Inside RCA Laboratories

"Using the knowledge of yesterday and the intuition of today, we concentrate on building tomorrow. But occasionally it helps to pause and reflect and look back on our yesterdays."

These words, which introduced a commemorative book prepared in 1967 to celebrate the 25th anniversary of RCA Laboratories, are as true today as they were then. RCA's history, rich in inventiveness, still continues to be a major impetus in guiding the company's future.

The history of RCA Laboratories begins modestly enough, in 1920, when the first RCA research unit was set up in a tent at Riverhead, Long Island.

Later, more permanent facilities were established in separate locations, chosen for their proximity to RCA manufacturing plants.

The need to consolidate all RCA research activities led to the establishment of RCA Laboratories on a 260-acre site in Princeton, New Jersey. The facility was officially opened in 1942 by RCA President David Sarnoff. It was later renamed in his honor to become the David Sarnoff Research Center.

General David Sarnoff 1891-1971

During World War II, RCA Laboratories technical achievements included the Shoran navigation system, airborne radar and television equipment for aircraft, and the Image Orthicon.

In the 1950s, the Laboratories achievements included the development of powerful transistors and the invention of the tricolor kinescope, leading to a compatible color television system that set the standard for the industry and won an Emmy for RCA.

The Laboratories outlook on research became international with the establishment of a research facility in Zurich, Switzerland. Today, this facility provides research in such fields as materials sciences and electro-optics.

The 1960s saw major advances in laser technology with specific applications in communication systems. For the first time, RCA merged television and laser technology for transmitting and recording images. This TV-laser combination was adapted by RCA researchers and applied to the development of the first holographic computer memory.

Another important RCA research advance was the use of liquid crystals for electronic control of the transmission and reflection of light.

In the 1970s, an important factor in RCA's growing technological strength was the establishment of manufacturing research laboratories in Princeton and satellite laboratories located at RCA's product divisions. Today, this close relationship between RCA Laboratories and RCA's manufacturing divisions makes possible effective engineering development.

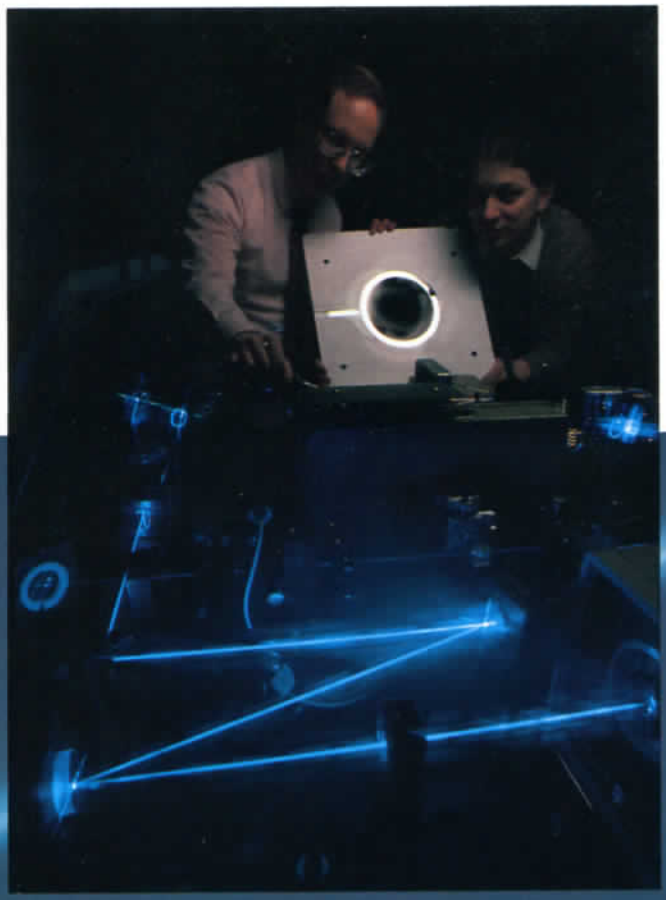
An RCA Laboratories technical associate grows AlGaAs (Aluminum Gallium Arsenide) epitaxial layers which are used for laser devices.

