



**COVER:**

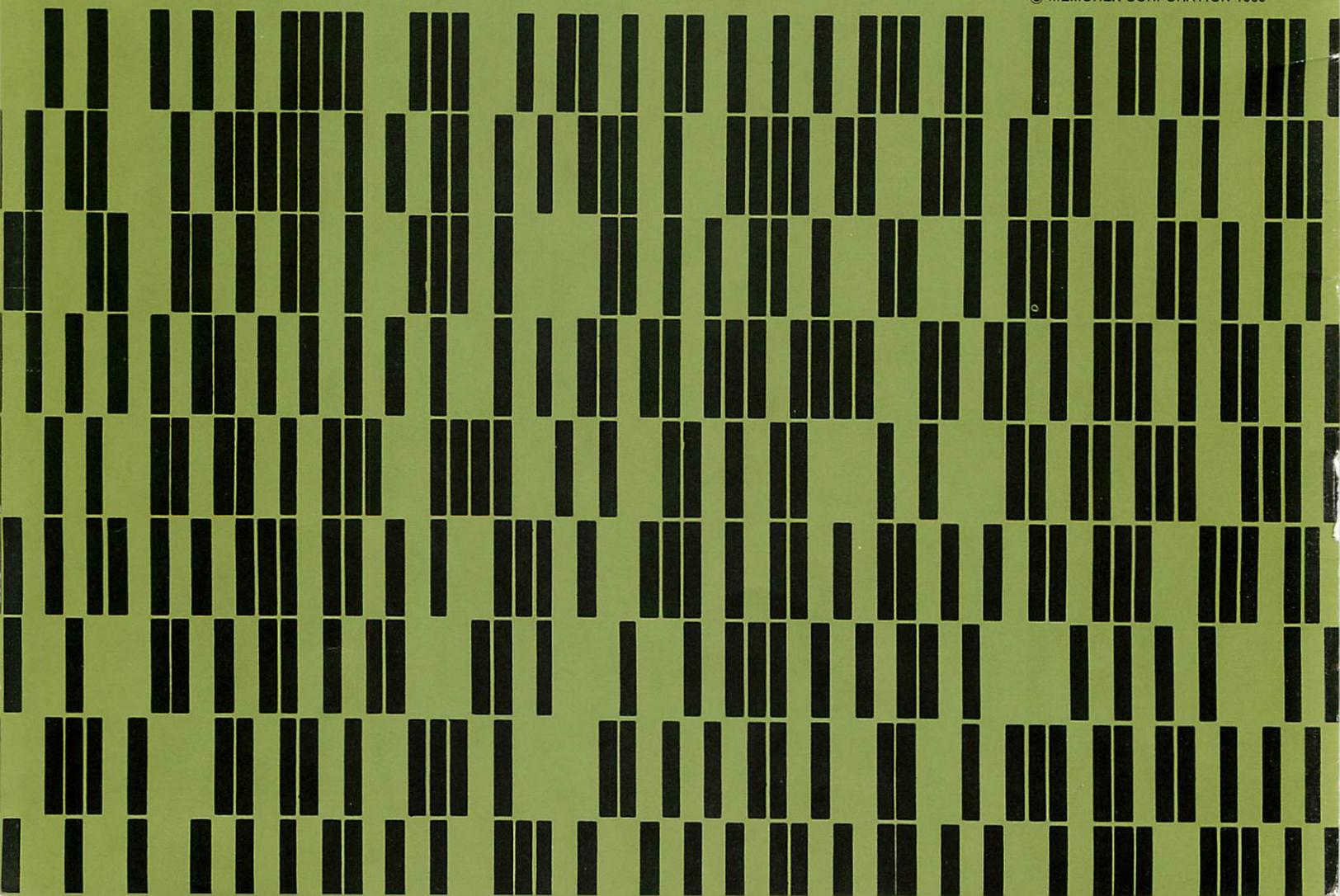
World-wide sales of Memorex's computer, instrumentation and video tape to customers in industry, commerce, education, science and aerospace are depicted on the tape package.

**BELOW:**

Artist's representation of computer information stored on magnetic tape in nine channels of coded data across its width. Each combination of magnetized areas is the equivalent of an alphabetical or numerical character.

**OPPOSITE:**

A small sample of video tape. This product, in reels of about one mile in length, records and reproduces commercial television programs. No developing or processing steps are necessary inasmuch as picture and sound are reproduced directly from millions of microscopic-sized magnetic fields on the tape's surface.



**What is Precision Magnetic Tape?**

For readers unfamiliar with magnetic recording, the following paragraphs present a non-technical explanation of the nature and uses of magnetic tapes for information storage. Their purpose is also to indicate the intrinsic quality demanded of precision tape products and to suggest the high level of technology employed in tape manufacture.

Information processed by an electronic computer is translated by it into computer language whose words and characters are solely comprised of the different combinations of two symbols, "0's" and "1's" ("bits"). For example, the letter "G" is represented by "010111" in a commonly-used computer code and the digit "5" is equal to "0101." The typical computer stores such bits of information in its large capacity memory by switching the magnetic polarity of small areas of the tape coating. The tape memory consists of nothing more than patterns of these differently magnetized areas representing the "0's" and "1's" precisely arranged along the width and length of the tape. (See representation opposite.) A typical reel of computer tape 1/2 inch wide and 2500 feet long is used to record bits on nine tracks across its width at a density of 800 bits per lineal inch on each track.

F  
2  
e  
N  
T  
b  
th  
E  
th  
c  
m  
p  
si  
za  
ta  
pa  
el  
pi  
pa  
an  
pe  
ta  
ta  
is  
In  
in  
cu  
da  
co  
sta  
me  
as  
of

antial  
y.  
by a  
cross  
ond.  
so  
e  
he  
sion  
al  
eti-  
e of  
inal  
ed  
ons  
ns  
f  
deo  
ng,  
am.  
d-  
ce  
e  
ers  
on  
ns

**Contents**

	Page
What is Precision Magnetic Tape?	1
Financial Highlights	3
Letter to Shareholders and Friends	4
Memorex Products: Applications and Markets	6
The Past	8
The Future	9
Research and Development	10
Manufacturing	12
Marketing	13
Consolidated Financial Statements	14
Five-Year Financial Summary	18
Management and Directors	19
Offices and International Operations	20

## **What is Precision Magnetic Tape?**

For readers unfamiliar with magnetic recording, the following paragraphs present a non-technical explanation of the nature and uses of magnetic tapes for information storage. Their purpose is also to indicate the intrinsic quality demanded of precision tape products and to suggest the high level of technology employed in tape manufacture.

Information processed by an electronic computer is translated by it into computer language whose words and characters are solely comprised of the different combinations of two symbols, "0's" and "1's" ("bits"). For example, the letter "G" is represented by "010111" in a commonly-used computer code and the digit "5" is equal to "0101." The typical computer stores such bits of information in its large capacity memory by switching the magnetic polarity of small areas of the tape coating. The tape memory consists of nothing more than patterns of these differently magnetized areas representing the "0's" and "1's" precisely arranged along the width and length of the tape. (See representation opposite.) A typical reel of computer tape 1/2 inch wide and 2500 feet long is used to record bits on nine tracks across its width at a density of 800 bits per lineal inch on each track.

Fully recorded, this tape stores 216,000,000 bits which is the substantial equivalent of the information in a New York City telephone directory.

Television pictures are generated by a beam of electrons which sweeps across the TV screen many times each second. Electrical signals control the beam so that each spot of the picture has the correct light intensity and color. The magnetic tape recording of a television picture utilizes these same electrical signals to create an invisible magnetization pattern on the coated surface of tape. Subsequent scanning of this pattern exactly reproduces the original electrical signals and restores the picture. The elements of the recorded pattern are of microscopic dimensions and are created at the rate of millions per second on each square inch of tape surface. A typical broadcast video tape, 2 inches wide and 4800 feet long, is used to store a one hour TV program.

Instrumentation magnetic tape recording similarly utilizes the electrical currents which represent scientific data. For example, a satellite in space continuously radios to its tracking stations on earth data regarding the medical condition of the space travelers as well as data relating to the operation of the satellite. At the tracking stations

## **Contents**

	Page
What is Precision Magnetic Tape?	1
Financial Highlights	3
Letter to Shareholders and Friends	4
Memorex Products: Applications and Markets	6
The Past	8
The Future	9
Research and Development	10
Manufacturing	12
Marketing	13
Consolidated Financial Statements	14
Five-Year Financial Summary	18
Management and Directors	19
Offices and International Operations	20

the electrical current representing the data is utilized by instrumentation recorders to create corresponding magnetization patterns on tape. In satellite tracking, a typical instrumentation tape, 1/2 inch wide and 7200 feet long, is used to store the data acquired during a period of 12 minutes.

In these recording operations, the length of tape is constantly winding from reel to reel at high speed and tension. In the recording phase, the moving tape is guided over the face of a "write" head, through which flows the magnetizing current to create the pattern of magnetization on the tape surface. In the playback of a recorded tape, the movement of this recorded pattern over the face of a "read" head causes an electrical current to be induced. The induced current is then processed to recreate the original computer information, television picture, or instrumentation data.

The ability of tape to be magnetized and to remain in such state while being stored indefinitely results from the ferromagnetic properties of iron oxide particles in the tape coating. These sub-microscopic oxide particles are not permanently affected in the recording process. Hence, magnetic tape can be re-used, i.e., erased (demagnetized) and re-recorded indefinitely until it is otherwise rendered unsuitable for use by mishandling, mechanical wear or damage.

Obviously, the quality of the coating of magnetic tape is critical to the efficient operation of computer memories, television picture recorders, and instrumentation data recording equipment. The coating's quality depends upon a number of contributing factors. Its iron oxide particles must be of the proper size, shape and concentration, evenly distributed throughout the coating and properly oriented to meet the desired magnetic specifications of each tape product. The coating thickness must be exactly the same across the width and length and from one reel of tape to another to assure consistent performance. The coating must be free from "pin holes," i.e., voids of coating material, which cause a "dropout" or the loss of information being recorded. It must also be free from dropout-causing pimples, wrinkles, and protrusions on the coated surface and from a curling of the tape's edges which would make impossible the intimate contact between the tape's surface and the recording and playback heads.

