gold records), "Surrender," "Can't Help Falling in Love," "Good Luck Charm," "Rock-a-Hula Baby," "Return to Sender." And, more smash LPs: "G.I. Blues" ('60), "Blue Hawaii" ('61), and "Girls! Girls! Girls!" ('62).

All kinds of theories, some of them fanciful, were advanced to explain the continuing Presley success. One theory had it that by disappearing into the Army at the height of his career, Presley had left his fans drooling for more; absence had only made their hearts fonder. This is a fine theory except for one thing: Presley did not disappear into the Army; he was drafted into it with about as much to say as to the direction his army life would take as had any other GI.

Another theory stressed the good will he had gained by not taking the easy way out in the Army as an entertaining GI; this undoubtedly had an effect upon his public, although not enough to explain thoroughly the way his career took off at his discharge. A third theory came from the teen-agers themselves, and it went something like this: Elvis simply outgrew all the things parents and other adults didn't like about him and got better at all the things teen-agers already liked about him. In other words, he grew up.

Certainly, few stars in the history of the movie business have behaved with such consistent good manners in Hollywood — where Presley is now based — as has this young man. Rumors and gossip about him have been at a minimum; few of his colleagues, in fact, can remember the last one. He is, besides, unusually well mannered in an industry noted for its stiff-armers, and he has a good deal of working tact and respect for his colleagues. Earl Wilson recently wrote of him: "Elvis was quietly non-circusy when I found him in his portable dressing room at Joe Pasternak's 'Girl Happy.' He wore a thin red sweater and dark slacks, and his hair was smartly combed. He has retained the nice habit of saying 'Sir' and 'Ma'am.'"

Part of this may come from real shyness. Presley has never become part of the Hollywood party scene, not even in the most casual way. He prefers to spend his time with a group of old friends from Tennessee, who travel with him and assist him in various capacities. It is, according to some of them, an extremely lonely life for the star, who cannot pick up and go off to a movie or a night club without being besieged by enthusiastic fans. But together the group has created something very much like a transplanted community in Beverly Hills. Not the least part of their charm is the accumulation of Tennessee



Presley and the Modernaires at an RCA Victor recording session.

drawls to be heard when they are out together for a session of touch football. This continues to be more or less of a Presley tradition; the group puts on football uniforms and special protective helmets and meets various other teams for a quiet workout, usually on Sunday afternoons.

Because of the unyielding demands of time in properly preparing and scheduling three motion pictures a year, including time for rehearsals, Presley has been unable to fill the hundreds of requests that continue to pour in for personal appearances all over the world. His feeling is simple: it would not be fair to play a few personal appearances and disappoint the many fans in other localities. He has made 12 movies since his discharge from the Army — among them “Flaming Star,” “Kissin’ Cousins,” and, most recently, “Roustabout” — and has just signed a contract for five more. (His “Roustabout” album sold more than 300,000 copies within four weeks of its initial release and is well on its way toward earning the Elvis trademark: still another gold record.) There is also a widespread feeling among the directors he has worked with that any time Presley wants to stop making musicals and concentrate on dramatic roles, the future for him will probably continue as unlimited as ever. In speculating on Presley’s future as a dramatic actor, one of them said: “He’ll knock their hats off!”

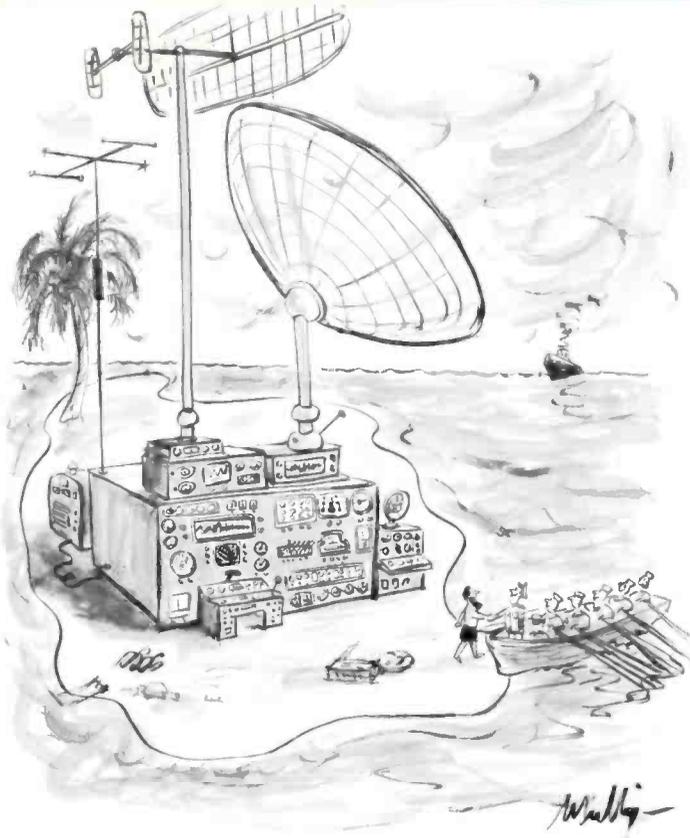
At the moment, he is in a position reached by few stars in any part of the entertainment business. His name on the marquee of a movie theater assures the producer of the film a gross of at least \$6 million a picture and, in all probability, considerably more. His name on the label of an RCA Victor single means sales of at least a million copies, and both Presley singles and LPs always make their place on the best-selling record charts for months on end. Special Presley products continue to sell in huge quantities year after year. His early teen-age fans, who are now young

mothers raising children of their own, retain a quality of unbroken loyalty to their idol; and their ranks have been enlarged by new teen-age groups.

Because of Presley, pop music once and for all took its dominant characteristics — mainly the driving, monotonous beat — from Country Western repertoire and absorbed the whole colorful spectrum of gospel music and rhythm and blues into its mainstream. Because of Presley, too, young unknown artists, eager for the big break, took heart at his success and revolutionized the story of pop singles recordings in this country; they became within a few years the big stars in the field while displacing the old, familiar names whose presence on a recording was, at one time, the assurance of a hit. Those days quickly vanished as the singles record market became dominated, more and more, by younger and younger teen-agers, most of whom were girls attracted to the Presley personality.

When the Presley entourage arrived in Hollywood for the first time back in the 1950s, Colonel Parker remembers with pleasure, the town didn’t give them six weeks, and was quick to tell them so. Well, Presley is now filming his 18th picture with 10 more motion pictures contracted for. Six weeks have turned into a decade; overnight success, into a long-term career.

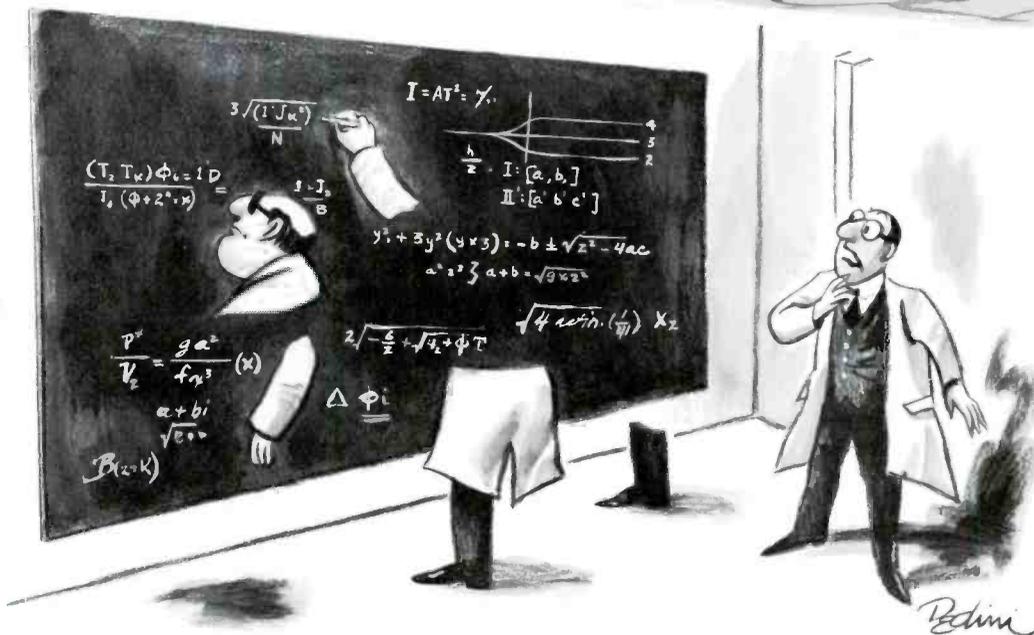
Whatever the original predictions of the professional and amateur “put-downers,” Elvis Presley, at the age of 30, is one of the half-dozen chief members of show business’ “Establishment,” and to him can be given the headiest compliment of all: he changed the entire course of international pop music in the past 10 years and set the path it would take for the rest of most of our lifetimes. ■



"I made it out of bits of this and pieces of that."



THIS
ELECTRONIC
AGE...



"Dr. Sturm, I — I believe you've made a breakthrough!"

The Economic Impact of Television...

by Desmond Smith

In the past two decades, virtually every phase of our economic life has been affected by the growth of television.

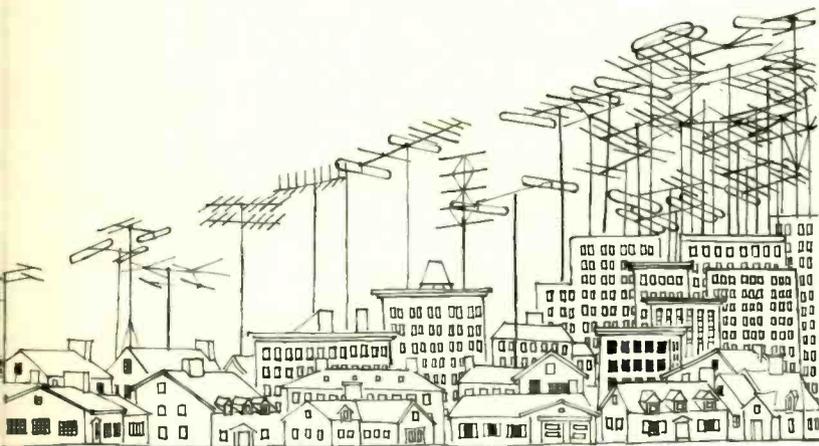
The prodigious growth of the television industry in the past two decades has brought about vast social change in America. It has, to begin with, satisfied the public demand for television sets at a phenomenal rate: some 625 sets every hour, every day, have been sold since the end of World War II. The public's investment now stands at the fairly staggering figure of \$22 billion. In the process of this growth, television has become far more than a technological miracle. It has brought in its wake an economic revolution that has affected dozens of fields from medicine and education to banking and basketball, to the expansion of television broadcasting which, in turn, has profoundly altered our entertainment needs, the way we get our information, and the traditional pattern of selling in America.