In the early 1980s, RCA Laboratories was credited with a TV picture tube innovation, the COTY-29, that is becoming the industry standard. RCA also pioneered both optical and capacitive video disc systems during this period.

These are just a few of the accomplishments that have resulted from the skill and dedication of researchers at RCA Laboratories in the past.

Human resources are a most valued asset of RCA Laboratories. Statistically, out of the Laboratories 1500 employees, about 800 are actively engaged in research. RCA's successes depend on these dedicated men and women. And as you will see inside these pages their accomplishments make a difference in millions of lives through innovations in electronics, communications and entertainment.

That's part of the excitement of working at RCA Laboratories: the small innovation tested today may well lead to a major change in the way the world lives tomorrow.



RCA Laboratories continues research in optical disc systems for storing and retrieving vast amounts of information by means of laser technology.

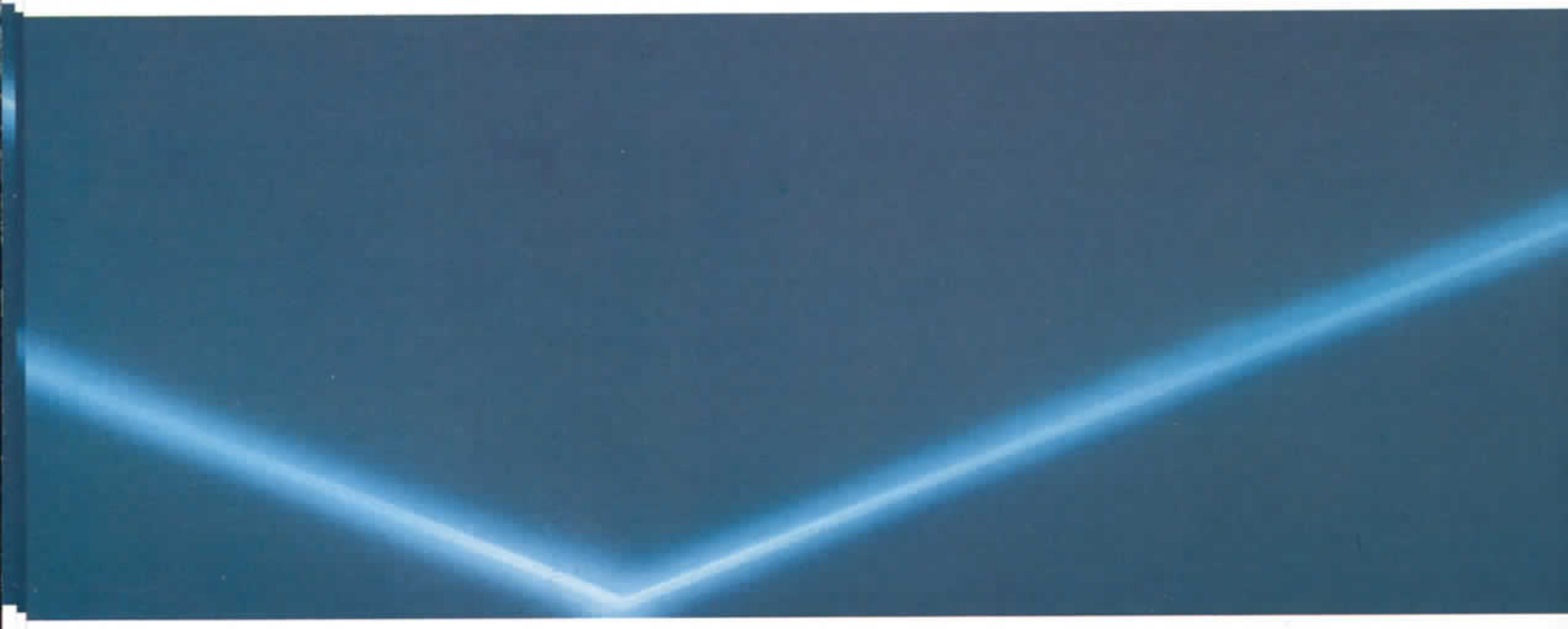
ELECTRONICS

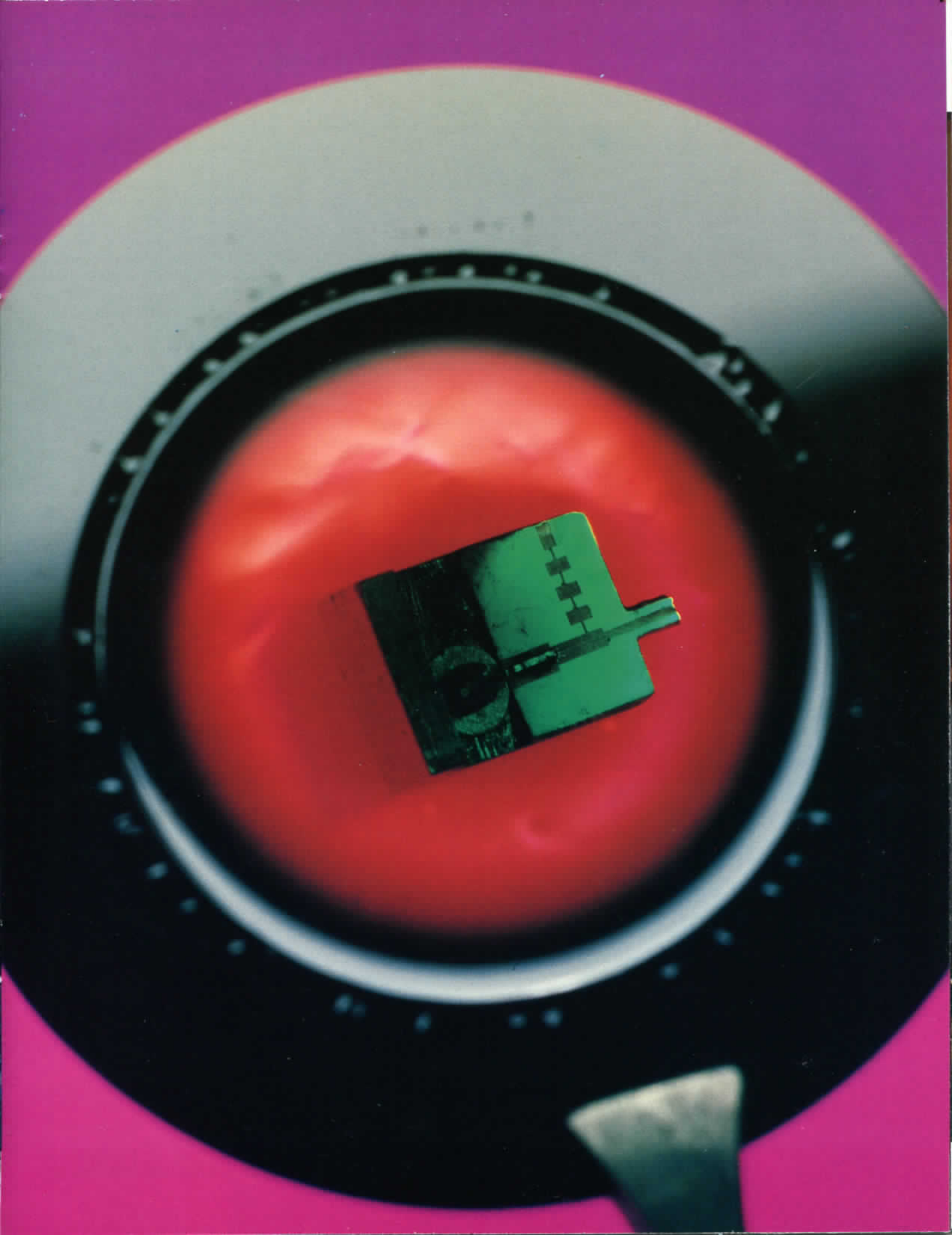
Inside RCA Laboratories, new discoveries and refinements in electronic technology are happening almost daily.

Occasionally, these discoveries seem to arrive out of nowhere, like a bolt of inspirational lightning. More often, electronic progress comes as RCA scientists and engineers apply their imagination and skill to the extension of existing technology in response to a recognized need or opportunity. Paradoxically, these achievements are often the most rewarding since they are application-oriented and the effect can be immediately translated into functional possibilities.