The quality of the coating must be maintained throughout the life of a reel of tape, a matter of years. It must be

resistant to brittleness and the decomposition effects of temperature, humidity and other environmental changes. The coating must be extraordinarily durable, so that the tape's constant winding and unwinding over the recording heads will not damage its surface—even when the tape is shuttled back and forth thousands of times. The tape's surface must also cause the correct amount of friction when passing over the recorder so its motion can be accurately controlled. It must also be non-abrasive so the tape will not damage the heads.

It should be noted that other quality characteristics of tape are no less critical than those of its coating. For example, when tape is coated in webs and then slit to narrow widths, a perfectly coated product can be made unsuitable for use if the slit is not precise. If the slit is a few thousandths of an inch too wide or too narrow at any point along its length, the tape will not move correctly through the guiding devices which position the tape to the heads. If the slit wanders ever so slightly from a straight line, or if one of the tape's edges tends to be longer than the other over the several thousand feet of its length, the tape cannot be satisfactorily wound and unwound. If the slit is microscopically jagged, the tape is liable to edge tear and breakage under the high tension handling by the recording equipment. If the slitting produces debris or if a jagged edge produces debris when the tape is used, it is likely that some debris will be deposited on the surface of the tape and cause dropouts just as pimples do.

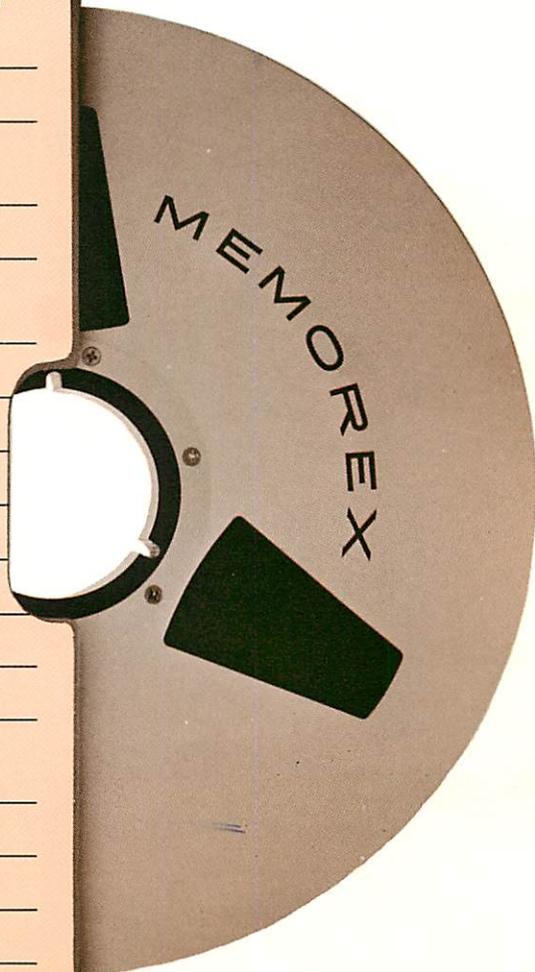
The above examples state **some** of the extraordinary requirements of quality which enable precision magnetic tape to provide a reliable medium for information storage.\* These quality requirements compel the manufacturer of tape products to achieve high competence in the science of chemistry and physics used to formulate the coating, in the chemical and electro-mechanical engineering of manufacturing processes, and in comprehensive quality control of these processes and of end products. The small number of established manufacturers of precision tape testifies to the difficulty of achieving this complex technology. In this industry the competence of Memorex's technical staff is unsurpassed.

---

\*The term "precision magnetic tape" does not encompass consumer sound (audio) recording tape, a product of lesser quality whose production does not involve extensive technology.

# Memorex Corporation Financial Highlights

	Year ended December 31	
	1965	1964
Net sales	\$13,099,000	\$8,042,000
Income before provision for Federal and foreign income taxes	\$ 2,481,000	\$1,962,000
Net income after taxes	\$ 1,331,000	\$1,002,000
Net income per share (based upon average number of shares outstanding during year)	\$ 1.35	\$ 1.04
Depreciation expense	\$ 423,000	\$ 252,000
Research and development expense	\$ 747,000	\$ 452,000
Net working capital	\$ 1,977,000	\$ 994,000
Long-term debt	\$ 2,352,000	\$1,037,000
Shareholders' equity	\$ 3,909,000	\$2,565,000
Return on shareholders' equity (average during year)	41.1%	48.2%
Shares outstanding at year's end	1,004,016	977,106
Employees at year's end	442	306



## To Shareholders and Friends

In years prior to 1965, Memorex won recognition as the manufacturer of computer, instrumentation, and television magnetic recording tapes of unsurpassed quality. In 1965, the growth of Memorex's business also established it as the second highest volume producer of the precision tape industry.

Net sales for the year 1965 were \$13,099,000 and net profit after taxes was \$1,331,000. Comparable figures for 1964 were \$8,042,000 and \$1,002,000, respectively. Earnings per share of common stock for 1965 were \$1.35, a 30% increase over the \$1.04 earnings for 1964, based upon the average number of shares outstanding.

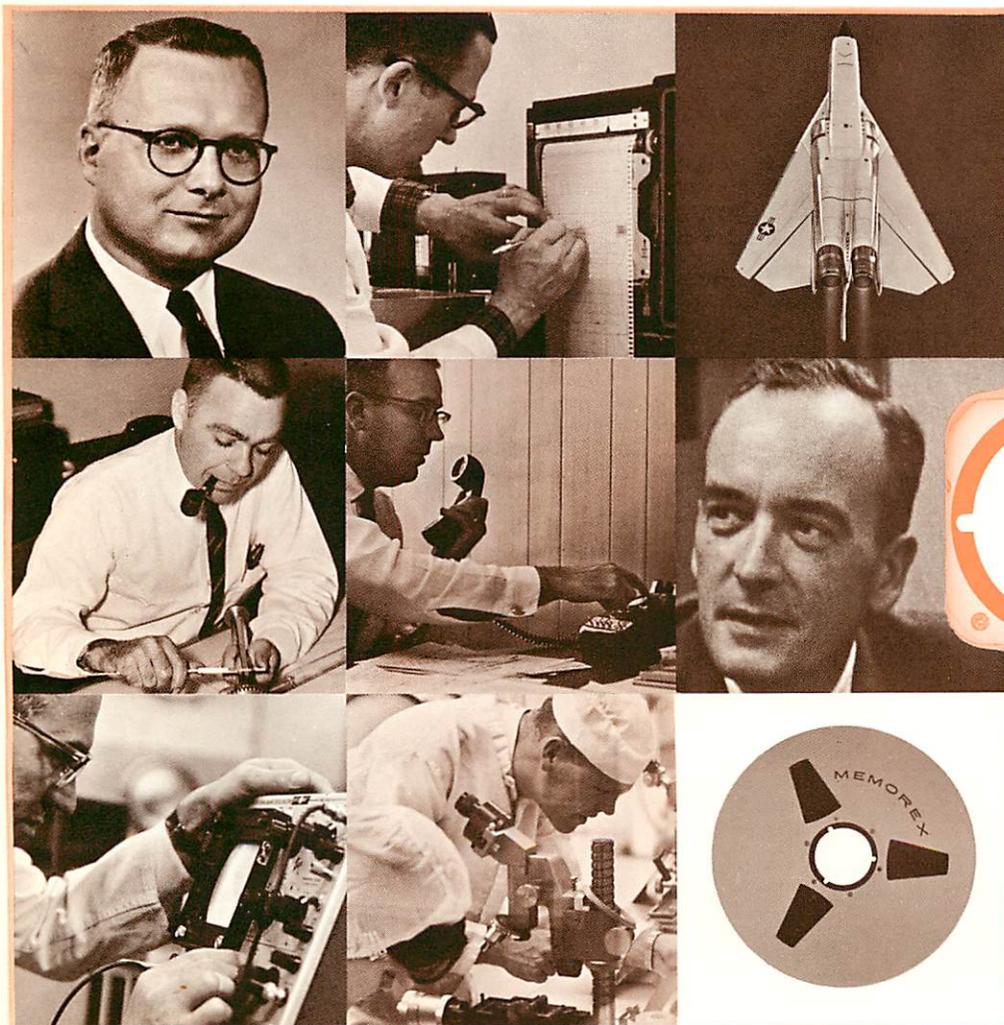
The ratio of net profit to sales declined to 10.2% in 1965 from 12.5% in 1964, as a consequence of increases in marketing, product development, and administrative activities which were more than commensurate to the sales increase.

Gross profit margin (sales revenues less costs of labor, materials, and supervision to make products) was comparable to that of prior years, although price levels in the precision tape industry during 1965 were under continuous pressure. This good result occurred because of three factors. First, the high quality of our products

generally provided customers with price/performance ratio advantages, so that demand for our products was not extremely sensitive to competitors' price reductions. Second, when Memorex's prices were reduced, some offsetting manufacturing cost reductions were effected by better production efficiency. Third, new products flowing from our research and development programs provided higher margins to offset the lower price trends of established products.

The growth by more than fifty percent of Memorex's business in 1965 was attributable to the success of new product introductions, the wider geographic marketing of our products, and our capture of a larger share of markets.

New products introduced included a television recording tape for broadcasting networks and local TV stations and a series of high performance broadband instrumentation tapes. Sales of the broadcast video product have registered the sharpest rise of any new product in the Company's history. Two broadband instrumentation products were successful in meeting the most demanding specifications in the precision tape industry, the Qualified Products List specifications of the



U.S. Government. Only Memorex and one other competitor have satisfied these specifications for both types of broadband instrumentation tapes.

Broader geographic sales in the United States were accomplished by the opening of more branch offices, the organization of a field-based customer technical service staff, and by a 75% increase in the size of our field sales force. Good progress was also made in establishing Memorex as an international company. Substantial sales were for the first time made in Canada, Great Britain, Western Europe, Latin America, Japan and Australia.

A multi-million dollar construction program to expand manufacturing plant, research laboratories, and general office facilities was undertaken in 1965. When the expansion is completed in late 1966 at a cost of about \$4 million, the Company's physical facilities will have nearly doubled.

Funds for the financing of the expansion, the refinancing of outstanding indebtedness, and for future working capital needs have been provided under a credit arrangement negotiated during the year with the Bank of America. Under the arrangement, an aggregate of nearly \$8,000,000 will be available to Memorex in a combination of un-

secured term loan, secured term loan, working capital credit, and lease financing.

Public sale of Memorex Common Stock in March 1965 by a group of the Company's original owners increased the number of our shareholders to more than 3,000. The existence of this nationwide public market for our shares constitutes an important source of future equity capital, when required, as well as underpinning for our substantial bank credits.