Television set manufacturing itself is only one part of the vast electronics industry, the nation's fifth largest manufacturing group. But without that industry's tremendous technical know-how it is probable that television would have remained an impractical laboratory experiment.

In October, 1938, RCA's David Sarnoff told the Radio Manufacturers Association that "television in the home is now technically feasible." His statement met with some skeptical comment. For example, a magazine called *Radio Guide* sent its readers a century plant with a note: "Plant it in a pot, water it carefully, expose it to the sunlight. When it blossoms, throw a switch on the new television cabinet that your grandson will have bought and you may expect to see telecasts offering program quality and network coverage comparable to that of our broadcasts of today." *Radio Guide* is not around any more.

Although television is still the pet peeve of cantankerous critics who fear it will turn us into a race of mindless boobs and reduce us all to one huge homogenized lump, it seems likely to continue prospering as a medium for filling our lengthening leisure time with the sublime *and* the not-so-sublime. Despite its critics, television refuses to stop growing. And, by any measure, its growth has been stupendous. At the start of 1946, there were fewer than 5,000 television sets in this country. Now there are 67.1 million sets in homes in the United States. Of the 56.8 million homes in this country, 53.1 million are TV homes. Today, 93.5 per cent of our households have their own sets, and use them an average of five to six hours a day. In the 19 years since the end of World War II, some 103 million television sets have been manufactured in the United States. Of these, 36 million have already been scrapped.

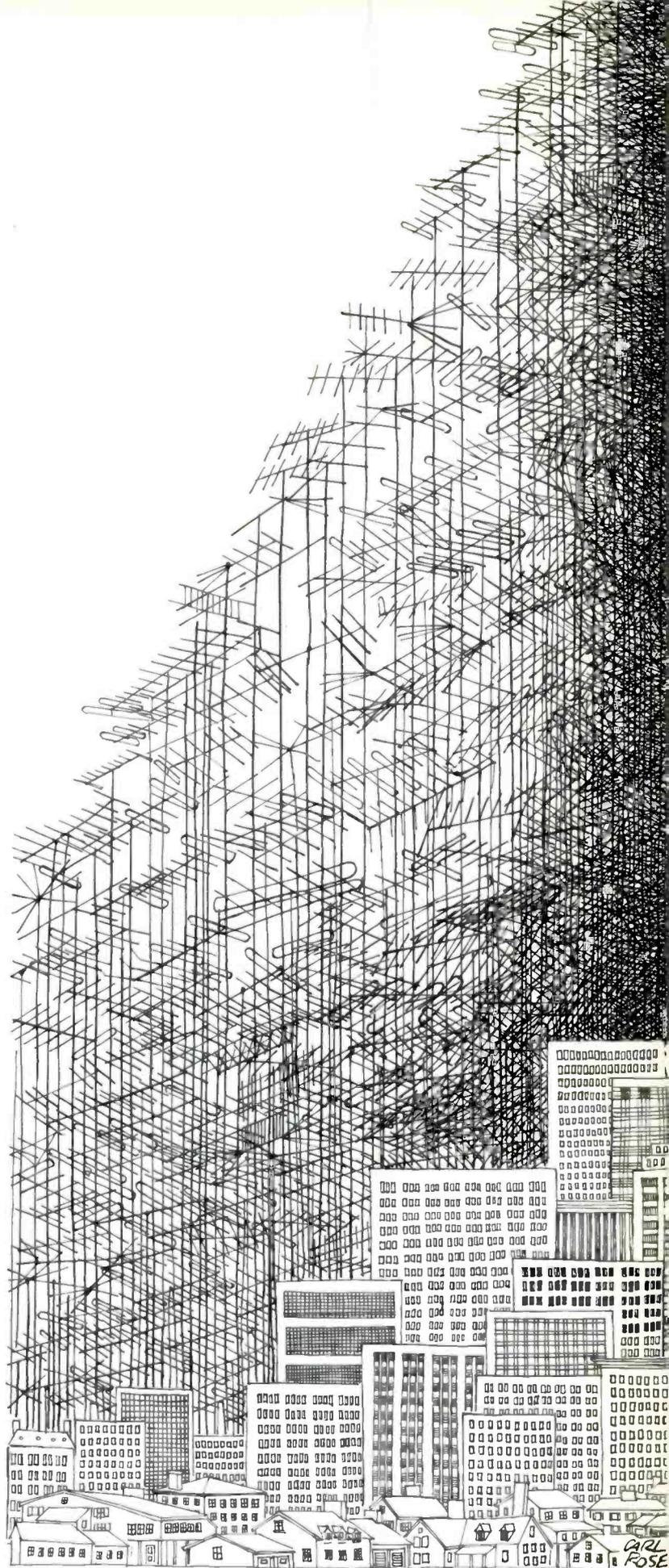
Television's dominant characteristic, outside its obvious universal appeal and ability to change attitudes, is versatility. Several hundred unique applications of TV have been itemized, from medical training to remote control



submarine operations. Actually, there are no limits to its meaningful use. Trying to describe its economic impact is like trying to measure an elephant with a pair of calipers — the beast is docile, yet it won't stand still long enough. Consider, for example, the television set itself. For the electronics industry, this single item has generated business at an average rate of more than \$1 billion a year for more than a decade. Despite admitted set saturation and after a shakeout in TV set production during the late 1950s, some 32 U.S. companies and a score of foreign manufacturers have remained to compete in the U.S. market for the customer's money. In this fiercely competitive arena, the most compelling new factor has been the steep rise in replacement sales as measured by the scrappage rate. As TV sets purchased in the large-volume years of 1951, 1952, and 1953 begin to approach their tube-bursting old age, a big jump in replacement sales has followed. Meanwhile, there has been a sizable increase in the number of two- and three-TV-set families. The benefits of all this production are even more arresting when it is appreciated that TV set producers are basically assemblers. Most of the total manufacturing costs consist of materials cost; the remainder is direct labor and factory overhead.

Behind the plain-to-see elements is a vast external business involving thousands of workers in hundreds of scattered manufacturing businesses. These range from plastic extruders in Detroit, to glass blowers in upstate New York, to cabinet workers in Vermont. According to the last U.S. census, some 113,000 people were *directly* employed in TV set manufacturing. But this by no means tells the full story. A simple but dramatic way of noting the far-ranging impact of television is to check the yellow pages of the Manhattan Telephone Directory, which contains 55 densely packed columns of 38 different TV subject areas. One of the great strengths of television is, in fact, its flourishing multiplicity, its diversity.

To at least 100 million Americans a day, television is a titanic dispenser of entertainment, information, and advertising. Advertisers of drugs, toiletries, detergents, tobaccos, foods, and dozens of other products jostled one another to buy time and programs on television to the tune of an estimated \$2.3 billion in 1964. On an average, between one and two of every 10 minutes of air time are devoted to advertising. According to *The People Look at Television*, a study done by Dr. Gary Steiner for Columbia University's Bureau of Applied Social Research, commercials place third in content category; they are behind movies (32 per cent) and comedy-variety (17 per cent) but ahead of action (13 per cent) and eight other cate-



gories. In a recent study for the American Association of Advertising Agencies, Opinion Research, a Princeton research group, announced that the average viewer sees some 75.8 advertisements a day on TV. Considered in this context, Arthur Miller's poignant play *Death of a Salesman* could as aptly have been titled *Birth of Television*.

Actually, the shift of salesmanship to television did more than take the territory away from Willy Loman — it radically *changed* the territory. Through television, consumers are pre-sold on a manufacturer's product before it reaches the store. One of the chief economic effects of television selling has been the astonishing success of "low information" retailers such as discount stores and self-service outlets. Nowadays, manufacturers acknowledge it is television, not the road salesman, that stimulates demand. Given this situation, the retailer operates as a depot for goods in what is essentially a demand-filling function. The marriage of mass retailing and mass merchandising clearly puts electronics in the pivotal role. Thus, it is possible for the manager of a retail chain outlet to check out the day's sales, transmit a reorder to his warehouse 70 miles away, and have the order registered electronically. Next day, the order is shipped complete with details of selling price, weight, quantity, and other information. There are a number of examples to show that manufacturers have been quick to react to this changed environment. For instance, during the head-cold season of 1963, pharmaceutical advertisers spent a whopping \$129 million pre-selling their wares. "What television effects is instant mass demand," says one business executive. "There is no warm-up. The message hits at 9 P.M. and the goods start moving out at 9 A.M."

Just how much television can be credited for the present buoyant economy is a highly debatable point. What is not in question, however, is the fact that, within the lifetime of most of us, America has shifted from a nation of conspicuous consumption to a nation of conspicuous production. Merely to scan the torrent of new goods pouring into our affluent economy is enough to give an old-time sales manager a bad case of heebie-jeebies. "There are almost no manufactured products for which we cannot build sufficient demand to create a seller's market," flatly declares advertising executive Marion Harper, Jr. Moving the stuff rather than producing it has become the key question for the 1960s. The subject for a good Ph.D. dissertation could be found in an inquiry into the effects on manufacturing if television hadn't happened.

It would, however, be wrong to imagine that everyone has accepted television as an unmitigated blessing. One early opponent was the movie industry. In the late 1940s,

Hollywood opinion was split into two camps. There were those who felt that the moviemakers ought to "fight" television; a similar group was convinced that, left alone, television would just go away. "Video isn't able to hold on to the market it captures after the first six months," said one movie executive. "People soon get tired of staring at a plywood box every night." This somewhat optimistic conclusion proved false. By 1952, Hollywood and the young television industry were, in the words of *Variety*, "going steady." A survey conducted in the late 1950s by Sindlinger, an audience research organization, revealed that during a single week 27 per cent of the adult and teenage public spent a total of 138.2 million hours at the movies; in the same period a similar proportion spent a total of 276.5 million hours watching movies on television. The resourceful movie industry appeared to prove that it was possible to sell its cake and eat it at the same time. Aside from investing millions of dollars in Hollywood's backlog, television continues to pour a Niagara of money into the production of dozens of TV series. Today, Hollywood is the chief production center for the bulk of television entertainment.

