

MOTOROLA ANNUAL REPORT 1960

Paul
Smith
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CONTENTS

- 1 Circuitry Evolution
- 2 Special Achievements of 1960
- 3 President's Letter

DIVISIONAL REPORT

- 4 Communications
- 6 Aviation Electronics
- 7 Automotive Products
- 8 Semiconductor Products
- 10 Consumer Products
- 13 International Operations
- 13 The Dahlberg Company
- 14 Military Electronics
- 15 Solid State Electronics

FINANCIAL REPORT

- 16 Concerning the Financial Report
- 17 Motorola Inc. and Consolidated Subsidiaries
- 20 Motorola Finance Corporation
- 21 Ten Year Financial Summary
- 23 Directors and Officers



The annual meeting will be held on Monday, May 1, 1961. A notice of the meeting, together with a form of proxy and a proxy statement, will be mailed to shareholders on or about April 3, 1961, at which time proxies will be solicited by the management.

TRANSFER AGENTS

Harris Trust and Savings Bank
111 West Monroe Street, Chicago 90, Illinois

Chemical Corn Exchange Bank
30 Broad Street, New York 15, New York

REGISTRARS

Continental Illinois National Bank
and Trust Company of Chicago
231 South LaSalle Street, Chicago 90, Illinois

Irving Trust Company
One Wall Street, New York 15, New York





1950's



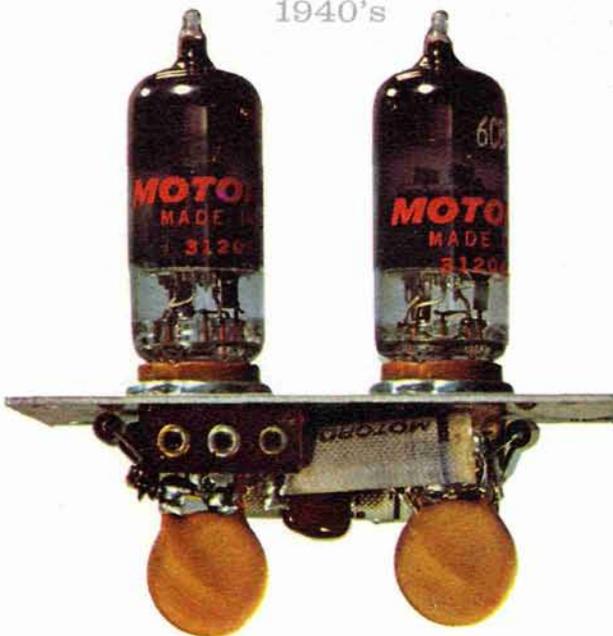
1960's



SOLID STATE
ELECTRONICS



1940's



"... The activity to which I now make reference is one which relates to the rise of solid state electronics ... and to some of the principal changes that can occur in all of our product areas in the next five or ten years ..."

These comments introduced the subject of the new solid state art in an address by Robert W. Galvin, President of Motorola, Inc., before the New York Society of Security Analysts on July 28, 1960. Illustrated on this page are the circuit sub-systems which Mr. Galvin showed to the security analysts to demonstrate the evolution in equipment design and manufacture which is taking place in the electronics industry.

Each circuit shown here is an actual size reproduction. Each performs a similar function ... the vacuum tube circuit of 1940 vintage ... the transistorized circuit module—a product of the 1950's ... the thin film integrated circuit—characterizing the present research trend toward use of solid block functional sub-systems.

The thin film integrated circuit above is one of several approaches to the new solid state circuit technology. This tiny unit is only one-fiftieth part of the volume of the conventional transistorized module (to its left), which it replaces. Although the size reduction is spectacular when compared to older equivalents, it is reliability improvement, rather than size reduction, which is of dominant importance to future systems design.

Motorola's research and development program is vigorous and selective. It deals with devices, materials, and processes in the fields of semiconductors, epitaxial growth, thin films, diffusion, surface passivation, and electronic ceramics. This provides a broad foundation for continuing leadership in the solid state electronics art.