An incidental aspect of the public sale of Memorex Common Stock was that more than 80% of Memorex employees purchased shares. This expression of confidence in the Company's future by those who know its business best can be reassuring to all shareholders.

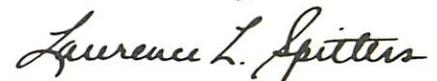
The successes of 1965 were not, of course, the accomplishments of the legal entity which is Memorex Corporation. Rather they were the results of individual effort by hundreds of people who are making careers at Memorex. Their talents were evident in the quality and competitive stature of our products. Their high productivity was evident in the ratio of our sales volume to the size of our employment (more than \$30,000 sales per employee). Again, in 1965 as in prior

years, their teamwork, morale and pride in accomplishment did not diminish notwithstanding the rapid growth of our organization.

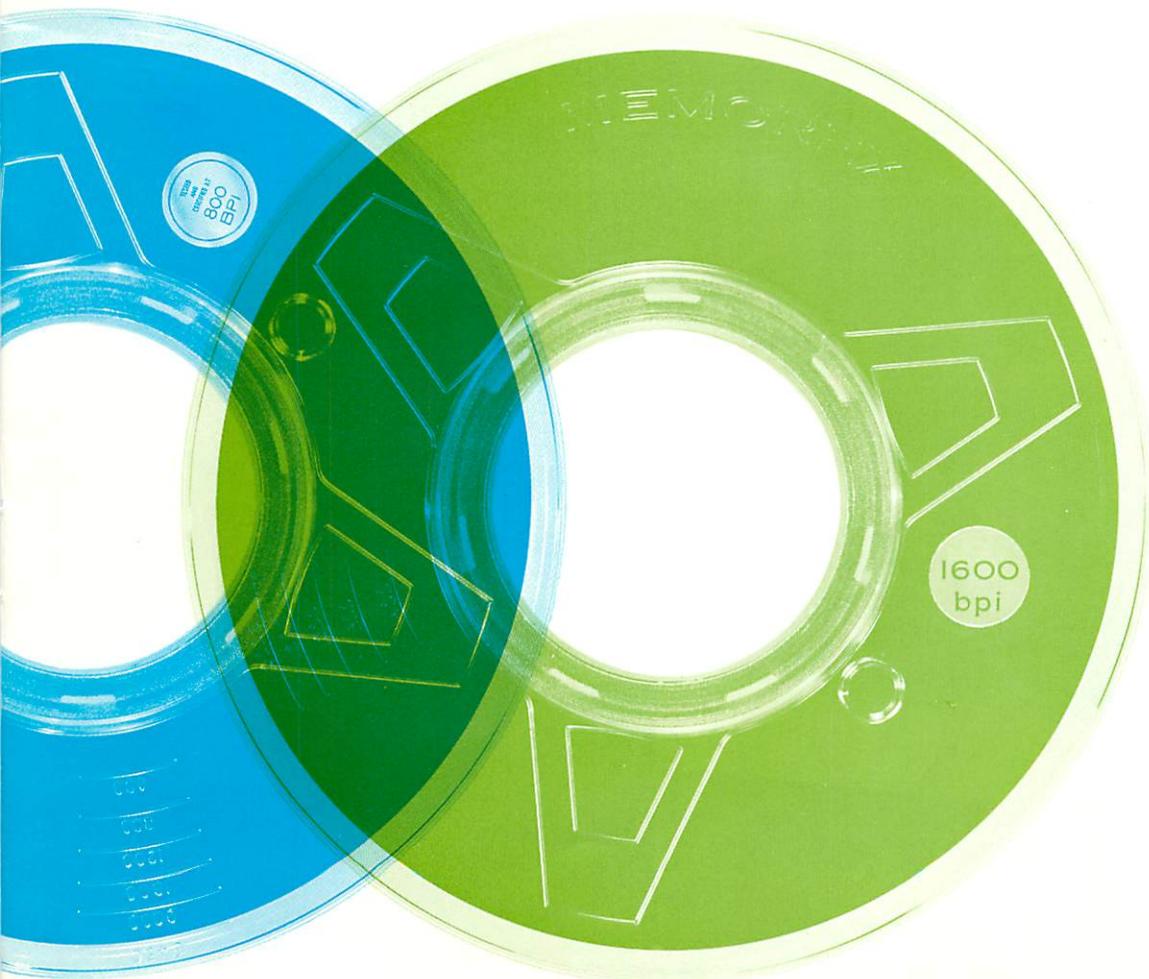
Looking to the future, the markets for Memorex's products continue to be attractive — the growing population of computers in commerce and industry, in government and defense; the growing number of television broadcasters and closed-circuit TV customers; the growing applications of broadband instrumentation recording in the missile and space exploration fields.

Memorex has also never been stronger than now to cope with competitive challenges. The accomplishments of the past five years have established Memorex's position as a marketing and technical leader with a highly efficient manufacturing capability. Its people are remarkable for their technology, ambition, and vitality. On this basis, we believe that the outlook for Memorex in 1966 and in ensuing years is as bright as ever.

Sincerely,



President



## Memorex Products: Applications and Markets

Precision magnetic tape plays an indispensable role in the multi-billion dollar revolution of information processing and communication. It is a basic tool for the acquisition, storage, communication, and reproduction of information for industry and government, finance and mercantile businesses, space and defense activities, scientific and educational institutions, and entertainment.

Memorex produces six series of precision tape products, including one for computers, three for instrumentation recording of scientific information, and two for television recording.

**Computer tape.** Memorex Computer Tape is used to communicate with and to store data for IBM, General Electric, NCR, RCA, UNIVAC, Burroughs, SDS, Control Data, Honeywell, ICT, English

Electric and other computers, whose pervading uses touch the daily life of each of us.

When you next write a check, chances are it will be processed at your bank's data processing center and your tape recorded account updated by its computer. Your monthly bills from use of hotel and gasoline credit cards are processed and issued from computer taped data. Your next jet flight will have been scheduled by computer.

Tickets taken from merchandise you purchase at large department stores are fed into machines that transfer their information to magnetic tape for computer processing. Possibly your purchase was induced by an advertisement or TV commercial, which resulted from a computer's exhaustive analysis of magazine readership or television viewers' reactions. Your magazine's subscription status is also tape recorded by its publisher, and each week it is delivered under a mailing label addressed by the computer's tape memory.

The staggering mass of information of government agencies is also computer processed. Indeed, many corporations no longer file written income tax reports, they simply send recorded

magnetic tapes to the tax collectors. The warranties of millions of automobiles are also made possible by the computers of their manufacturers which tape record the vital statistics of mileage, dollars spent on claims, serial numbers, and accessories.

School children each day fill out millions of answer sheets in tests which are graded by tape-using computers. Insurance companies file information relating to millions of policy holders, calculate risks, write policies, evaluate claims, issue premium bills, and pay dividends to shareholders using the magnetic tape memories of extensive computer systems.

Computers are also used to perform prodigious mathematical calculations. Design of rocket motors, formulation of chemical propellants, analysis of data from static tests, countdown procedures in missile and satellite launching, and calculations of trajectory, flight path, re-entry course, and touchdown point are possible only because of the calculating capability of computers and of magnetic tape memories for storing massive amounts of information, reference tables, and data processing instructions.

These illustrations of computer appli-



cations could be multiplied over and over but the full range of potential applications has yet to be grasped. Each application opens the door to other possibilities, for the expansibility and variety of computer uses are as great as that of the human mind. The future growth of this most important market for precision magnetic tape cannot be doubted.

**Instrumentation tape.** In aerospace programs involving launch vehicles, space capsules, missiles, and jet aircraft, Memorex Instrumentation Tape is used to record data of gravitational forces, acceleration, speed, direction, angle of attack, temperatures, pressures, vibration, shock, stress, and other performance measurements. From earth-orbiting satellites and deep-space probing rockets, it is used by ground tracking stations to record the data of atmospheric and meteorological conditions, radiation in space, observations of the earth's surface and surface pictures of the moon and planets.

Once recorded, the taped data can be reproduced as many times as necessary. Scientists and engineers put a missile or satellite through thousands of laboratory "flights" as they replay the tapes of a single mission to study

the causes of its success or failure, or to make accurate long range weather predictions, improve the mapping of the earth's surface, or enhance knowledge of navigation and astronomy. Thus, tape recorded data contribute greatly to the progress of our aerospace programs (and similar recordings of monitored Soviet programs enable us to measure their progress).