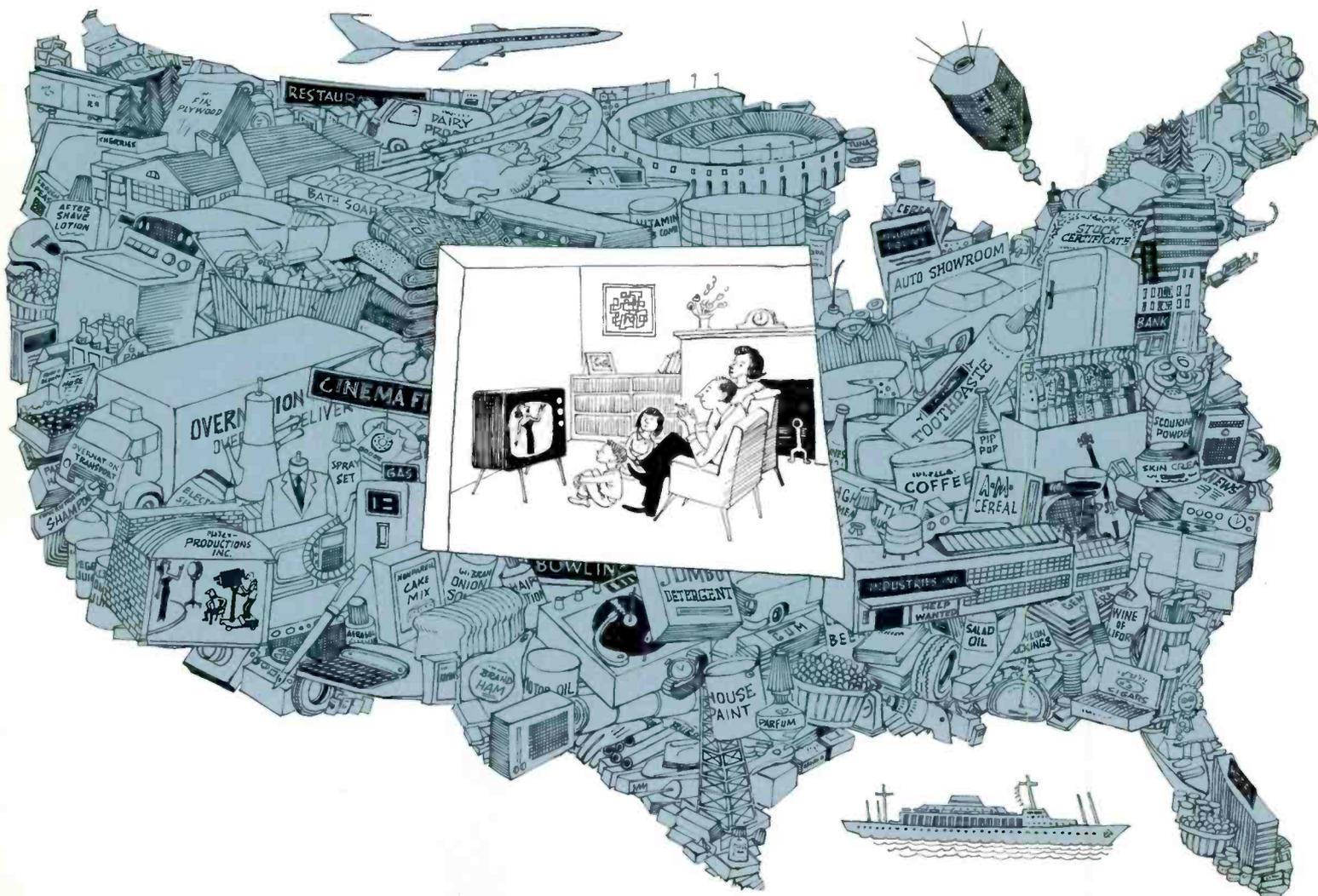
"Going steady" would seem to be an appropriate way of describing television's economic impact on sports. Some gloomy sportswriters have seen a threat to the survival of athletic events in television's expanded coverage of sports. They point to baseball's declining box office and the move of the Brooklyn Dodgers to Los Angeles as a symptom of TV's challenge. Television's supporters deny the charge, claiming that, by and large, the big clubs welcome TV. It has, they say, stimulated spectator interest in addition to providing an added source of income.

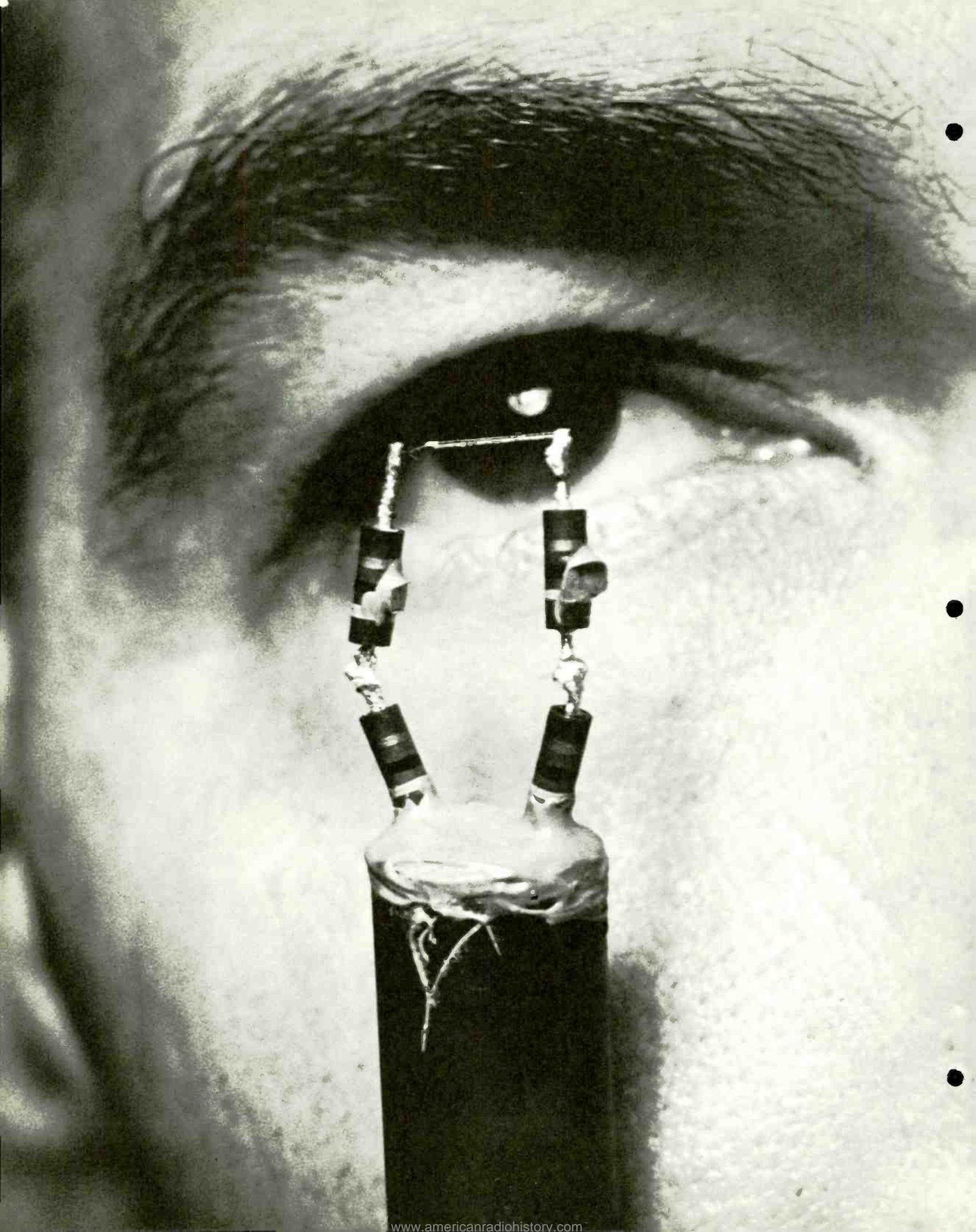
In general, this line of argument seems hard to fault. This is particularly true in the case of football, where the TV networks in 1964 signed contracts calling for payments of more than \$80 million for broadcast rights. To be sure, football did very nicely out of the TV networks' scramble. But so did baseball, basketball, track, and other sports. In October, 1964, the Professional Golfers Association wrapped up a \$606,000 broadcasting contract. "The entire revenue from television," Warren Cantrell, P.G.A. president, told *The New York Times*, "will go to championship expenses and the championship's prize money." Television's increased attention to such offbeat sports as jai alai, water skiing, and soccer has developed a wide circle of devotees for them. Similarly, such hard-to-follow games as bridge and chess have won new adherents because of the medium's ability to translate the action into meaningful terms. When a World Series regularly attracts audiences of 25 to 30 million, not only does it put a healthy glow

on a razor blade company's balance sheet but it also heightens a nation's interest in sports. NBC has announced that it plans to carry the American Football League games in color next season. "Color TV," says Carl Lindemann, Jr., head of NBC Sports, "will develop a viewing public second to none in sports."

The realization that many more sports programs in 1965 are going to be broadcast in color will not, necessarily, send sports fans rushing to the store to buy a color set. But it will have an effect. One reason is that it will add hours of color programming to broadcast schedules. Today, color programs average six hours a day, compared with a mere two hours a day in 1957. More programming, vast improvements in color receivers, and lower prices are three manifestations of change in color television. The economic impact of color television is already considerable. From a present estimated set count of about 2.9 million sets, color — by the end of 1965 — is expected to jump to almost 5 million sets, and by 1968 this figure should approach 15 million.