Much of the technology that we take for granted in color television is a direct result of such RCA research and skills. You can see a prime example enclosed in a glass case in the Research Library at RCA Laboratories: the first shadowmask color TV picture tube, developed by RCA scientists in 1949. Still used today, this shadowmask technique made possible the hundreds of millions of color TV receivers produced in the last 30 years. One in five TV sets in American homes today is designed and manufactured by RCA, making RCA the number one producer of TV receivers.

RCA Laboratories' Silicon Millimeter Wave Integrated Circuit (SIMMWIC) is seen through a silicon wafer of one to two micrometers. Variations of this circuit may be incorporated in many future satellite communications systems.





In advanced television research RCA Laboratories is applying digital signal processing to new receiver designs and to the development of a high definition TV picture compatible with the existing broadcast standards. Digital processing of sound and image in TV receivers and other home electronic equipment permits precision control and promotes the introduction of new features while reducing the number of electronic components.

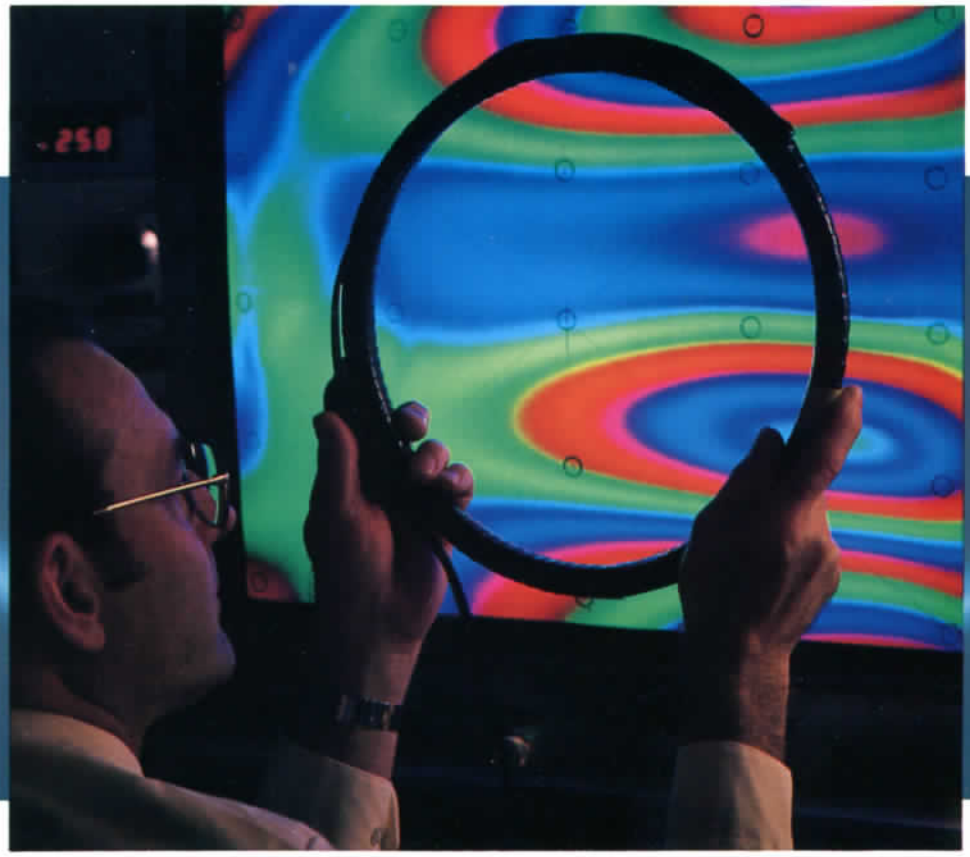
RCA Laboratories also is continuing research on technologies for a flat screen TV for both the home and for computers.

As television becomes more digitized, the use of integrated circuits becomes more crucial. RCA Laboratories provides research and development of new solid state devices, technology, and circuits for use in computers, television and other communication systems.

Part of integrated circuit research includes complementary metal oxide semiconductor (CMOS) technology, which RCA pioneered in the 1960s and which has since been widely adopted by the solid state industry. Such devices or chips, consisting of a multitude of transistors, range in size from only a few thousandths to a few tenths of a square inch.