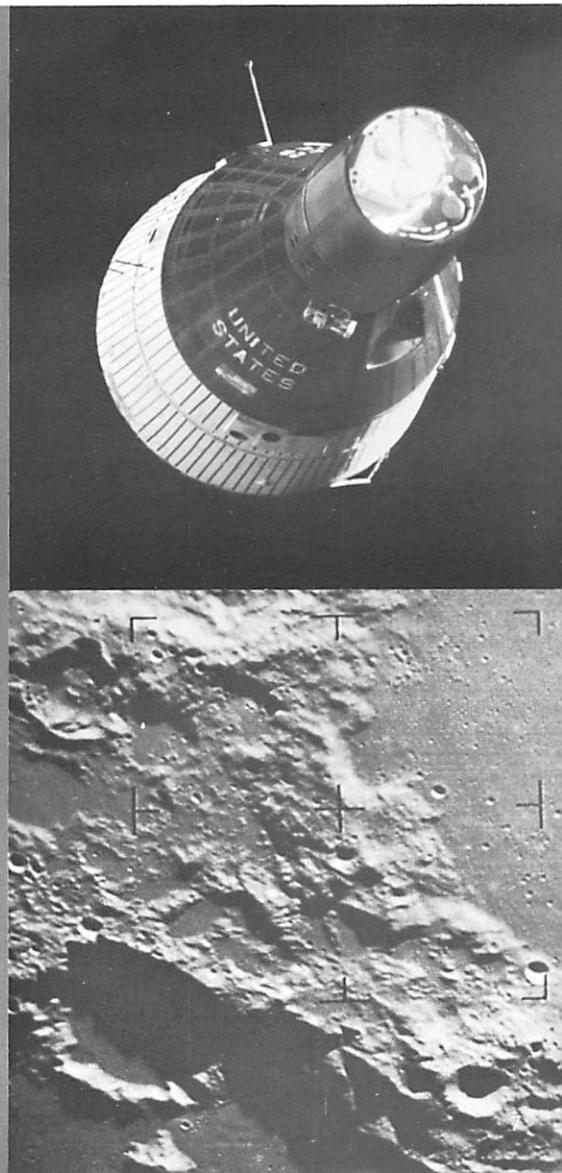
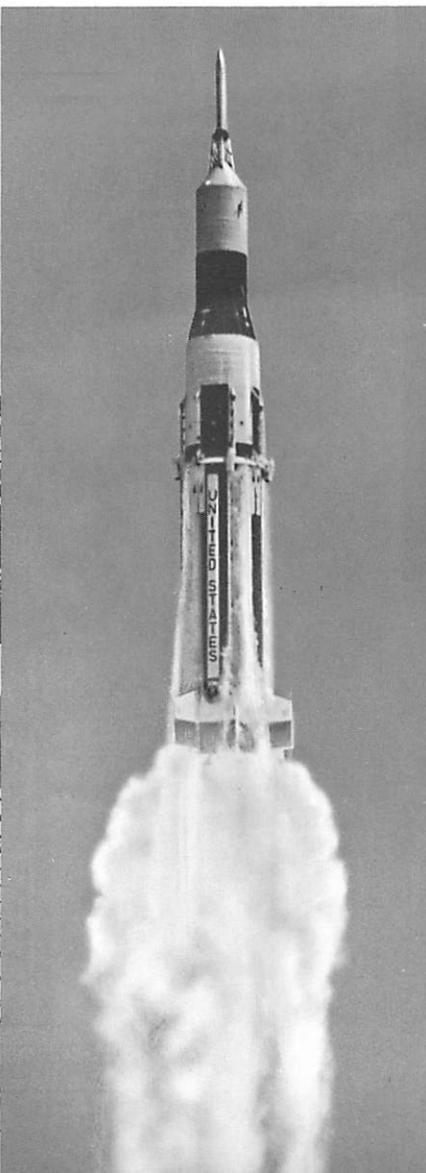
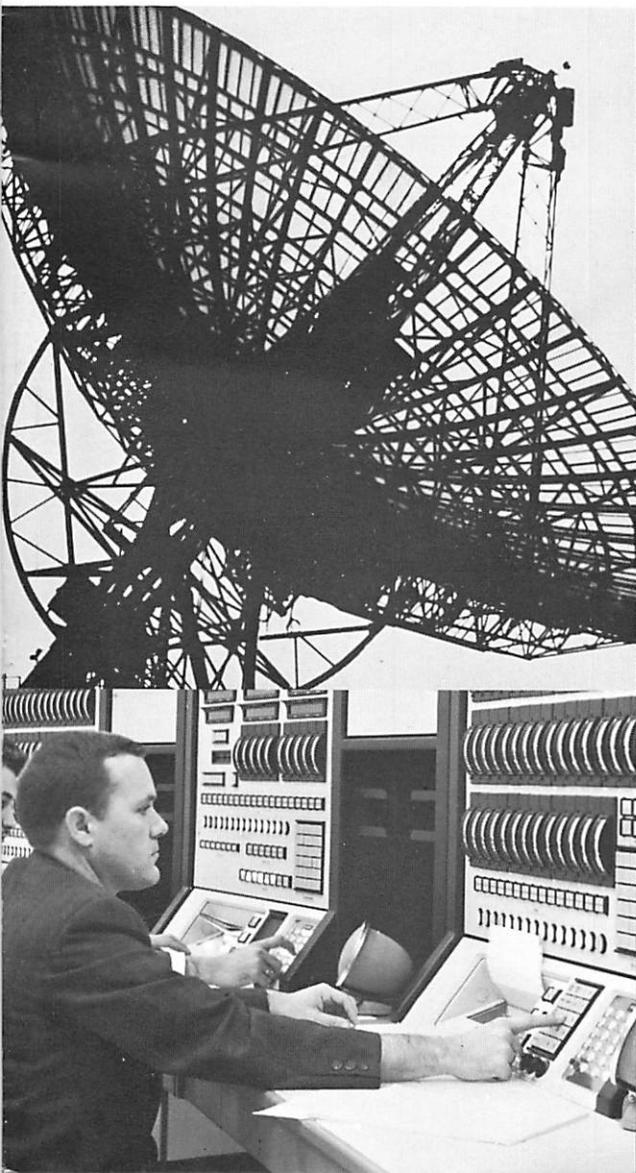
Other instrumentation tape recording applications are found throughout science and industry. In the field of medicine, tape is used as a diagnostic tool to monitor respiration, heart sounds, pulse rate, blood pressure, and brain-wave currents. In oceanography studies, magnetic tape records the slowly changing flow rates and pressures of ocean currents and replays the data at higher speed to facilitate analysis. In industry, instrumentation tape recording is much used in connection with research and quality control data measurements.

**Video tape.** If you watch the Sunday afternoon mayhem of professional football on television, you may wonder at the immediate replays of dazzling catches and runs. The answer is video tape. The tape recorder "films" the action, and, by simple push of a button,

the tape is reversed and the action reproduced.

More than 40% of national network programs are broadcast from video tape. Magnetic tape lends itself to production of TV programs because, unlike photographic film, no processing is necessary before a tape-recorded program can be replayed for editing. Also, tape can be erased and reused. Tape copies of programs are easily made without loss of fidelity for distribution to local TV stations throughout the country. Local stations in the Midwest and Far West also use video tape to record "live" programs originating in the East for delayed rebroadcasting in their different time zones.

Closed-circuit video tape recording is yet in its embryonic stage but rapidly growing in popularity, especially in the field of education. Pre-recorded lectures by distinguished authorities and difficult-to-repeat laboratory experiments have obvious advantages to teachers and students. The cost of closed-circuit television is constantly declining, so that with systems now priced well under \$10,000, the use of this educational tool and the market for closed circuit video tape should become widespread.



# The Past

Three brief periods, each marking a distinct stage in the evolution of Memorex's business, comprise its five year history. Into each were telescoped the determining events and experiences which, even in the present era of science-related industry, are typically extended over many more years of corporate life.

From incorporation in early 1961 to the middle of 1962, all activity was formative and non-revenue producing: recruitment of technical, marketing, and administrative staffs; work in research and development; construction of plant, laboratories and offices and fabrication of production equipment. The chemical formulations for the Company's initial products and the manufacturing processes, which resulted from its R & D, utilized invention and improvisation otherwise unknown in the industry.

Then, in late 1962 and 1963, operations made Memorex economically viable. The first products, computer and

instrumentation tapes, were successfully introduced, a modest position secured in markets, and a level of profit achieved sufficient to procure additional capital for expansion.

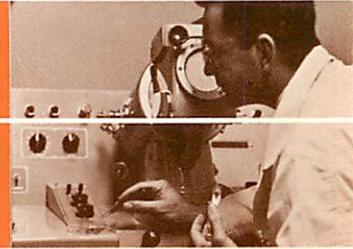
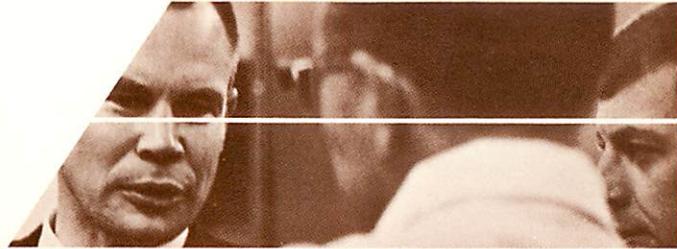
The third stage, in 1964 and 1965, involved implementation of a bold plan for growth. The Company's products were replaced with improved formulations and other tape products added, its marketing enlarged and extended throughout the United States and into foreign countries, and manufacturing facilities and laboratories expanded and upgraded. During this growth period, Memorex also organized a "professional management" which was science-oriented, profit-motivated, and aggressive in its response to opportunities.

Paradoxically, none of the scientists and engineers engaged in the original research and development work at Memorex had had experience in the magnetic recording tape industry. Their disciplines and backgrounds were entirely in the chemical, pharmaceutical, and recording equipment manufacturing industries. Of necessity, their work was original and fundamental. The result of their work was a combination of unique chemical formulations and production processes which provided a predictable and scientific

basis for manufacturing, in lieu of a mysterious and uncertain art.

Memorex's concentration upon only precision tape products at its founding was also a singularly different policy in the industry. In this regard it might be said that Memorex was not disadvantaged by an earlier birth and longer history. That is, longer-lived competitors had developed their technologies during the 1950's in the production of sound (audio) recording tapes, which are more easily made, non-precision, lower value products. Problems confronting the sound tape manufacturers in redirecting their technical efforts to make precision tapes were thus obviated by Memorex's concentration upon precision products at the start. The more difficult goals of Memorex's policy increased its early risks, but their attainment brought immediate technical distinction to the Company.

The name "Memorex"—a combination of "memory" and "excellence"—was chosen by the Company's founders to connote their emphasis upon quality of products. A million reels of Memorex tape, tested by standards surpassing those of competitive products, have since established the Company's reputation as "the industry's top quality producer."



# The Future

In the future, as in the past, Memorex will be a research-minded, aggressive, and expansive enterprise. The future of the industry also offers to the Company challenging technical and economic opportunities.

The best of today's precision tape products will become inadequate to perform on the next generation of recording systems. New uses of tape as well as conventional applications will demand still greater reliability and further increases in the density with which information is stored. Thus, compelling technical and economic reasons dictate vigorous research and development for improvements in existing products.