How the television industry and the national economy will affect each other, the future alone can tell. Certainly, the positive aspects have been strengthened by the following factors: a rising public demand for color television; television's emergence as the leading national advertising medium; the prospect of a new burst of ultra-high-frequency TV station growth as a result of the enactment last year by Congress of the all-channel TV (UHF-VHF) receivers law; and the rise of community television antenna systems. For the moment, it is difficult to foresee the outcome of all this change. But it is certain that the television industry is entering a new cycle of activity. What is not certain is whether an audience already spending five to six hours a day viewing TV can be enticed to spend still more time with television. Particularly relevant here is the development of portable and battery-operated TV sets, which, among other things, could make viewing practicable out-of-doors. In any event, for the next few years life in the television industry will not be dull. The economic outlook is, in fact, decidedly bright. ■





BEYOND MICROWAVE

by Bruce Shore

New radio frequencies, now being explored by scientists, can carry more information than all present frequencies combined.

After 20 years of trench warfare along the microwave frontiers of the electromagnetic spectrum, communications scientists have opened a full-scale offensive against the technological Maginot line standing between them and the use of the frequencies above microwave — those including millimeter, submillimeter, infrared, and light waves.

Advancing behind a screen of heavy armor bristling with such high-frequency assault gear as klystrons, magnetrons, varactor diodes, and parametric amplifiers, these research forces have already pushed to the outskirts of the millimeter frequencies and, through the laser, have even breached the bastions of infrared and visible light.

At stake in this contest is the future of a communications industry whose channels stand soon to be swamped by a rising flood of information spilling into the air waves from a multiplying host of transmitting antennas inside and outside the earth's atmosphere.

The day is already in sight, in fact, when such transmission forms as AM and FM radio, short wave, international telephone and teleprinting, television, and radar will not permit simultaneous operation without producing a composite din of electromagnetic cross talk, intermodulation, and fade-out that will be impossible to decipher.

To postpone this day and the stringent program of frequency rationing that it would elicit from national governments around the world, communications researchers are spending their energies devising arch techniques and artful circuitry that will allow them to pack information into every nook and cranny of today's transmission channels. Representative of these efforts are multiplexing and pulse code modulation (PCM).

In multiplexing, many hundreds of different messages are combined for transmission on a single "carrier" frequency by a technique resembling that used when a combination of notes on a piano is combined and struck together as a single chord. The only difference occurs at the receiver where, in the case of radio, this "chord" is picked up and broken down into its individual "notes" again so as to make possible retrieval of the separate information contained in each. The effect of multiplexing, therefore, is to increase dramatically the amount of information that can be carried simultaneously by a single radio channel.

In the case of pulse code modulation, on the other hand, all information is transformed into a digital code — like Morse code — and transmitted as a pattern of "ons" and "offs," which can be recognized and reconstructed into a meaningful voice message or TV picture by a decoder at the receiver. The effect is to reduce the number of individual pulses needed to send a single message on a "carrier" wave and, therefore, to increase the total number of messages that can be carried.

So much for the ingenious legerdemain being developed to ward off the day when communications transmitters may well turn into monumental "towers of electromagnetic babble." These techniques, though interesting and valuable, do not strike at the source of the problem — the narrowness of the frequency band presently available for wireless communications.

From the time when the German physicist Heinrich Hertz first confirmed the existence of radio waves in 1886 down to the conclusion of World War II, the number of frequencies that could be used for broadcasting grew steadily. By 1945, information could be manipulated over a swath of frequencies stretching from about 10,000 cycles per second (10 kc.) at the low end to 30 billion cycles per second (30 kmc.) at the high. By that time, however, the technology was played out. It was and still is largely unable to crack the next level of frequencies above microwave.

Thus, while the amount of traffic carried by radio communications has mushroomed, the number of channels that can be commandeered to transport it has remained virtually unchanged since World War II.

The reasons are not hard to fathom once it is understood that communications by electromagnetic wave are essentially the same as communications by sound wave. First, there is need for something that will generate a tone (vocal chords in the case of speech, oscillators in the case of radio), and then for something that will "modulate" or vary that tone in a periodic way (tongue and lips in the case of voice, certain electronic components in the case of radio).

One other item. Because the electromagnetic tones generated by radio oscillators might be too weak to be detected by the time they reach their intended receivers, many amplifiers are employed all along the line to strengthen and sustain them. There is no direct equivalent for these in sound.

It is the almost total absence of simple oscillators and amplifiers operative at electromagnetic frequencies beyond microwave that, so far, has stymied electronics scientists and engineers in their quest for new communications channels in the millimeter and submillimeter portions of the spectrum.

At RCA Laboratories in Princeton, N.J., this quest has recently led to three unique developments: (1) a beam-plasma tube that employs the interaction between an electron beam and a gaseous cesium plasma to generate or amplify microwave frequencies verging on the millimeter domain; (2) a gaseous plasma "cathode" from which dense electron beams can be siphoned for the purpose of one-day generating millimeter waves; and (3) the industry's first superconductive amplifier, a device that amplifies microwaves when immersed in liquid helium, and may

Millimeter waves are generated by application of an electric voltage to the hairlike piece of indium-antimonide seen here against the examining eye of an RCA scientist.



RCA researcher works with superconductive microwave amplifier, the first ever achieved. This device has amplified radio waves oscillating at 6 billion cycles per second.

soon do the same for submillimeter waves.

Equally significant is the work going forward on solid-state plasmas. Plasmas are energetic concentrations of positively charged "ions" (atoms missing one or more electrons) and negatively charged electrons held together, at long range, by a mutual electrical attraction. As such, they can exist in either space or solids.

In space, plasmas generally have the appearance of luminous gases, like those seen in operating neon signs, fluorescent lights, and mercury vapor lamps. In solids, they are the product of the way electrons, freed — by application of an electric field — from the atoms composing the solid, interact with their former hosts as they careen through the material.

Strangely enough, this interaction has all the earmarks of a plasma phenomenon and has been used by scientists at RCA Laboratories, in both its Princeton and Tokyo facilities, to generate high-frequency millimeter waves.

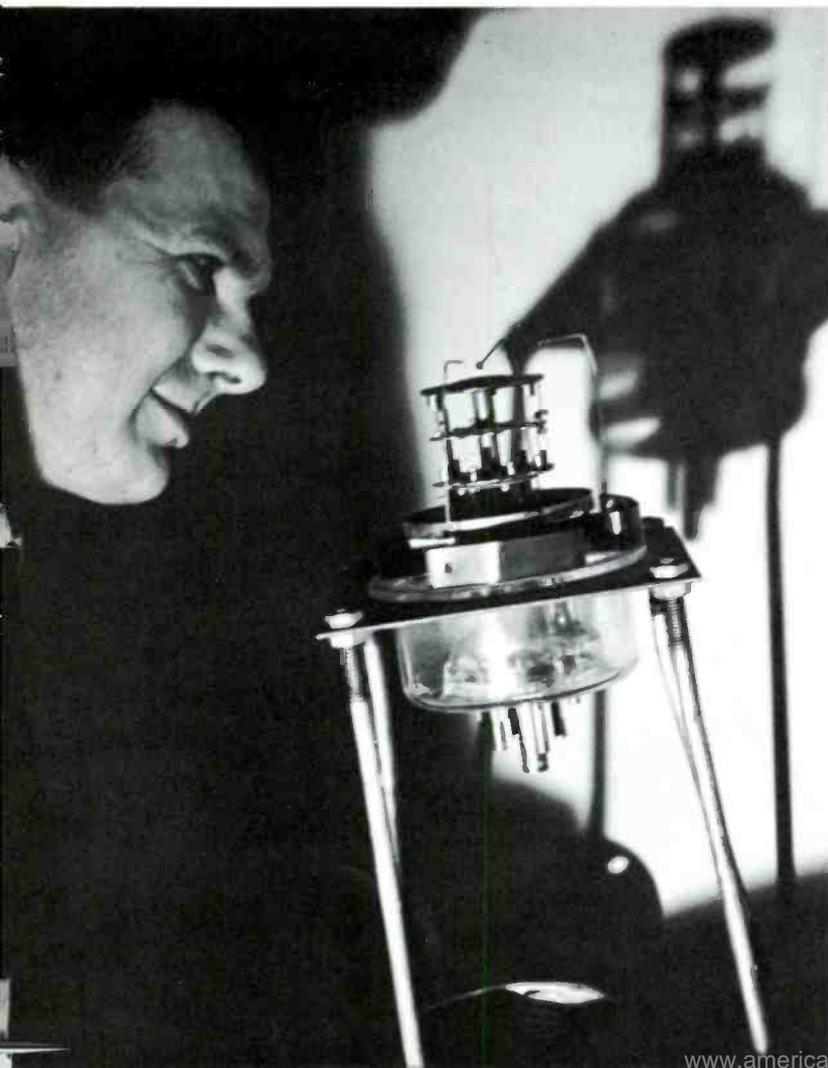
Despite this and other substantial progress in laboratories around the world, the inability to fashion good oscillators and amplifiers continues to hamstring development of practical millimeter and submillimeter communications systems. The best that has been demonstrated so far was reported only recently by the Space Technology Laboratories of Thompson Ramo Woolridge, Inc., where a voice communications system operating on a two-millimeter wave length was successfully tested over a distance of 250 feet — impressive in itself, but hardly adequate even for transmitting the length of a football field.

The extreme difficulty experienced in getting from microwave to millimeter wave frequencies on the electromagnetic scale has not been repeated in going from microwaves to microns (light wave lengths), however. The development of the laser has made the latter surprisingly easy.

Now available in a variety of forms, the laser is the first device capable of generating and amplifying light in the electromagnetic enclave embracing infrared, visible, and ultraviolet frequencies. Moreover, because its output is coherent and nearly monochromatic, the laser can be modulated or varied in accordance with the same techniques developed for the lower radio frequencies. Rudimentary AM and FM light beams have already been demonstrated by RCA and others, and have been made to carry conversation, music, television pictures, and radar-like pulses for use in precision range-finding. In this latter category are the eight laser range finders recently delivered by RCA's Defense Electronic Products division to the U.S. Army Signal Corps for battlefield evaluation.

It also turns out that laser beams are an important means for generating millimeter and submillimeter waves as well. This is done by simply "beating" or mixing two laser beams of differing frequencies together in such a way that one subtracts from the other, creating a new frequency in the lower millimeter register.