RCA Laboratories has made major advances in the development of charge-coupled devices (CCDs) which were used for the first time in a mass produced consumer product in RCA's 1980 top-of-the-line TV sets. These chips were employed in a comb filter signal processor that significantly improved the quality and sharpness of color pictures. RCA has applied this technology to highly advanced broadcast and infrared cameras.

An RCA Laboratories scientist demagnetizes a picture tube prior to evaluating the performance characteristics of a TV *yoke. RCA's continuing research into picture-tube technology led to the development of the company's* COTY-29 *system.*



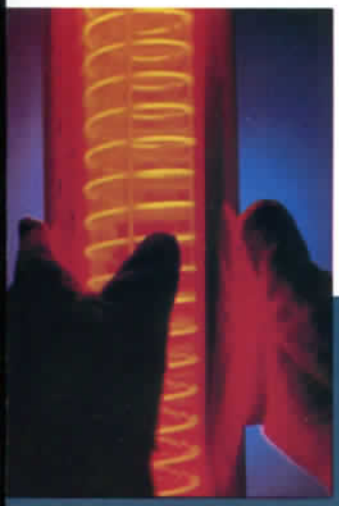
If there is one tool consistently in evidence in every department of RCA Laboratories, it's the computer. RCA makes full and proficient use of Computer-Aided Engineering (CAE), Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM). The use of these techniques makes accurate simulation possible, reducing the time span between design and completion of prototypes.

One RCA tube innovation developed with CAE, the 29mm Combined Optimum Tube and Yoke, known as COTY-29, is responsible for the slim profile of today's TV sets. The COTY-29 not only reduces the front-to-back measurement, but results in a less expensive TV set with a higher quality picture.

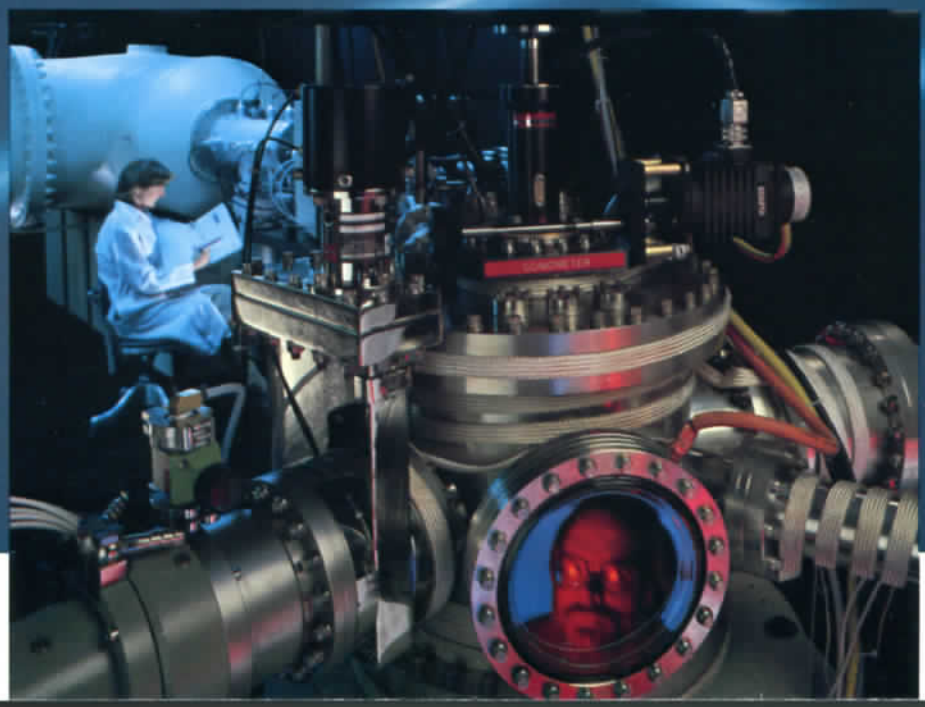
Manufacturing and materials research is a vital part of RCA Laboratories. Scientists and engineers utilize highly advanced materials research and processing equipment and are developing robotic systems and other techniques with the end result of more efficient manufacturing and improved quality for RCA products.