Part of this effort will be applied to the pursuit of technological breakthroughs which may lead to invention of new tapes, utilizing different chemical

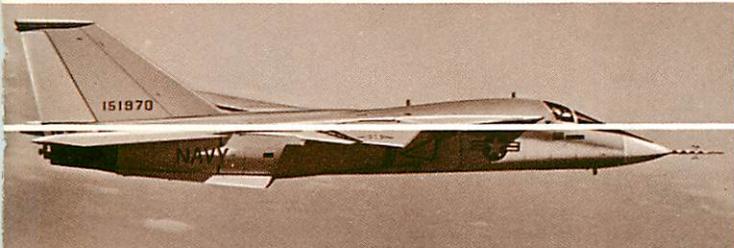
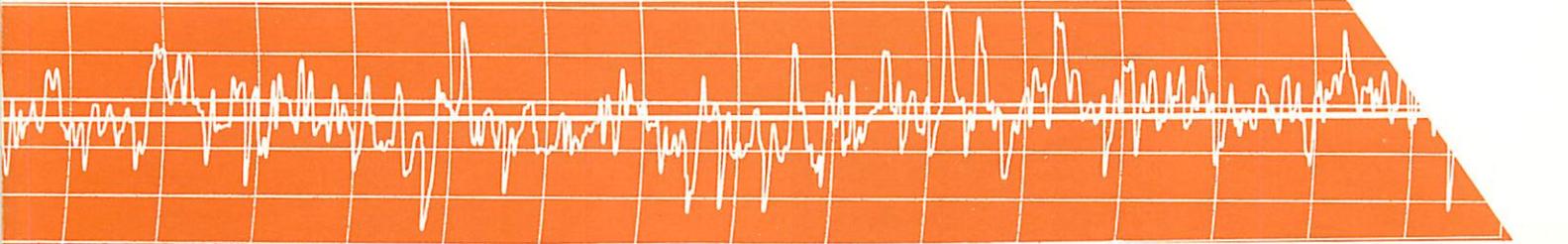
materials and processes as well as different recording equipment, or to invention of other new memory media or devices. Undoubtedly, the years to come will witness the perfecting of a number of these memories, but their effects should be supplementary to the uses of tape. That is, magnetic tape will continue to be basic to future systems for data acquisition, reduction, manipulation and analysis. No other storage medium, commercially available or discussed in technical literature, possesses the sum of tape's advantages: portability, erasability, large storage capacity, speed of communication between devices and locations, relatively low cost per item of information stored. More than a billion dollars of investment by users in tape recording equipment also constitutes a formidable impediment to radical change or abandonment of the many uses of tape.

More extensive marketing and a broader product base will continue to characterize Memorex's marketing activities. The relative importance of international markets most certainly will increase in future years. In general, foreign tape makers are manufacturers of sound recording tape, not high quality precision products. This factor enlarges the opportunity otherwise

afforded by fast growing international markets for computer and video tapes.

Memorex's product line, to date restricted to high performance premium products, may in time be expanded to include lower performance products. The Company does not now produce these products, but they are easily within its present technology and manufacturing capability. They would include a number of instrumentation tapes used in scientific laboratories. When television recorders for home use become popularized, Memorex will likely begin production for this consumer market.

Direction of Memorex's business will continue by those technical and business managers who to date have been responsible for the Company's successes and who have profited by their experience with its problems. This management is ambitious. It is planning to achieve all that opportunity, plentiful resources, and a leadership position in the industry will permit. Memorex managers know that the future is always problematical; they are also confident that "what is past is prologue."



# Research and Development

Nowhere is the complexity of magnetic tape technology more evident than in the diversity of scientists and engineers engaged in Memorex research. To the problems of developing better products are applied the mutually dependent talents of chemists, chemical engineers, process engineers, electrical engineers, mechanical engineers, physicists, and tape recording specialists.

A steady flow of commercialized new products and favorable customer reaction are the best measures of their accomplishment. By these measures, Memorex's R & D has excelled. Its record of new product introductions since 1962, when the first Memorex product was sold, is unrivaled. The new products have been:

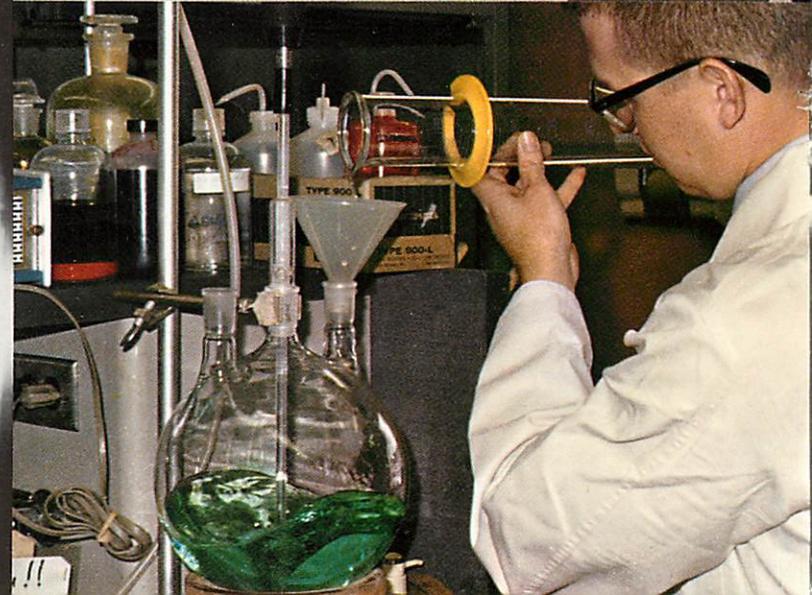
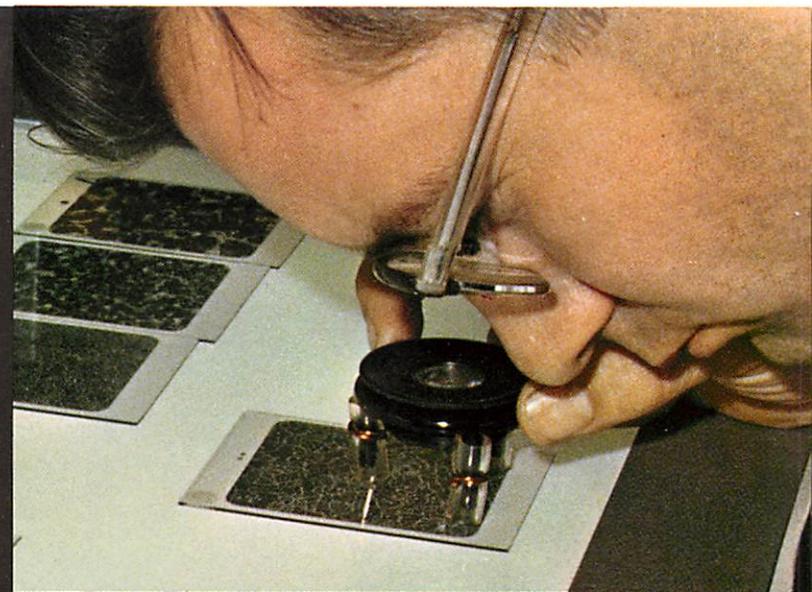
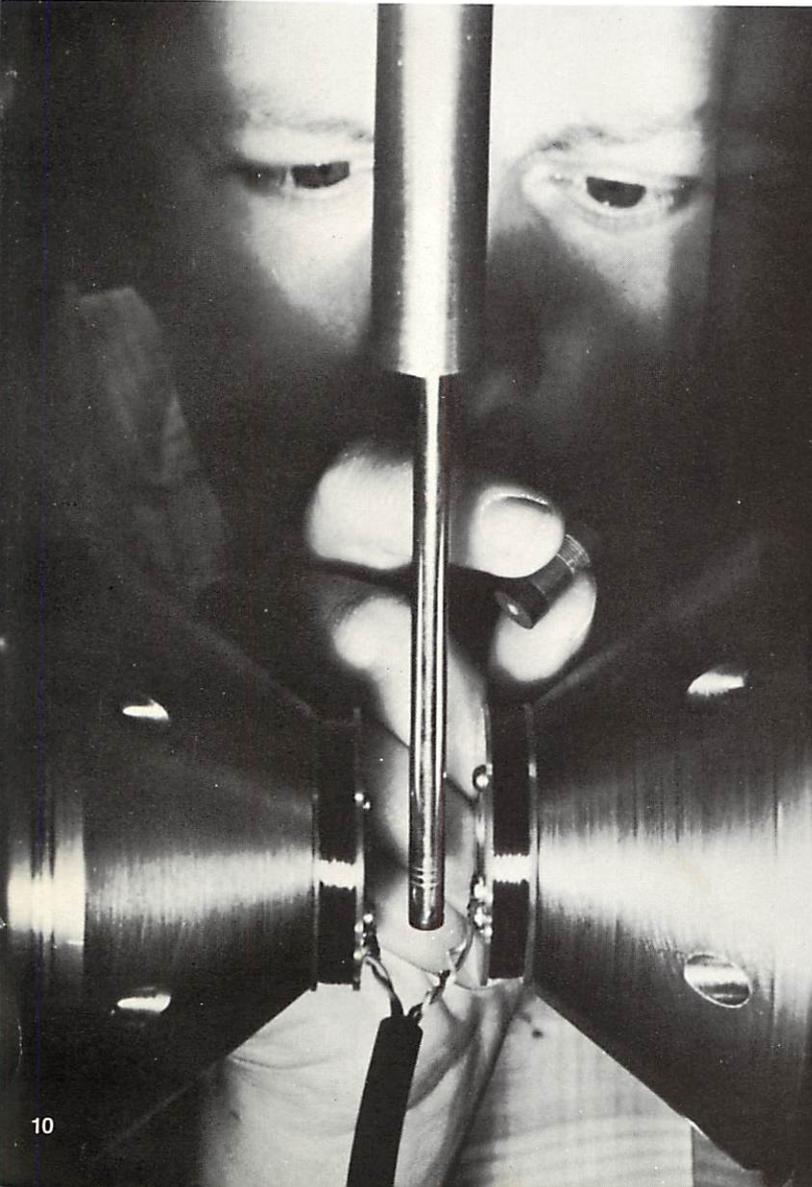
- July 1962, Computer Tape
- October 1962, Broadband Instrumentation Tape
- April 1963, Improved Formulation Computer Tape
- September 1963, Middle Recording Range Instrumentation Tape
- October 1963, Video Tape for Closed Circuit Television Use
- November 1964, Advanced Broadband Instrumentation Tape
- July 1965, Video Tape for Commercial Broadcast Television Use
- September 1965, Broadband Instrumentation Tape Meeting Qualified Products List Specifications of U. S. Government

The five categories of Memorex research and development work are: (a) in-depth study of the nature of the magnetic recording technique; (b) investigation of the properties and effects of raw materials and their combinations in tape formulations; (c) design of manufacturing processes and equipment; (d) development of tape testing techniques and equipment; and (e) advanced research and de-

velopment of materials and processes for new memory products.

Acute awareness of problems of tape's use is essential to the finding of solutions by improving the tape. Hence, Memorex tape recording specialists engage in the continuing study of the interface between tapes and computer, instrumentation, and television recording equipments. Their work is performed in Memorex laboratories, wherein standard models and specially constructed recorders of all types abound, and in cooperative projects with manufacturers of recording equipments and with sophisticated users. They have developed first-hand understanding of the problems of tape wear, oxide and other coating shed, recording head contamination, head wear, and the obtaining of better short wavelength performance and pulse response. This vital knowledge of use problems constitutes the foundation for the work of chemists, process engineers and researchers of other disciplines who develop new products.