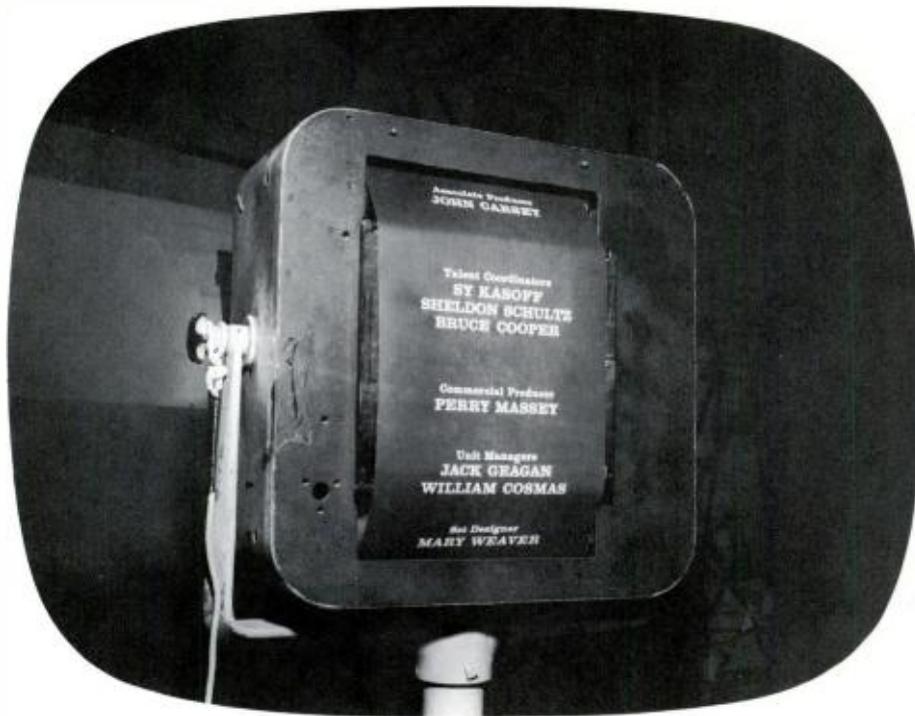
Though the situation is still somewhat fluid, it appears that the communications industry is preparing to seize higher electromagnetic ground in its struggle to contain the information explosion. ■



Dr. Arie Eichenbaum, RCA Laboratories, examines a plasma cathode he developed for use in producing a dense stream of electrons that may be used to produce millimeter waves.

PEOPLE ON THE "CRAWL"

by Betty Ann Lanigan



Unheralded, unsung, but indispensable—these are the people whose names appear on the list of credits that “crawls” by on the TV screen at the end of a program.

Comedienne Kaye Ballard does a devastating satire of an award-winning television queen accepting an “Emmy.” The mink-clad performer condescendingly gives all her thanks to the “litt-ul people” who have helped her—the producer, director, audio man, and many others.

Television viewers of the nation, wise beyond their years in show-business lore after eight years of “The Tonight Show” and its badinage, chortle with appreciation at Miss Ballard’s lampoon of this cherished show-business custom. They are well aware that no performer of any consequence would dare accept an award for himself only. Tradition demands kudos to the man who hired him, the man who made him look like a matinee idol instead of the haggard 50-year-old he really is, the fellow who realized his husky voice needed special amplification, the person who managed to keep his toupee from showing up as such on camera, and the writers who took special care to make him appear witty or, better still, infinitely wise.

Technical director Ray Barrett of NBC-TV says with acerbity, “You take a nucleus of supposedly creative people—a producer, a director, some writers, maybe a choreographer and a music director. You give them some talented, well-trained people to put into a show, and when you’ve done all that, you haven’t begun. Because you *still*

don’t have a picture of what they’ve produced on that tube. And without us, they could stay dancing in the rehearsal hall until next year, and nobody would know the difference.”

“Actually,” Barrett says, “it is the skill of the technical crew that frees the producer and director sufficiently to allow the creative functions they perform to come into being.”

A visitor in the studio audience of a major TV show is usually startled by the number of technicians off-camera, in comparison to the people seen onscreen. Ironically, studio visitors often express irritation when equipment or personnel used in telecasting the program interfere with their view. “I’d rather watch it at home without seeing all this mess” is a common reaction. Since the chief responsibility of the network is to see that what appears on the screen of the home TV set is as close to perfection as is humanly possible, and the fact that some of the tools to achieve this perfection (either men or machines) block the view of someone in the studio, they consider the complaint regrettable, but unimportant. Putting first things first, they give maximum cooperation to the people on the “crawl,” the list of credits that “crawls” by on the TV screen at the end of the program.

There are rules about the people whose names appear on the crawl. Some names must, according to contract, appear there. Some appear by tradition. Some appear because the producer feels it gives his staff a sense of the importance of their duties in the over-all scheme. It not only gives them a sense of identity and status among their peers but also a protective pride toward the program. They know that the inclusion of their name on the crawl gives the public the right to judge their efforts by the finished product.

The length of the crawl on a program is determined by the number of people required to get a show on the air. For a five-minute black-and-white news program, coming from a small studio in which two cameras are used, the staff is very small. In addition to "the guy in the booth" (the offhand way production crews refer to the newsman giving the late local news), there will be two newswriters, two cameramen (whose names don't appear on the crawl), a director, a technical director, a video man, and an audio man. That's a ratio of eight to one: eight behind the scenes to one before the camera. Such a relatively small program also will have the part-time services of a unit manager, who has provided them with a studio, made out the time sheets, figured the cost of the crew, and completed various other business functions.

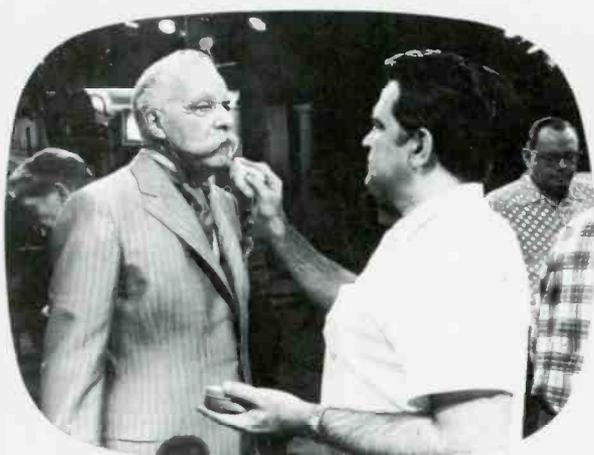
At the opposite end of the scale could be a variety show such as Perry Como's, which can claim 35 to 40 people on its creative staff, 25 men on the engineering staff, and 100



Electricians check equipment before start of show.



"Crawl" people in control room during taping of show.



Makeup man applies final coat of powder to Alfred Lunt.



Producer-director explains scene to Alfred Lunt and Lynn Fontanne.

people before the cameras — if you count members of the orchestra.

For an example of a really startling crawl, hark back to the 1964 political conventions, when there were 600 technical and production people combining efforts to put the "show" into the living rooms of America. Of these, approximately 20 per cent received a listing on the crawl.

A producer of any television program might be compared to a corporation president, responsible for the manufacture, distribution, sales, and integrity of a product. He decides content of a program, manner of presentation, and selection and signing of a cast within the budget that has been allotted for the show. He also selects the production staff to be entrusted with the responsibility of translating his concept into acceptable form.

If he is a good producer and has chosen well, the finished product will reflect his good taste, his ability to select people who work well together, and his consideration of the practicalities of the account ledger. For instance, if a producer "goes for broke" on acting talent, he may not have enough left over to pay the best writers available. If he skimps on scenic design, the castle walls may wave in the passing breezes as the high-priced dance soloists cavort before the cameras.

From the time the show goes into rehearsal, it is in the hands of the director. For this reason, some producers prefer the double task of producer-director. He not only has twice the work to do but he has to be twice as good at

it. The role of associate producer becomes doubly important in situations like this, for obvious reasons.

A prime example of a producer-director is George Schaefer of the "Hallmark Hall of Fame." Schaefer, whose walls could be papered with awards from admiring organizations, is one of the chief beneficiaries of grateful tears on the part of award-winning performers. It is a matter of record that Julie Harris broke down and cried on camera at the 1962 Emmy Awards Show when attempting to thank Schaefer for his direction of her performance in "Victoria Regina."

Once a director has taken over from the producer (or a producer has doffed his "producer" hat and donned his "director" hat), the show is physically on the way. Rehearsal space has been provided by the unit manager (name on the crawl). Rehearsal schedules have been set up by the associate producer (name on the crawl). Changes in the script have been suggested by the director and effected by the writers. The camera moves that will be used when the show reaches the studio have been blocked out by the director and he has decided what the content of each picture is going to be, plotting his camera moves with this in mind. A show can be remarkably interesting, but if the picture it makes onscreen is not acceptable to the viewer (without his realizing why it fails to hold him), the producer's vision of the show will have gone drizzling down the drain.

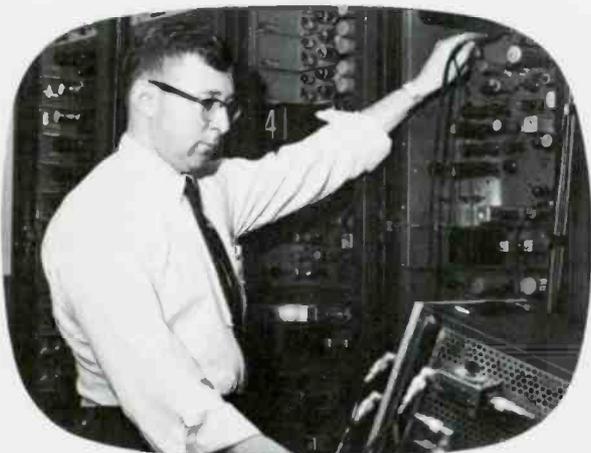
After the show has been in rehearsal for the allotted



General production scene at filming of "The Tonight Show."



Lighting director takes a reading before cameras go into action.



Maintenance engineer makes last-minute check before taping begins.



Lighting director and stagehand have fun with gorilla costume.

time (for a large drama such as "Hallmark," the time is two weeks; for a variety show such as "Hullabaloo," in which performers do acts already perfected in night clubs and theaters, five days), the technical director, the audio man, the video man, and the lighting director attend a run-through to determine what their problems will be on the following day, when the show moves into the studio.