PRESIDENT'S LETTER

SPECIAL ACHIEVEMENTS OF 1960

First fully-transistorized, VHF,
pocket-size transmitter.

Mass-produced, epitaxially-grown transistors.

First large-screen, battery-operated,
transistorized portable television receiver.

Mahogany Association top styling award for
Motorola television and stereo hi-fi units.

Record International Operation sales.

Reinstatement as "Mission and Traffic
Control" manager for the B-70 Bomber.

Creation of the Solid State Controls Department.

Completion of new Administration Building.



To the Shareholders of Motorola, Inc.

A new record was set for Motorola sales and other revenues which totaled \$299,065,922 in 1960, a small increase over 1959 in spite of the economic downturn in the last quarter of the year.

Net earnings of \$12,633,813 were below 1959, and earnings per share outstanding at the end of each year were \$3.14 in 1960 compared with \$3.59 in 1959 (adjusted for the share distribution in 1960).

The two dominant influences on Motorola's business in 1960 were:

1. The downturn in the economy.
2. The quality of our diversification.

The downturn in the economy reduced sales of consumer radio, phonograph, and television products of our Consumer Products Division substantially during the last half of the year. The degree of downturn was not anticipated. The division budgets were purposely geared to a higher volume, resulting in an adverse effect on earnings which, though reasonable, equaled neither our 1960 goal nor our 1959 result.

To a lesser extent, the economic forces also affected the Communications Division and the Semiconductor Products Division with minor effect on earnings related to our goals.

Throughout this period our Military Electronics Division operated at considerably less volume than in 1959 but with about the same rate of earnings.

Many elements of the Company performed outstandingly. The Automotive Products Division achieved near-record deliveries.

The Semiconductor Products Division made another giant stride forward in becoming an important supplier to hundreds of other electronic companies. Over seventy-five per cent of its output is now sold to customers outside the Company's other divisions.

Particular success was recorded with power and mesa transistors using both germanium and silicon base material. Further achievements were made with zener diodes. In addition, Motorola is the first company outside the Bell System to

market devices mass produced by a revolutionary process called epitaxial growth. This major advance improves quality and promises reduced costs as the result of increased production yields.

The Communications Division continued its consistent growth and its leadership of the two-way mobile radio business. Important product and marketing advances were also achieved with portable and paging radio products, radio traffic control systems, closed circuit television systems, and others.

The Federal Communications Commission authorized adequate frequencies and rules for the inauguration of private microwave radio systems. We believe this offers a significant, though probably not spectacular, opportunity for growth which will step up moderately through the next five to ten years.

Our Military Electronics Division closed 1960 with a greatly increased backlog, auguring well for the new year from the standpoint of earnings as well as volume.

Motorola's international business operated at the largest volume of sales, license income, and earnings in its history.

Research efforts in the field of solid state materials and devices continue most promisingly. These efforts should, over a period, provide new products with which to further increase both our integration and diversification in electronics.

During 1961 we expect to improve our sales volume of communications products, semiconductor products, microwave equipment, hearing aids, hospital communications equipment, aviation electronics products, solid state products, and military electronics.

Our automotive products sales will likely be less with reduced automobile business. Consumer products volume may approximate 1960. Total sales and earnings should exceed 1960.

The able service of my associates did much to preserve a satisfactory record for the Company in a year when the economy was unfavorable.

For the Board of Directors

Robert W. Glavin
PRESIDENT

March 13, 1961

COMMUNICATIONS DIVISION

An increase in volume of sales again was recorded in communications equipment for 1960. Both new users in established applications, and new applications by business and governments created further demand for independently-licensed radio systems. Advanced equipment created replacement demand.

Important to sales this year was the MOTRAC (transistorized mobile two-way radio) line of premium quality, high reliability communications systems. Its initial announcement in latter 1958 was followed in 1959 by widespread acceptance. In 1960 added production capacity was needed to meet market requirements.

Compact and highly reliable, MOTRAC radio provides complete 2-way communications.