Research in materials and formulations is, in a sense, a scientific treasure hunt of long duration. The raw materials of magnetic tape include a multitude of



chemicals which compose the tape's coating surface and the fine oxide particles which impart to the coating its magnetic properties. Few shortcuts are available in the search for improved materials or better formulations to produce coating surfaces which are smoother, tougher, and more capable of operating in adverse environments.

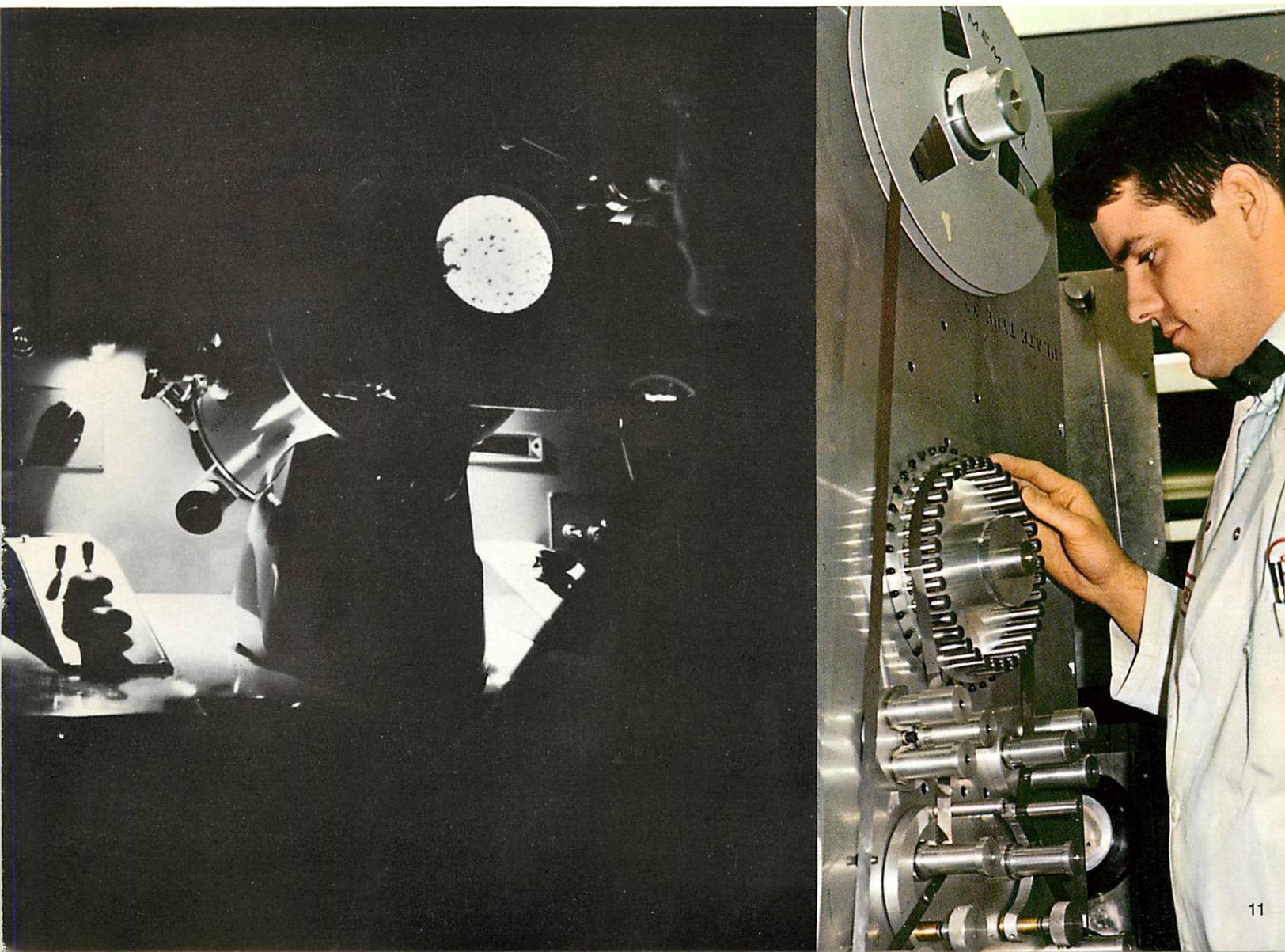
Experimental tapes by the hundreds are formulated and produced by pilot lines. Each must run the gamut of tests measuring dozens of chemical, physical, and electrical characteristics. Those which succeed and show potential improvements are then reproduced, time after time, under typical production conditions and in scaled-up processing, to verify the original test data and to ascertain whether the formulation is reproducible in commercial volume. Those experimental tapes which qualify at mass production are next submitted to extensive use tests, in-house and in the field. While some telescoping of these activities is possible, it is no exaggeration that the thoroughly tested tape formulations of improved quality products involve years of developmental and pre-production activity.

Process research covers the chemical, mechanical and physical processes at every stage of manufacturing operations. Its objective is three-fold: to increase efficiency and to lower costs of manufacture by minimizing waste of materials and by improving the rate of flow or capacity of process equipment; to improve quality of production by minimizing the variability of processes through automation and control devices; to effect improvements of products by developing process changes, e.g., modifying the process of dispersing oxide particles in the formulation to achieve a more uniform distribution of particles in the tape's coating. Again, the results of experimental process research must submit to multiple and demanding tests before a modification or addition can be accepted by Manufacturing as a standard process.

The difficulties of product and process development work would be insuperable if Memorex researchers were unable to obtain critical measurements of the characteristics of raw materials, intermediate products and finished products. Indeed, this testing, verification and interpretation of experimen-

tal results is the heart of research. The tools used are electron microscopes, spectrophotometers, magnetometers, profilometers, and many other unusual measurement devices which have been specially conceived by Memorex scientists for the unique uses of tape research.

The thrust of Memorex research and development projects to date has been to produce improved products to fill existing needs in marketing areas which have not always been adequately satisfied. Primary R & D efforts in the future will certainly continue to fill existing product needs better. However, an advanced development activity is now being directed to the development of new products which will utilize, in place of the iron oxide used today, different magnetic particles or continuous film materials. These new magnetic materials have the potential for advancing the art of tape recording well beyond today's recording systems. When successful — and by definition commercial reward for advanced development is several years in the offing — these innovations will create additional markets which do not presently exist.



# Manufacturing

Precision is the hallmark of Memorex manufacturing. A typical computer tape must be manufactured in a perfectly straight length of 2500 feet, vary in width by less than .002 of an inch, maintain a coating thickness of .0004 of an inch within a tolerance of 4%, be totally devoid of a speck of dust or other airborne or ingredient foreign matter, and be free from a single particle or agglomerate of oxide protruding more than a few ten-thousandths of an inch from its mirror-smooth coating. This precision must be maintained uniformly from January to December in hundreds of thousands of reels.

Specially designed facilities maintained with hospital room cleanliness, a dust-free atmosphere filtered by the air-conditioning systems used in atomic laboratories to control airborne radio-

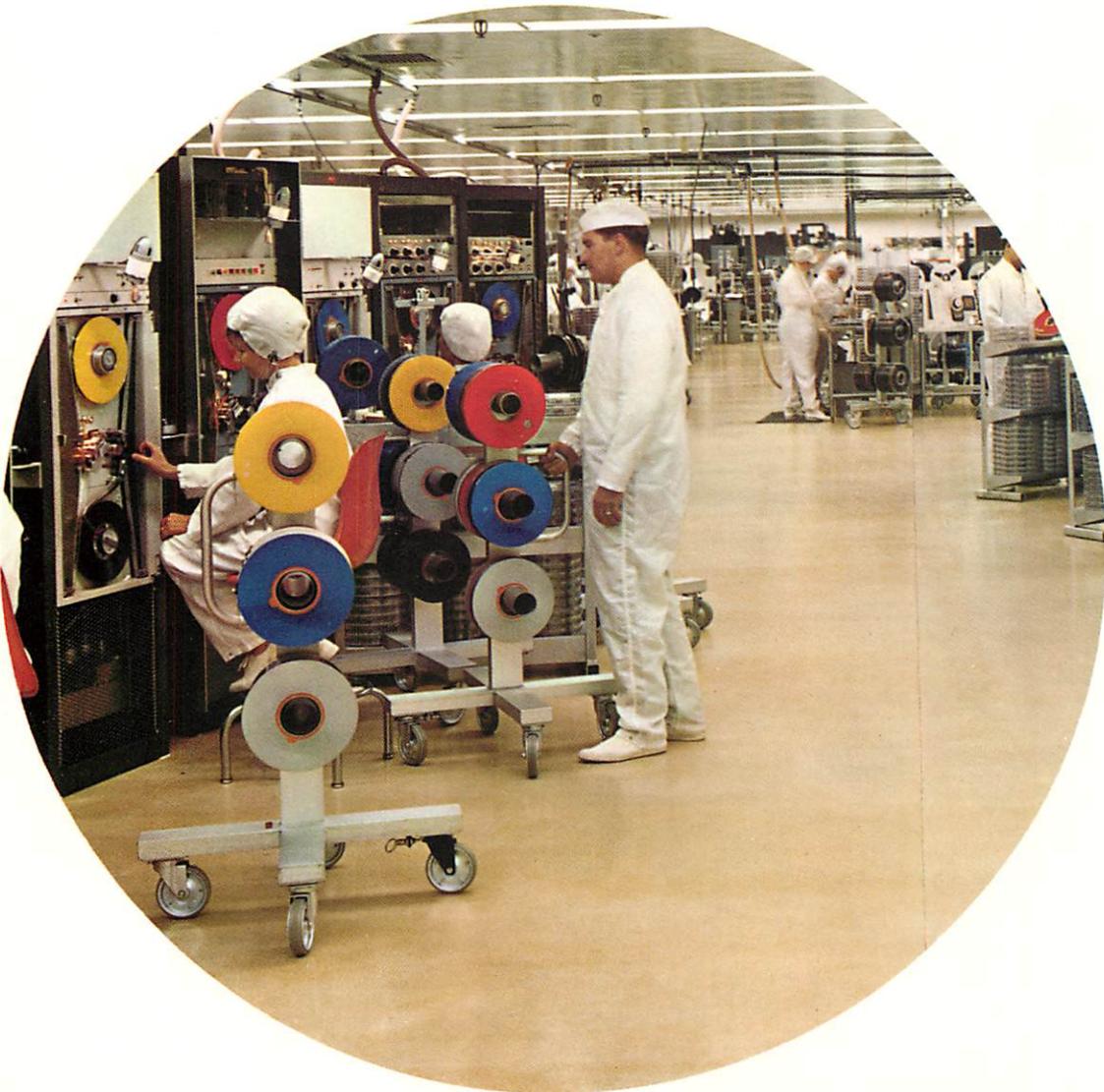
active particles, automated equipment which avoids traditional processing methods and not always reliable human skills, and carefully trained, top caliber personnel make the manufacturing results possible.