Through RCA's commitment to electronics research, tomorrow's TV receivers and other home electronic equipment will give us better quality and more versatility than most consumers would ever dream possible.

It all starts with the integration of ideas and the technology to make them possible. And that is part of the electronic genius of RCA Laboratories.



A furnace for making solid state laser diodes is attended by a technician at RCA Laboratories.



A high-energy particle accelerator at RCA Laboratories provides scientists with a new tool in materials research.

COMMUNICATIONS

The past 30 years have seen remarkable changes in the communications industry. Television has become part of our daily lifestyle. Satellites have made it possible to transmit information almost instantly between points thousands of miles apart.

RCA has played an integral part in this revolution, and, supported by innovations from RCA Laboratories, will continue in this leading role.

Active research is being carried out in the development of more efficient ways to transfer and store information. RCA Laboratories is working on multichannel optical recording systems using an array of solid state lasers on one chip. The Laboratories has demonstrated such a system that records information onto an optical disc using five semiconductor lasers. It is a major step in the development of a compact system which can store and retrieve vast amounts of information at extremely high speeds.

Multichannel optical storage systems have many practical applications in high speed communications and mass storage of data from large mainframe computers. Another important use is for the storage of image data received from satellites such as Landsat, which monitors the earth's environment by transmitting hundreds of images each day for use in applications such as agricultural management.

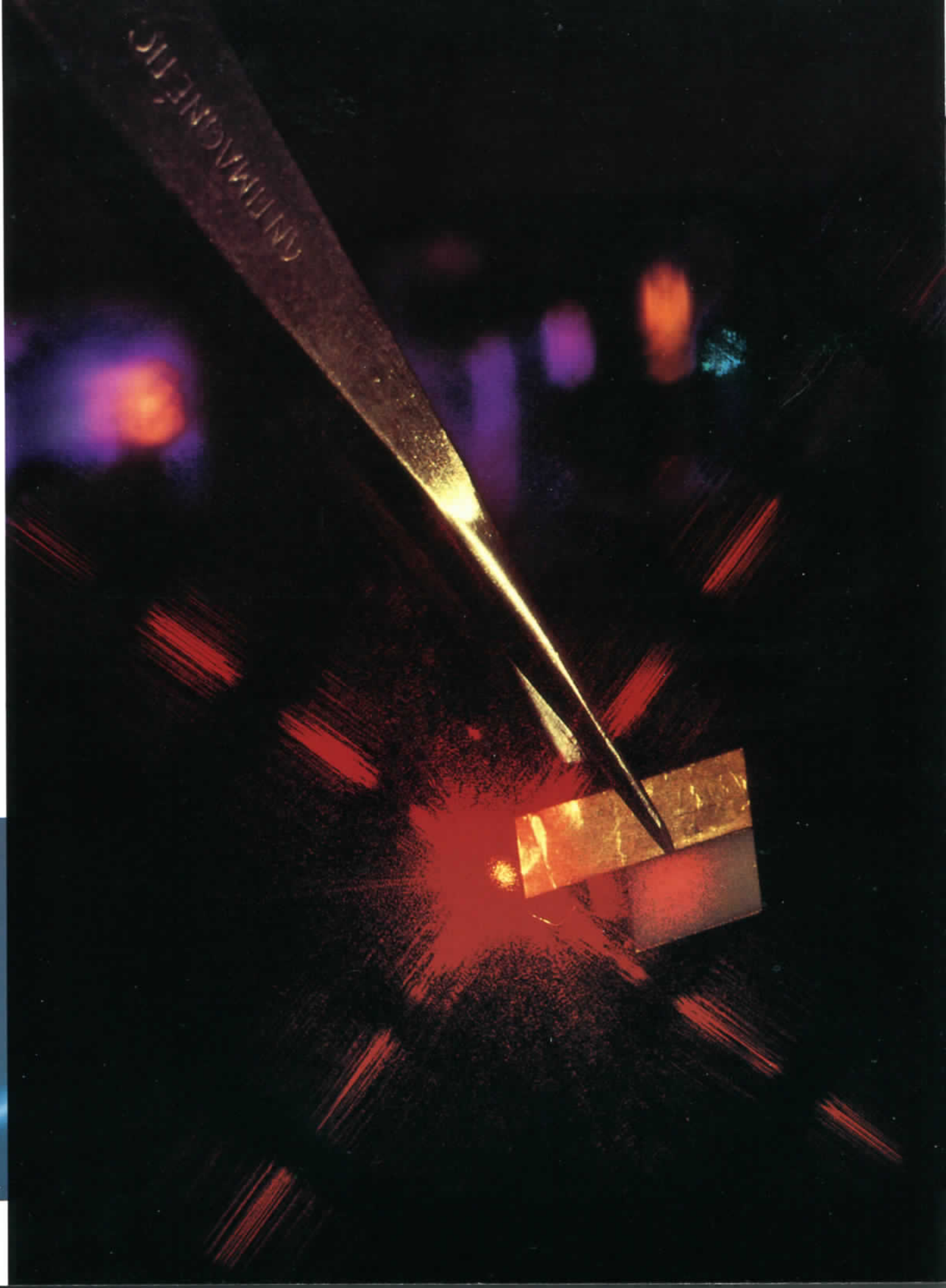
RCA is the acknowledged leader in satellite communications, with more than 90 complete satellites to its credit. October 1982 marked the launching of the first all solid state communications satellite, made possible through GaAs FET microwave amplifiers developed at RCA Laboratories. The solid state design helps make communication not only more efficient in space, where electrical power is expensive, but has electrical characteristics that allow more traffic for each channel.