The technical director may take a look at the scale-model sets and begin planning how he is going to get the cameras in close enough to the actors with all that heavy Victorian furniture in the way. The audio man may be wondering if the "mike" booms will be a problem in the scene where one actor is standing and the actress is seated.

Actress Lynn Fontanne realized during rehearsals of "The Magnificent Yankee" that the greatest difference between legitimate theater actresses and television actresses was that the latter spoke in soft, husky whispers and never projected. She decided to test her newly found theory during the rehearsal of a scene with her husband Alfred Lunt and veteran actor Eduard Franz. They were in NBC's Brooklyn Color Studios at the time, and one of the network's best audio men was on the job. Yet, during that scene, the microphone failed to pick up her lines. Lunt glared at her and said, "Speak up, dammit, Lynn. I can't hear you!" She replied in a drawl, "Don't be ridiculous, darling. I'm being a star."

It was the end of her experiment, however, and she returned to her own impeccable style of projection, with

no further problems, either for her husband or for the frantic audio man.

The technical director for a television show has one of the most interesting of all jobs, since his responsibilities encompass so many different aspects of television equipment. It is he who is responsible for the entire technical setup, not only onstage but backstage as well. Since anything electronic comes within his bailiwick, most technical directors have degrees in electrical engineering. The video and audio men report to him, and he works in cooperation with the lighting director.

"Our chief problem," one technical director stated, "is people. Naturally, in anything as complicated as television, you have equipment failure from time to time. But more frequently the thing that will foul you up will be the human element: last-minute changes about which you haven't been notified, wrong information, things like that. For every tube that goes wrong, there will be five human goofs. But since the world is made up of people and not tubes, we make do. At least, you can swear at the tubes."

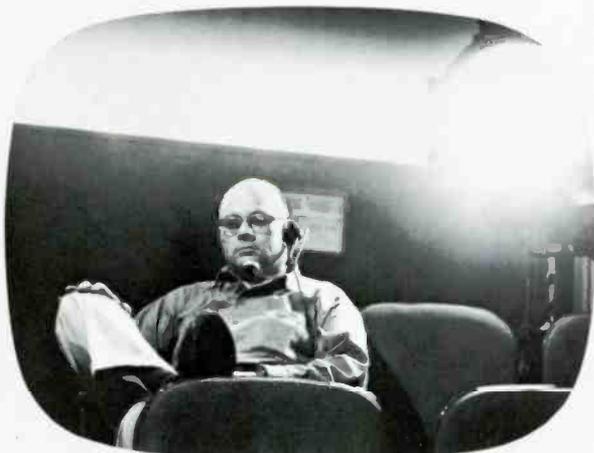
An audio man's nightmare may be the blues singer who whispers most of her number and then blasts away at a high note. Or the theater-trained actor playing a scene with the television-schooled Method actor as the audio man tries to balance out the levels of sound. If he weren't successful, the people at home would have to jiggle their volume control constantly to keep the set from blasting one minute and being inaudible the next.



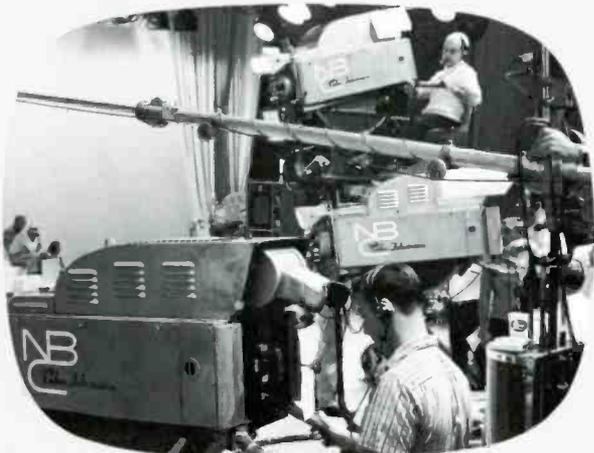
Stage manager of "The Tonight Show" makes a point.



Video men keep close watch over picture controls during taping.



Stagehand listens for directions from control room.



Action behind the scenes at a typical TV show.

The video man's problems lie more in the field of selectivity. There are so many gradations of intensity in colors, so many variances of complexion, hair, and wardrobe that achieving the optimum picture can be extremely difficult. And, though the wardrobe people in television are well aware of the compatibility of certain colors against other colors, there is always the situation where the fabric under lights develops a blinding sheen. (In men's suits, ironically, this can be quite a problem, especially the lighter weight Italian silk fabrics that appear dark in color to the human eye and show up on camera like satin, filled with highlights.) The video man must do in the studio what the dial juggler at home strives for. He must produce for the viewing public a picture that — providing the home receiver is in good shape — will not require alteration. Unlike the dial juggler, however, he works with 300 dials, rather than two.

Does the appearance of a name on a crawl have any appreciable effect?

"Yes, I think it does," unit manager Jack Geagan of NBC says. "People outside the industry seem to look for familiar names on shows they enjoy. When a program has pleased them, they want to make the effort to learn who has gone to the trouble of putting the show together."

No wonder when they hand out the awards, the stars feel it's about time to say "thank you" to "all the litt-ul people." ■

Airlines and Computers

by Thomas I. Bradshaw

To handle the ever-increasing flow of reservations and billing operations, airlines are turning to computers for help.



RCA 301 computer and a central reservations processor employed by TWA have prepared all the information needed to have ticket ready when traveler arrives at airport. This system enables passenger to board with minimum of delay and helps flights to depart on schedule.

Moving some 21,800 passengers more than 23 million air miles each day is a formidable problem in logistics for Trans World Airlines. But just as staggering is the volume of paperwork that must be handled in such an operation. Every passenger has made and confirmed a reservation and has been issued a ticket. To accomplish a smooth pattern of passenger movement, hundreds of reservation clerks, ticket agents, and behind-the-scenes personnel are involved.

Even so, providing passengers with jet-pace service from ticket counter to destination imposes a taxing burden on all major airlines. Many companies have found the answer by enlisting the services of data processing systems

for electronic control of reservations and the accounting that must follow.

One of the most forward-looking data systems is that being implemented by Trans World Airlines. TWA's three-fold electronic reservations expansion program will employ a continent-wide computer-communications network, subdivided into two major areas: (1) a coast-to-coast electronic reservations system to provide immediate flight availability information, and (2) a separate revenue accounting and operational information computer system for the benefit of the airline.

The reservations network is based on three regional data processing centers: at Los Angeles; Kansas City, Mo.;

and New York. Each center will be furnished with a pair of back-to-back Radio Corporation of America computers. The first two RCA 301s have been installed at Los Angeles. The New York and Kansas City centers will be equipped early in 1965.

The Los Angeles center is connected by remote reservation equipment and communications lines with TWA offices throughout the airline's western region — as well as with a TWA Central Inventory Processor at Kennedy International Airport, New York.

When the Kansas City and New York centers have been tied in with offices in their respective areas and with the Central Inventory Processor, all the airline's domestic and

TWA's ticket counters are equipped with files of plastic imprinting plates — 3½ by 2 inches — on which fares and itineraries are pre-computed for the most frequently traveled routes. The agent inserts the proper routing plate and a blank ticket in an automatic ticket imprinter, then presses a button. The machine fills out the ticket in a single second. If the passenger has an Air Travel Card, this also is inserted in the machine so that the passenger's name and billing information are printed simultaneously in the appropriate spaces on the ticket.

When the processed flight ticket coupon has been collected from the passenger, it is relayed to TWA's accounting center in Kansas City, where as many as 40,000 such



Reservations clerk queries TWA's computer system for up-to-the-minute information concerning availability of flights, itineraries, and seating arrangements.



RCA computers in TWA's regional data processing center at Los Angeles. Similar centers are being established in New York and Kansas City, Mo.

international passenger and cargo information will be regulated electronically.

Joseph A. Clay, TWA Systems Director, Reservations and City Ticket Offices, said the computer-communications hookup will mean that a customer in Los Angeles booking two seats on a flight to Chicago can be told in a matter of seconds the details of flight times, itineraries, and seating availability for immediate departure for as far as a year in advance.

Revenue accounting is centered at Kansas City, where TWA employs another RCA 301 computer and an RCA Videoscanner, an electronic device that utilizes a television camera tube to scan the imprinted information for computer processing.

coupons — as well as freight waybills — can be “read” per hour by the RCA Videoscanner.

TWA's Robert S. Senator, Senior Director, Integrated Data Processing, said Videoscanner is serving to improve efficiency, expedite passenger inquiries and lost ticket tracing, speed up refunds and credit billings, and “enables us to perform quicker, more comprehensive traffic analysis for guidance in flight scheduling.”

Airlines, which have taken such dramatic strides to keep up with their growing volume of passenger traffic, are now taking positive steps to see that papers move as fast as people. ■



Dr. James P. Keuper (right), president of Brevard Engineering College, confers degree of Doctor of Space Science on Dr. Werner von Braun.

SPACE-AGE COLLEGE

by Gertrude Martin

Fast-growing Brevard Engineering College, located at the center of America's space activity, draws its faculty—and many of its students—from among engineers and scientists who work at Cape Kennedy.