Manufacturing operations involve several major steps: mixing and milling of the chemical formulations and oxides; application of the coating materials to the long wide rolls of film base; drying and curing of the product by high temperature ovens; enhancement of the smoothness of the surface; slitting of the wide rolls to the 1/2", 3/4", 1" and 2" widths used by tape recorders. Each step must be performed perfectly, or the entire length of tape must be discarded. Unlike the manufacture of many electronic products which allows the replacement of components, defective precision magnetic tape cannot in any way be reworked or materials be reclaimed.

Uninterrupted flow of unvarying high quality production is assured by making each step of manufacturing operations inherently controllable. To do so, Memorex has borrowed the principles of automation, production line moni-

toring, and process control from the chemical and pharmaceutical industries. However, the standard processes and equipments of these industries are generally incapable of meeting the rigid specifications of tape making. Hence, Memorex's manufacturing is replete with unusual processes and custom-designed equipments, and control systems for monitoring and adjusting their deviations.

No manufacturing group exercises more authority at Memorex than its Quality Control Department. Its inspectors enter into plants of suppliers to verify the quality standards of raw material production at their sources, as well as perform exhaustive quality control tests at Memorex prior to acceptance of the materials. They penetrate every process and operation, testing intermediate as well as finished products, employing QC standards which go well beyond the specifications of the most critical users. The unrelenting enforcement of these standards gives integrity to Memorex's warranty of finished products and profit to its customers who no longer find testing of tape before use a necessary expense.



# Marketing

If the maker of better mousetraps can expect the world to beat a path to his door, Memorex has not assumed a comparable marketing advantage for the maker of precision tapes. On the contrary, aggressive marketing contributes as much to the Company's competitive strength as the quality of its products, its research or manufacturing prowess.

Two touchstones have determined marketing organization and practices: maintenance of close customer contact, and strong technical support for selling activity.

Direct selling to users by Memorex sales engineers, whose concern is limited to magnetic tape, provides the close contact. Short lines of communication and closer attention to customers' problems, immediate answers on prices and deliveries, and good service in general are its advantages. Customers in every area are quickly accessible to the sales staff located in offices in principal U.S. cities.

Memorex sales engineers are well

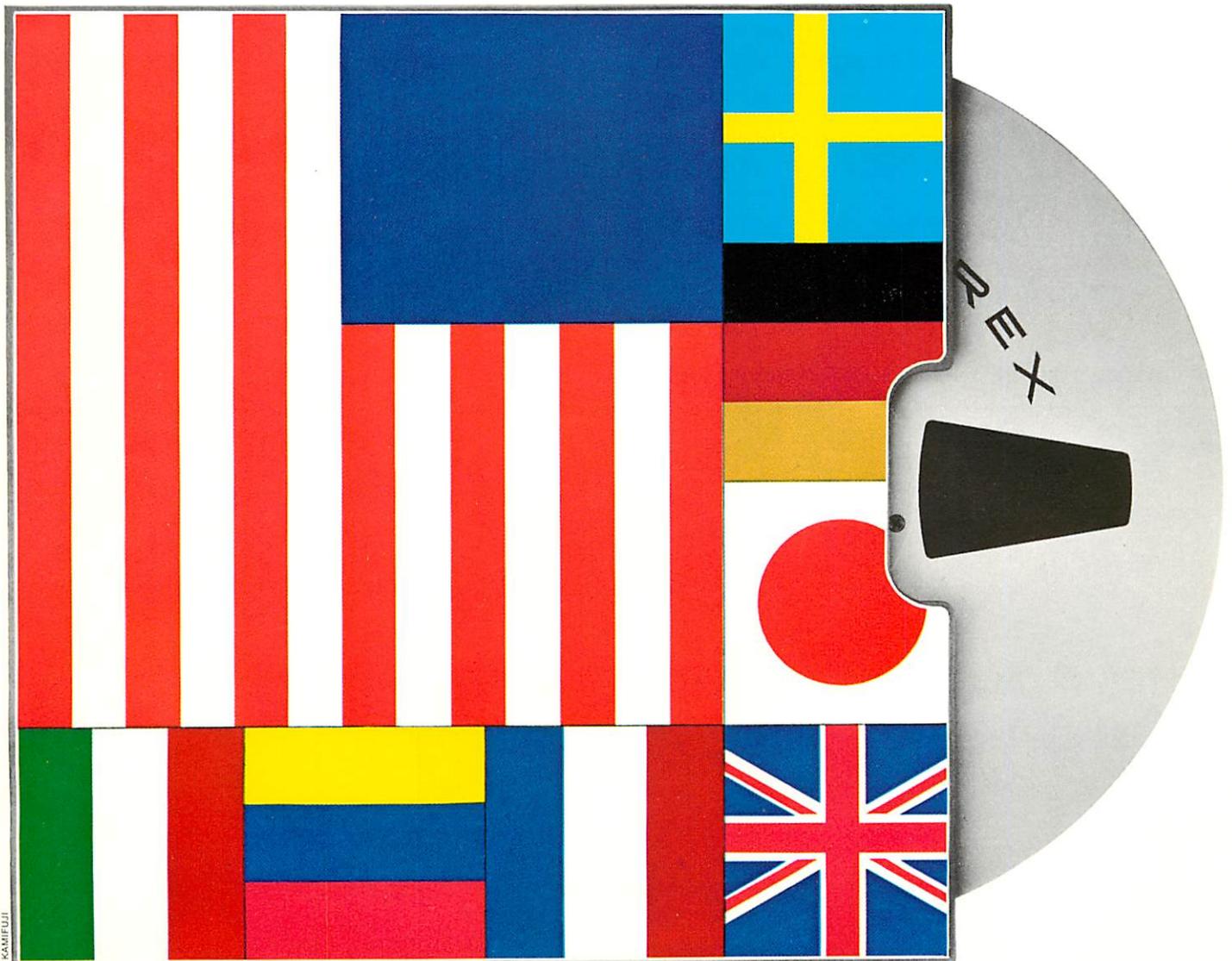
trained professionals, intimately conversant with tape uses and qualified to troubleshoot recording problems. They are also charged with the responsibility for being the customers' advocates in the Company's councils. Their customer-biased attitude and their forcefulness have had much to do with the sensitivity of Memorex's management, R & D and production people to the changing conditions of the marketplace.

Technical support for selling is provided by application engineers, located in branch offices. These men, all recording equipment experts, assist in educating customers in tape usage and in solving first order technical problems of the equipment-tape interface. More difficult problems, not infrequently requiring special modifications of Memorex's products, are handled by the Product Technical Service Department. The latter is a Santa Clara-based, manufacturing-related group which performs the liaison between customers and the special production departments.

International marketing, undertaken in 1965, has also used direct selling and high level technical support wherever

the market potential justifies. In Great Britain, France, and Germany, offices are established with sales people who are nationals of the countries. They, too, are supported by an engineering function located in London and by the peripatetic problem-solvers of the Product Technical Services Department. Where required by law or trade practice, as in Japan and Latin America, or where markets are yet too small to justify a Memorex office, as in Canada and Australia, the Company's products are sold by local representatives.

Prospective customers, at the inauguration of Memorex's marketing in 1962, were advised by a Company brochure that the marketing organization would work by the rule that "a man's reach should exceed his grasp." That attitude and boundless energy produced a sales record which is unparalleled in the precision tape industry. In 1966, the same rule is operative. Memorex's enlarged marketing and technical service staffs, responsive to the challenge of competition and to the opportunities of the market place again promise to accomplish much.



**For the Year Ended December 31, 1965**

Net Sales		\$13,098,835
Operating Costs and Expenses (including depreciation of \$422,950):		
Cost of sales	\$8,497,950	
Selling, general and administrative expenses	1,708,151	
Profit sharing expense	<u>280,185</u>	<u>10,486,286</u>
Operating Income		\$ 2,612,549
Interest Expense		<u>131,216</u>
Income before Federal and Foreign Income Taxes		\$ 2,481,333
Provision for Federal and Foreign Income Taxes		<u>1,150,000</u>
Net Income		<u>\$ 1,331,333</u>
Net Income per Share (Note 6)		<u>\$ 1.35</u>

The accompanying notes are an integral part of this statement.





# Consolidated Statement of Financial Position

December 31, 1965

## Working Capital:

Current assets –		
Cash	\$ 389,958	
Accounts receivable	2,938,494	
Inventories, at the lower of cost (first-in, first-out) or market	1,700,074	
Prepayments	55,253	\$5,083,779
Current liabilities –		
Current portion of long-term debt (Note 3)	\$ 605,702	
Accounts payable	1,026,930	
Accrued liabilities –		
Salaries, wages and commissions	170,940	
Profit sharing	280,085	
Federal and foreign income taxes	661,400	
Other	61,465	
Product warranty reserve	300,000	3,106,522
Net working capital		\$1,977,257
Property, Plant and Equipment, at cost (Note 3):		
Land	\$ 476,849	
Buildings and improvements	2,465,128	
Machinery and equipment	2,017,158	
Furniture and fixtures	238,565	
	\$5,197,700	
Less accumulated depreciation	770,488	4,427,212
Other Assets		88,714
Total assets less current liabilities		\$6,493,183
Deduct Other Liabilities:		
Deferred Federal income taxes (Note 2)	\$ 232,050	
Long-term debt (Note 3)	2,352,007	
Commitments (Note 4)	—	2,584,057
Net assets in which capital is invested		\$3,909,126
Shareholders' Equity (Notes 3 and 5):		
Common stock, \$1 par value –		
Authorized – 5,000,000 shares		
Outstanding – 1,004,016 shares	\$1,004,016	
Paid-in surplus	848,560	
Retained earnings	2,056,550	
Shareholders' equity		\$3,909,126

The accompanying notes are an integral part of this statement.