RCA Laboratories, a pioneer in the development of solid state lasers, is also working on methods to expand their applications to space communications and fiber optics.

This technology uses light signals in glass fibers to transmit data. Because the glass cable of fiber optics is unaffected by electromagnetic pulses, interference is at a minimum. Undetectable signal interception is very difficult, making fiber optics a valuable technology for high security situations.

Ongoing research on lasers, optical recording systems, and other advanced components promises many exciting innovations and advances in communications for the future.

The CDH-LOC diode laser, developed and patented by RCA Laboratories is a minute solid-state light source designed for use in such systems as optical disc mass storage, fiber-optics communications, and high speed printing.


CINEMAGNETIC

ENTERTAINMENT

Looking at the RCA organization as a whole, involvement in the entertainment industry is characterized by the Corporation's ownership of the National Broadcasting Company, Inc. (NBC), RCA Records, and other home entertainment ventures.

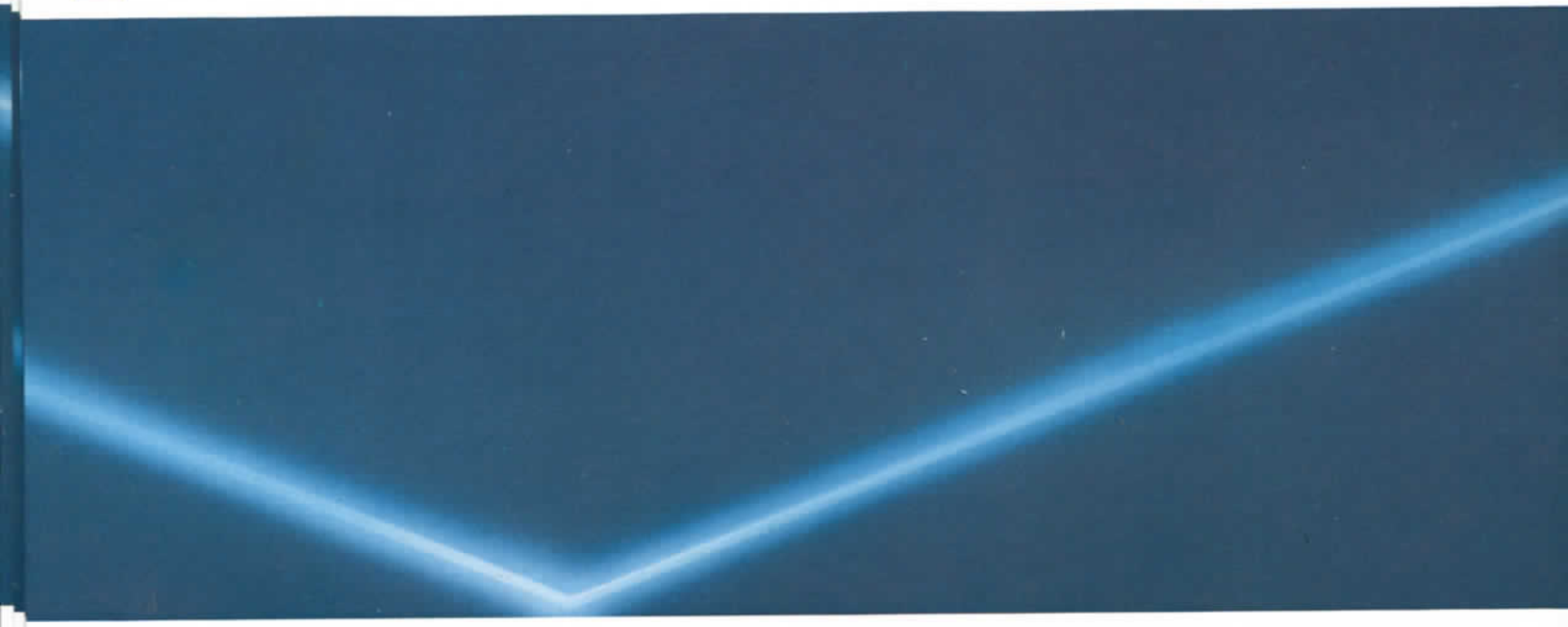
Inside RCA Laboratories, involvement in the entertainment industry means a continuing responsibility as a pioneer in technical innovations ranging from video recording and cameras to state-of-the-art television receivers.

In bringing entertainment to the nation's living rooms, RCA is not only aware of today's possibilities, such as high definition TV screens, but also anticipates the entertainment and functional center of tomorrow.

As part of an RCA interdivisional effort, RCA Laboratories is doing research for the development of a communications-oriented data base system for the home. RCA scientists and engineers are looking at two-way home information systems which will orchestrate the separate functions of the telephone, home computer, and television set into an efficient communications unit that will provide many new services. You will be able to thumb through an electronic catalog, place an order and pay for it. You will be able to check on reviews for a particular play, choose your seats from those available for any performance and reserve your tickets. You will be able to contact friends across town and invite them to join you or leave a message if they're not home.