Brevard Engineering College in Melbourne, Fla., may be the only school of its kind in the country that owes its existence to the fine art of social dancing. It all began when a group of employees at RCA's Missile Test Project on Cape Kennedy decided to start a college. As they wrestled with problems of faculty and curriculum, their wives organized a cotillion to raise money. The event was a social and financial success. The ladies were able to present their husbands with \$700, a figure that represents the total initial

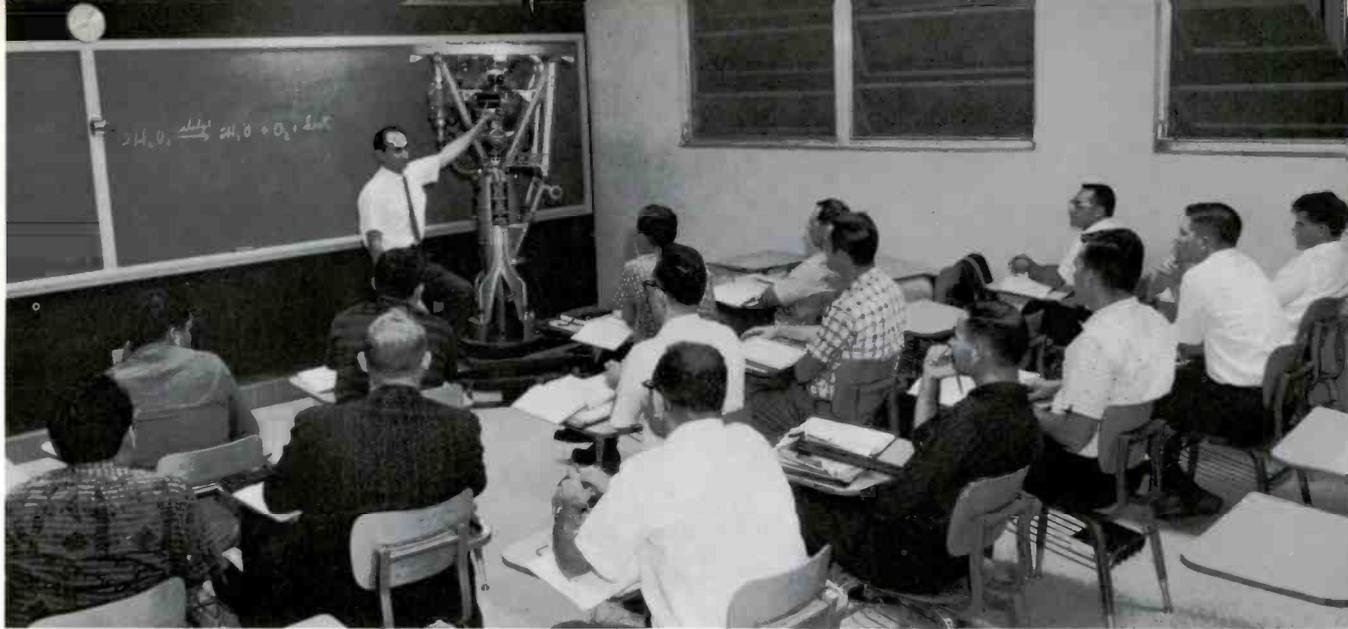
capitalization of a college that today has a student body of more than 800.

Brevard Engineering College was founded in 1958 with a clearly defined objective—to provide the very best in advanced engineering education for technical personnel in the space industry. The need for such training was evident in an area that had no provision for advanced educational opportunities. Dr. Jerome P. Keuper, president of the college since its founding, was convinced that a faculty could be recruited from what is one of the heaviest concentrations in the country of scientists and engineers with advanced degrees. In assembling a faculty, he was in an especially fortunate position. Few educators anywhere could draw on a more distinguished group of specialists than those available in the Cape Kennedy area.

From the very beginning, Brevard demonstrated its importance to the space community it had set out to serve. As the first term got under way, nearly 200 students from the Air Force Missile Test Center filled rented classroom space in the local junior high school. This was a mature

View of the campus of Brevard Engineering College, Melbourne, Fla.





Sebastian D'Alli, professor of space technology, uses a Vanguard rocket engine to illustrate a point in a rocket-propulsion class.

group of men and women whose average age was between 20 and 35. An overwhelming percentage of them held full-time jobs in the space industry.

About two-thirds of the first class registered for undergraduate work. The rest already held engineering diplomas and were preparing for a degree offered by no other college — Master of Science in Space Technology. They were taught by a faculty of 25 scientists and engineers from RCA and other contractors engaged in missile range work.

Today, after a series of moves during which the school found a temporary home in an old church and later in a World War II Navy barracks, Brevard Engineering College is permanently settled on its own 50-acre site in Melbourne. A building program, begun frugally in 1960, has thus far provided the college with administration and classroom buildings and a library designed to hold 40,000 volumes. A dormitory is presently under construction.

The laboratories were built entirely by donations from aerospace industries in the Cape Kennedy area. Substantial donations from industry, individuals, and the community have made additional classroom space possible. The first major support was offered in 1959 when Dr. Irving Wolff, then Chairman of the RCA Education Committee, approved the college for the company's Tuition Loan and Refund Program. In addition, his recommendation made it possible for the school to participate in RCA's program of annual

grants to colleges and universities where RCA personnel are enrolled.

This kind of support produced an almost immediate reaction. One by one, other missile contractors have recognized that in this small, independent college they might find the answer to a very serious personnel problem. It was difficult to retain top-level employees in an area where there was no chance for them to develop professionally. Brevard Engineering College not only presented that opportunity, it offered a unique curriculum conducted by men who had extensive practical experience in space age technology.

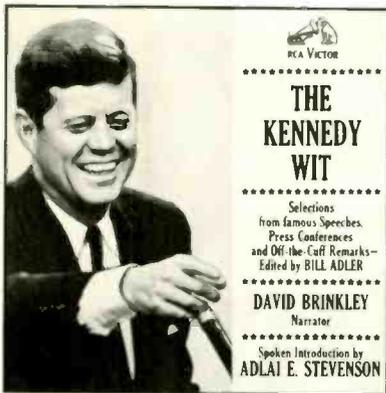
The college is now fully accredited as a specialized institution by the Southern Association of Colleges and Schools. A committee of that body visited Brevard Engineering College in 1964 and, in a report of that visitation, remarked that "the close linkage of the college with the space industry is readily perceived." The committee characterized the school's curriculum in space technology as "most distinctive," and expressed confidence that it "will be kept up to date in a manner which would be impossible in a college remote from the scene."

This is the unique advantage of Brevard Engineering College, an institution envisioned by its founders as a training center where theory is tested daily in a laboratory a few miles away — the missile range of Cape Kennedy. ■

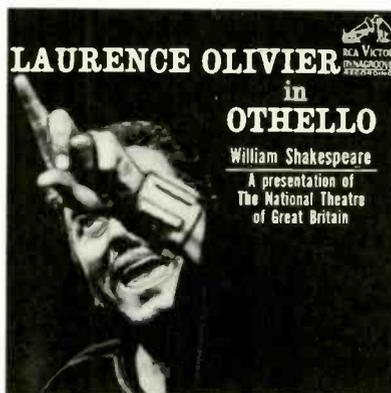
Technical journal collection in the library at Brevard Engineering College. The library is one of the structures completed under a building program started in 1960.



THE KENNEDY WIT (RCA Victor VDM-101). In the introduction, Adlai E. Stevenson expresses the experience that comes with listening to this collection of humor and wit of the Late John F. Kennedy: "To hear his voice again is to bring tears and smiles together — as close as they can ever be." There are humorous talks before labor unions and big business, remarks about the late President's family and political opponents, an address to a West Point graduating class, and highlights from his European trips. An entire section features the Kennedy wit during his press conferences. Bill Adler, who edited the book of the same title, researched the tapes for this album. Narration is by David Brinkley.



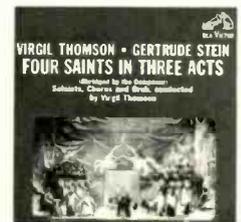
SHAKESPEARE: OTHELLO: Starring Sir Laurence Olivier (RCA Victor VDM/VDS-100). "The present album is certainly the best recording of any Shakespearean work now in existence," wrote John Ciardi in the *Saturday Review*. "By now I have a five-foot shelf of good Shakespeare, some of which even touches upon greatness, but only this partial inch of it is supreme." This recording, complete on three long-play records, was produced by the National Theatre of Great Britain. The deluxe packaging consists of a 32-page text of "Othello," a 16-page booklet with an article entitled "Othello Heard, But Not Seen," by George R. Marek, Vice President and General Manager, RCA Victor Record Division, plus biographical information about the cast and photographs of the production.



"FIDDLER ON THE ROOF": Original Broadway Cast Recording Starring Zero Mostel (RCA Victor LOC/LSO-1093). The biggest musical hit of this season is "Fiddler on the Roof," starring Zero Mostel as Tevye. RCA Victor's album captures all those delightful moments of the Jerry Bock-Sheldon Harnick score that have theatergoers shouting its praises. There are the vibrancy and excitement of "Tradition"; the hauntingly beautiful "Sabbath Prayer"; the rousing toast "To Life"; the poignant and humorous "Do You Love Me?"; and the Mostel song that brings down the house, "If I Were a Rich Man."



For
The
Records...



NOBODY ELSE BUT ME!: Tommy Leonetti (RCA Victor LPM/LSP-2962). When Tommy Leonetti was 16, his fascination with musical arrangements prompted him to analyze them to find out, in his words, "the content and structure of all the chords and their progressions." And now, several years later, his performance on "Nobody Else But Me!" convinces the listener that Tommy knows what he's doing. His breath control and phrasing are incredible; his voice quality can be tender, forceful, dramatic; and Tommy sings with an ease that is completely captivating. This record includes such songs as "I'll Be Around," "Joey, Joey, Joey," "A Nightingale Sang in Berkeley Square," and "You're My Girl."



A FRENCH PROGRAM: Artur Rubinstein, Pianist (RCA Victor LM/LSC-2751). This album is especially notable since it includes five works recorded by Rubinstein for the first time and two compositions — Poulenc's "Mouvements perpétuels" and Fauré's "Nocturne in A-Flat" — which were recorded on 78-rpm disks in the 1930s and which are now considered collector's items. Rubinstein was particularly eager that this album should include music by his good friend Francis Poulenc, who used to say, "Rubinstein plays me well..." Francis Poulenc died during the week this recording was made, and thus the album is somewhat of a memorial tribute to the great French composer. Other composers represented on the album are Ravel and Chabrier.



MY KIND OF FOLK SONGS: Gale Garnett (RCA Victor LMP/LSP-2833). Gale Garnett's debut album for RCA Victor, "My Kind of Folk Songs," was released last April, and its initial sales hardly suggested a huge success. Six months later, however, one of the songs on the album, "We'll Sing in the Sunshine," began getting extensive airplay on radio stations from coast to coast. The song, written by Gale, was soon released as a single record and became her first smash hit, quickly reaching the top of all industry best-seller charts. The album followed suit. "My Kind of Folk Songs" features a dozen of Gale's favorites.



OTHER CURRENT RELEASES

POWERFUL MINIATURE TRANSMITTER

A 10-ounce radio transmitter, so small it can fit in a shirt pocket yet powerful enough to send a message across the continent, has been developed by RCA. In contrast, a standard lifeboat transmitter-receiver weighs 58 pounds.