**For the Year Ended December 31, 1965**

	<u>Total</u>	<u>Common Stock</u>	<u>Paid-in Surplus</u>	<u>Retained Earnings</u>
Balance December 31, 1964	\$2,564,734	\$ 977,106	\$ 862,411	\$ 725,217
Net income for the year	1,331,333	—	—	1,331,333
Proceeds from sale of common stock to employees under stock option plan	46,296	26,910	19,386	—
Costs of registration of common stock with S.E.C.	(33,237)	—	(33,237)	—
Balance December 31, 1965	<u>\$3,909,126</u>	<u>\$1,004,016</u>	<u>\$ 848,560</u>	<u>\$2,056,550</u>

The accompanying notes are an integral part of this statement.

**Consolidated  
Statement  
of Source  
and Use  
of Funds**

**For the Year Ended December 31, 1965**

Funds were obtained from:

Net income	\$1,331,333
Depreciation	422,950
Increase in deferred Federal income taxes	118,050
Total funds from operations	<u>\$1,872,333</u>
Increase in long-term debt	1,314,739
Proceeds from sale of common stock	46,296
Total funds obtained	<u>\$3,233,368</u>

Funds were used for:

Additions to property, plant and equipment, net	\$2,185,429
Increase in other assets	31,761
Costs of registration of common stock with S.E.C.	33,237
Increase in net working capital	982,941
Total funds used	<u>\$3,233,368</u>

The accompanying notes are an integral part of this statement.

# Notes to Consolidated Financial Statements

December 31, 1965

## 1. Principles of Consolidation

The consolidated financial statements include the accounts of the parent company and all subsidiaries (which are wholly-owned) after elimination of intercompany accounts and transactions.

## 2. Deferred Federal Income Taxes

The company uses the straight-line method in computing depreciation for book purposes but uses the declining-balance method for income tax purposes. As a result, \$232,050 of income taxes otherwise payable have been deferred; however, such amount has been charged to income and credited to Deferred Federal Income Taxes in the accompanying consolidated financial statements. The deferred credit will be reflected in income in future years when income taxes payable increase as a result of using these tax deductions currently.

## 3. Long-Term Debt

Long-term debt at December 31, 1965, consisted of the following:

Notes Payable to Bank —	
6 1/4 % Note, due in quarterly installments through December, 1970	\$2,250,000
6 % Note, due in monthly installments through May, 1974	435,909
6 % Notes Payable to Others —	
Secured by deed of trust on certain land, due in annual installments through April, 1968	165,255
Unsecured, due in annual installments through January, 1967	106,545
	<u>\$2,957,709</u>
Less amounts payable within one year	605,702
Long-term debt	<u>\$2,352,007</u>

Notes payable to bank are secured by deeds of trust on certain land and buildings and pledge of all the parent company's equipment and capital stock of subsidiaries. The agreement with the bank provides, among other things, that the company will (1) maintain current assets in excess of current liabilities by not less than \$900,000 through September 30, 1966, and \$2,500,000 thereafter, (2) maintain shareholders' equity of not less than \$3,200,000 through December 31, 1966, and (3) maintain from and after January 1, 1967, a ratio of total debt to shareholders' equity of not more than 1.5 to 1.

## 4. Commitments

The company and subsidiaries lease certain of their buildings, equipment, and district sales offices under long-term lease contracts which expire at various dates through 1971. Aggregate rentals remaining under these lease contracts were \$393,400 at December 31, 1965, of which \$132,200 was due within one year.

## 5. Stock Option Plans (Parent Company)

As of December 31, 1965, under a Restricted Stock Option Plan adopted in 1961, options granted for 22,500 shares of the company's common stock were outstanding as follows:

Year of Grant	Options Granted Shares	Price Per Share	Options Exercised		Options Outstanding at 12-31-65
			Before 1965	During 1965	
1961	27,375	\$ .10	16,290	11,085	—
1962	13,500	.20	6,000	3,750	3,750
1963	1,500	.50	375	375	750
1963	22,500	3.33	1,800	9,450	11,250
1964	3,000	3.67	—	750	2,250
1964	6,000	6.67	—	1,500	4,500
	<u>73,875</u>		<u>24,465</u>	<u>26,910</u>	<u>22,500</u>

No additional options will be issued under the above Restricted Stock Option Plan.

An aggregate of 70,000 shares of the company's common stock were reserved for issuance under a Qualified Stock Option Plan approved by shareholders in December, 1965. Under this plan, options may be issued to key employees to purchase common stock at a price of not less than 100% of market value of the shares at the dates options are granted. After December 31, 1965, the first option was granted under this plan for 3,000 shares at \$32.875 a share.

Both of the plans provide, among other things, that options granted are exercisable at one-fourth the total shares each year on a cumulative basis, commencing one year after date of grant. Options granted prior to 1964 expire eight years after date of grant and those granted in 1964 and subsequent years expire five years after date of grant.

## 6. Net Income Per Share

Net income per share is based on the average number of shares outstanding during the year.



## Auditors' Opinion

### To the Board of Directors and Shareholders, Memorex Corporation:

We have examined the consolidated statement of financial position of MEMOREX CORPORATION (a California corporation) and subsidiaries as of December 31, 1965, and the related consolidated statements of income, shareholders' equity, and source and use of funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the above-mentioned financial statements present fairly the financial position of Memorex Corporation and subsidiaries as of December 31, 1965, and the results of their operations and the sources and uses of their funds for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

ARTHUR ANDERSEN & CO.  
San Jose, California  
January 28, 1966

## Memorex Corporation Five Year Summary

(dollar amounts in thousands except per share earnings)



### Years ended December 31

Operating Data	1965	1964	1963	1962	1961
Net Sales	\$13,099	\$ 8,042	\$ 3,486	\$ 475	\$ —
Net Income:					
Before Taxes	2,481	1,962	454	(694)	(314)
After Taxes	1,331	1,002	218	(694)	(314)
Per Common Share	1.35	1.04	.23	(.85)	(.42)
Depreciation	423	252	141	93	28
Research and Development	747	452	288	457	308
<b>Financial Data</b>					
Working Capital	1,977	994	642	331	586
Total Assets	9,600	5,377	2,089	1,710	1,363
Long-term Debt	2,352	1,037	—	—	—
Shareholders' Equity	3,909	2,565	1,594	1,515	1,263
Average Number of Common Shares Outstanding	987,590	964,050	955,650	817,770	750,000
Number of Employees at Year's End	442	306	146	78	24

Note: Number of shares, earnings per share, shareholders' equity, and long-term debt have been retroactively adjusted to give effect to the conversion of Promissory Notes and the 30 for 1 stock split effected in 1964.

**Management:**

**Laurence L. Spitters**, President

**W. L. Noon**, Vice President  
(Administration of research,  
development, engineering and  
manufacturing operations)

**Eugene L. Rogers**, Vice President  
(Administration of domestic and  
international marketing operations  
and personnel and legal activities)

**Donald F. Eldridge**, Vice President  
(Corporate development activities)

**Rex D. Lindsay**, Vice President  
(Manager of Manufacturing Division)

**Edward S. Seaman**, Vice President  
(Manager of Marketing Division)

**Richard D. Boucher**  
(Plant Manager)

**Robert M. Brumbaugh**  
(Chief Engineer and  
Manager of Engineering Division)

**Eric D. Daniel**  
(Director of Research Division)

**D. James Guzy**  
(Managing Director,  
International Operations, London)

**Gordon MacBeth**  
(Director of Chemical  
Development Division)

**Stanley W. Meyer**  
(Manager of Quality Control)

**Gordon O. Sheppard**, Treasurer  
(Manager of Finance Division)

**Carl A. Anderson**, Secretary

**Howard N. Burkhart**  
Assistant Treasurer

---

**Board of Directors:**

**Alger Chaney**, Chairman of the  
Board of Medford Corporation

**W. Noel Eldred**, Vice President,  
Marketing, Hewlett-Packard Company

**Donald F. Eldridge**, Vice President  
of the Company

**Thomas E. Morris**, Vice President,  
Blyth & Co., Inc.

**W. L. Noon**, Vice President  
of the Company

**T. Robert Sandberg**, Vice President,  
Cutter Laboratories, Inc.

**Laurence L. Spitters**, President  
of the Company

**Fred M. van Eck**, Partner,  
J. H. Whitney & Co.

**Dr. Theodore Vermeulen**, Professor  
of Chemical Engineering,  
University of California

## **Memorex Executive Offices**

Memorex Corporation  
Santa Clara, California 95052

## **Memorex Branch Offices**

### **New York**

1222 Route #46  
Parsippany, New Jersey 07054  
(201) 335-1444

### **Philadelphia**

6705 Park Avenue  
Pennsauken, New Jersey 08110  
(609) 662-3047

### **Washington**

4905 Delray Avenue  
Bethesda, Maryland 20014  
(301) 654-2545

### **Atlanta**

3166 Maple Drive, N. E.  
Atlanta, Georgia 30305  
(404) 231-4865

### **Cape Kennedy**

One North Rosalind Avenue  
Orlando, Florida 32801  
(305) 424-3302

### **Detroit**

24638 Northwestern Highway  
Southfield, Michigan 48076  
(313) 353-2670

### **Dayton**

Herman Miller Building—Suite 232  
333 West First Street  
Dayton, Ohio 45402  
(513) 223-9552

### **Chicago**

2 N 567 North York  
Elmhurst, Illinois 60127  
(312) 834-8922

### **Dallas**

4924 Greenville Avenue  
Dallas, Texas 75206  
(214) 363-8977

### **Los Angeles**

1045 Gayley Avenue  
Los Angeles, California 90024  
(213) 477-1018

### **San Francisco**

727 Industrial Road  
San Carlos, California 94070  
(408) 593-1691

## **Memorex International Operations**

Memorex Precision Products Limited  
Maidenhead, Berkshire, England

Memorex GmbH  
Cologne, West Germany

Produits de Precision S.A.R.L.  
Paris, France

**ACKNOWLEDGEMENTS :**  
Photographs of F-111B aircraft  
on pages 4 and 9—courtesy  
of Grumman Aircraft Engineering  
Corporation, principal subcontractor  
to General Dynamics on Navy F-111B.  
Photographs on page 7—courtesy of  
NASA-Ames Research Center and  
Houston Manned Spacecraft Center.