The creation of new products also involves perceptual considerations. At RCA Laboratories the study of the human visual system plays a key role in the development of new video technologies.

RCA's interactive "Dimensia" system of audio and video components operated by a single remote control brings the presence of a recording studio into the living room.



Through research and development, the Laboratories has enhanced RCA Corporation's leadership in the entertainment field, and through the years not only RCA, but RCA Laboratories, have been recognized by the entertainment industry for some of those outstanding contributions.

In 1985, RCA technical achievements were recognized for "outstanding achievement in engineering" by the presentation of an Emmy. The Emmy—the industry's highest tribute from the Academy of Television Arts and Sciences—was presented for the development of the CCD color TV camera, of which the basic research on the solid state imaging was conducted by RCA Laboratories.

Three Emmys are on display at the David Sarnoff Research Center honoring RCA Laboratories achievements and the life long work of two individuals.

In 1955, the RCA tricolor picture tube, developed at RCA Laboratories, was awarded an Emmy for "the best engineering technical achievement."

Six years later, Brigadier General David Sarnoff, for whom the David Sarnoff Research Center, home of RCA Laboratories is named, received the Trustees Award for "being an illustrious statesman of our industry, both a pioneer and a prophet...the leading architect in the development of color television."

More recently, in 1983, an Emmy was presented posthumously to the man who is known as the father of television, Vladimir K. Zworykin, for "more than a half century of pioneering conception and invention including the first practical tube for picture transmission."

The David Sarnoff Research Center.

"What we seek to consolidate in RCA Laboratories *is the knowledge, the know-how, the experience, and the intelligence of those who represent the vanguard of development... To you we look for the discovery of new needs, the creation of new products, new services, and new opportunities..."*

—General David Sarnoff

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