The new unit was designed primarily for emergency use by downed pilots, shipwreck survivors, and persons in similar plights.

When operating the 10-ounce transmitter, the user controls frequency by means of his body heat. He places a miniature metal container under his arm and keeps it there. This container holds frequency-determining elements and is linked to the transmitter.

ROUND AND ROUND IT GOES

Relay 1 was launched by the National Aeronautics and Space Administration on December 1, 1962. Two years later, the satellite had circled the earth almost 5,700 times and was still going strong as it began its third year in orbit on Sunday, December 13, 1964. The long-lived satellite, built by RCA for NASA, is all the more remarkable because (a) it was planned to have an active life of only one year, and (b) a severe power drain suffered shortly after launch made it appear likely that Relay 1 would not last a month. The power difficulty was corrected, and the satellite began an active program of receiving, amplifying, and retransmitting radio and voice signals between ground stations scattered all over the world.

SPACE-AGE FIRE ALARM

The song about Smokey, the fire-preventing bear, tells us that he can "find a fire before it starts to flame." So, indeed, can a device called a Solar Blind Hydrogen Flame Detector, which is capable of detecting "invisible" flames caused by liquid hydrogen leaks. Such leaks produce a tongue of flame that is virtually invisible to the eye because the flame emits only ultraviolet and infrared radiation. The danger is manifest: undetected, such flames could injure personnel or burn up the liquid hydrogen tank and its surroundings.

The high efficiency of liquid hydrogen as a rocket fuel has led to its increasing use and has made the development of

such a flame-detecting device imperative.

The Solar Blind Hydrogen Flame Detector, developed by RCA's Aerospace Systems Division, has been delivered to NASA's George C. Marshall Space Flight Center for test and evaluation.

NEW LIGHT FOR ASTRONOMERS

For centuries man has studied the stars and has been fascinated by them. In our age, he has achieved a fuller understanding of the extraterrestrial world, but — as learned men of science agree — many of its mysteries still lie beyond his intellectual grasp. Now, the addition of electronic image intensifiers to photographic telescopes promises to open new frontiers in space for astronomers everywhere. This combination of electronics and photography triples the observable brightness

observatories throughout the world.

"Image intensifiers are important," Dr. Tuve explains, "because of the exceedingly low light levels with which astronomers must work." In photographing fields of faint stars, astronomers are limited by the brightness of the night sky, which restricts the exposure that can be made with a fast optical system. "With image intensifiers," Dr. Tuve points out, "long-focal-length telescopes too slow for photography can be used effectively to record still fainter images against the background of the night sky."

"Perhaps the most important application of image intensifiers," he further adds, "will be in obtaining stellar spectra. These devices should make it possible to obtain spectra with telescopes of moderate aperture that previously have been difficult to obtain even with the largest instruments. Moreover, image tubes are efficient in the infrared region of the spectrum, where emulsions are relatively insensitive."

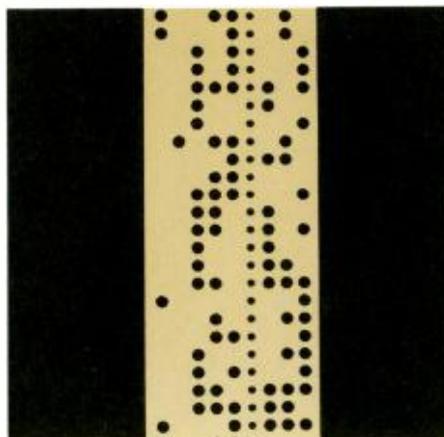
ELECTRONIC LEARNING LABORATORY

One of the newest electronic aids to education is a learning laboratory that enables teachers of such subjects as foreign languages, stenography, remedial reading, and drama to do a more effective job — and to do it easier. By operating the system's simple controls, the teacher can elect to tutor individual students, teach the entire class, or select groups of students to recite or hear their classmates' recitations.

The new unit, developed by RCA Audio-Visual Products and called the EDC-101, is capable of presenting as many as 10 different lesson programs simultaneously to classroom groups totaling as many as 64 students. The laboratory's nerve center is its desklike console; there the teacher sits and controls the switches and knobs that operate the tape and disk lesson sources and the intercommunications links. Individual student booths contain a combination headset-microphone and a minimum of controls.

The console switching complex permits the teacher to monitor student performance and makes possible intercommunication between teacher and student or between two or more students. An "all-call" channel allows the teacher to speak to all students regardless of the program they are receiving.

Electronically



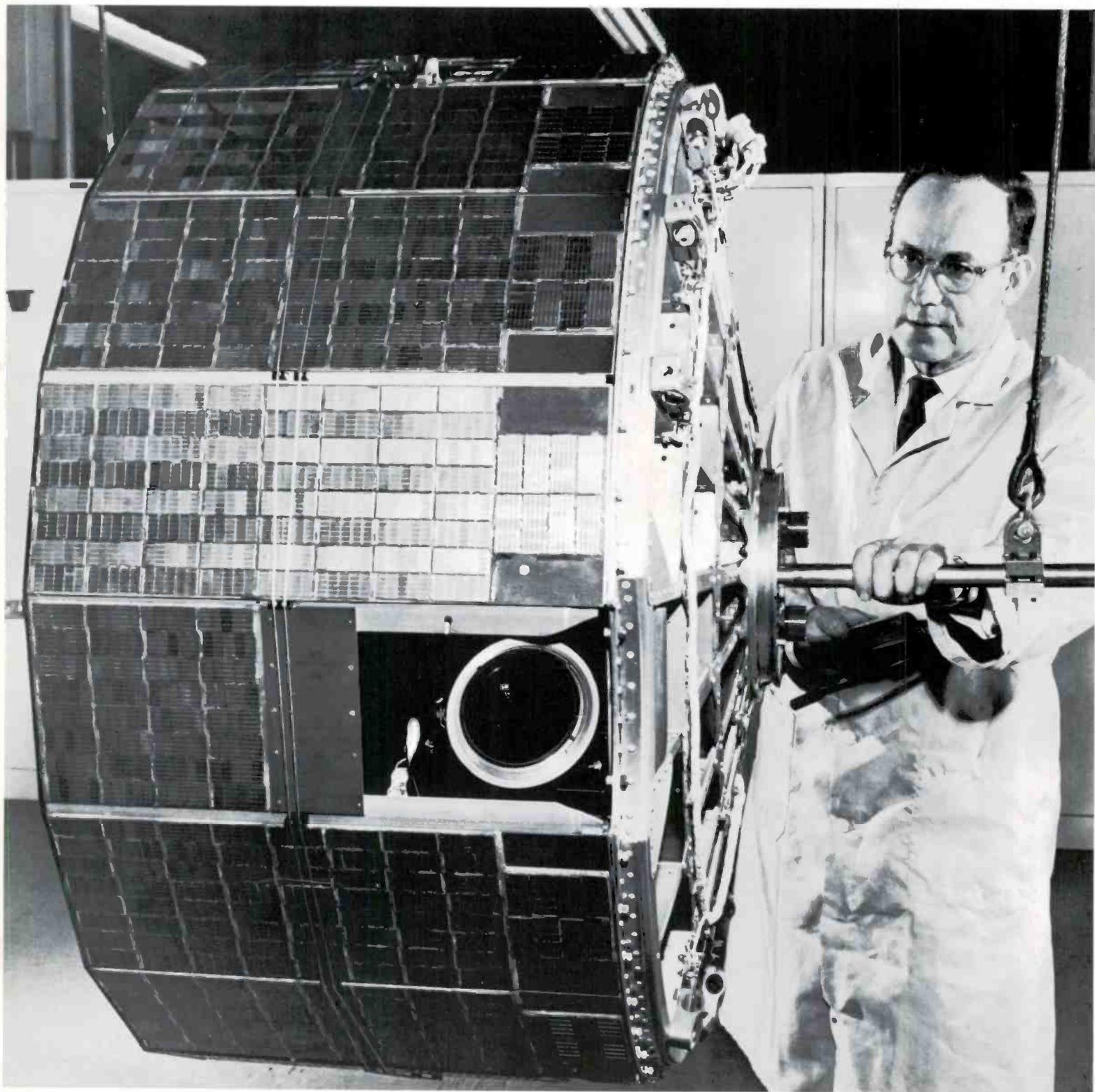
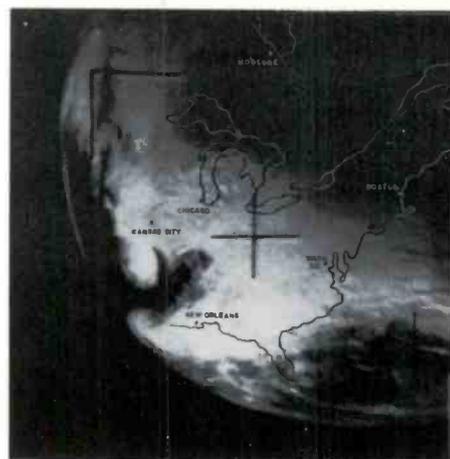
Speaking...

of an image and makes it possible for smaller telescopes to rival the unaided capability of the largest instruments.

The new image intensifier tube was developed by RCA Electronic Components and Devices in collaboration with the Image Tube Committee of the Carnegie Institution. It will enable a 60-inch reflector telescope to photograph faint star images or images obtainable only by instruments of 180-inch diameter.

Dr. Merle A. Tuve, Director of the Department of Terrestrial Magnetism at Carnegie Institution, points out that the tubes will give astronomers markedly increased power to explore the universe from numerous vantage points. The Institution has ordered 20 of the new tubes and, in conjunction with the National Science Foundation, will allocate them to

Photo of most of the United States was taken by TIROS 9 weather satellite from an altitude of 1,419 miles. The map overlay was drawn by a computer from signals sent by the spacecraft. In bottom photo, Abraham Schnapf, RCA's TIROS project manager, shows the new spacecraft. This newest—and ninth—of the uniformly successful TIROS spacecraft built by RCA for NASA was launched on January 22, 1965, at Cape Kennedy. It is the first to be launched in a near-polar orbit and the first to "roll" like a wheel in space, taking electronic photos through lenses extending from its perimeter. Produced by RCA's Astro-Electronics Division, TIROS 9 observes the entire earth once a day.



ELECTRONIC AGE

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