Closed circuit TV proved an effective visual aid for Motorola-sponsored service training programs begun in 1960. Television monitors enabled detailed instruction, visible to the entire class.



Communications Division Vice President Arthur L. Reese compares the new Handie-Talkie pocket-size transmitter with the larger model it replaced. The new transmitter has a companion pocket receiver (shown center).

Motorola's introduction this year of the first fully-transistorized, VHF pocket-size transmitter led to new applications for two-way communications. Transistorization has resulted in a smaller, more reliable, and lower operating cost package, more convenient to carry on the person.

The transistorized Handie-Talkie pocket transmitter is a complete, self-contained unit including the battery supply, built-in microphone, and antenna. When used with its companion Handie-Talkie receiver, the combination provides a fully transistorized, personal communications system for the man on foot.

Radio Traffic Control Systems

Initial interest in radio as a communications medium to control vehicular traffic advanced to acceptance of the Motorola pre-timed radio traffic control system. During 1960, the initial installations in Washington, D.C., and at Detroit, Michigan, were expanded and additional prototype systems were implemented in New York City and Los Angeles. Contracts were received for both complete and exploratory installations from New Haven and Hartford, Connecticut. These early installations have had considerable impact on the planning of many traffic engineering departments considering either the Motorola pre-timed system, or a traffic actuated system using Motorola radio equipment.

Commercial sales of microwave systems were improved during 1960, attesting to both an increased market interest and the widening acceptance of the Motorola product. New transistorized radio frequency and multiplex channeling systems will be delivered in 1961 to fill orders placed in late 1960. Liberalized licensing policies adopted by the Federal Communications Commission in 1960 will provide expanded commercial potential although growth is expected to be gradual.

Motorola maintenance agreements are performed through independently-owned service stations.

These Motorola-supervised stations provide continual 24-hour service, and operate throughout the U.S.



Motorola closed circuit television experienced moderate growth during the year but is still in the early developmental stage. Among installations in 1960 were those for Chicago Board of Education, Proctor and Gamble, U.S. Navy, Martin Company, and the Shell Oil Company.

The precision test instruments program was augmented in 1960 with an extensively transistorized, battery-operated, portable DC multimeter.

The popular "in-plant" low-frequency pocket paging system was complemented with the introduction of a "city-wide" pocket receiver VHF radio paging system. This device permits individual signaling and voice message transmission to any one of 7,000 pocket receivers on a single two-way radio channel. Some typical installations in 1960 were for Sheraton Hotels, Eastman Kodak, Mt. Sinai Hospital, (New York), and Continental Can Co.

Motorola continues to sell its communications systems exclusively through its own sales engineering organization. This serves to assure comprehensive system design, proper installation and maintenance for the customer's greatest satisfaction.

Sales and service groups were re-districted at the end of the year to gain effectiveness in use of manpower and facilities in reaching market areas. Furthermore, major communications users—government agencies, transportation and utility organizations—now are serviced through an expanded "account executive" program.

With the completion of the new Administration Building and the transfer of consumer manufacturing to Franklin Park, the Communications Division will, in time, occupy the former headquarters building adjacent to its present location on Augusta Boulevard in Chicago.

The principal product lines of the Communications Division now consist of two-way mobile and portable radio systems; VHF complex systems designs; microwave and data processing communications systems; electronic signaling and control devices; closed circuit TV; digital communications; radio traffic light control; radio paging systems; power megaphones; remote alarm indicators; precision test and measurement equipment; "Selcal" selective calling equipment for airlines; communications, navigation, and automatic flight control equipment for the general aviation market.

AVIATION ELECTRONICS

Motorola's aviation products group has completed its first year as part of the Motorola organization. This segment of the Communications Division has responsibility for developing and manufacturing aviation products for the non-military aircraft market.

The aviation electronics group supplies three basic product lines for lightweight, single and twin engine aircraft: automatic direction finders; VHF navigation and communications systems; and automatic flight control systems. Current plans involve transistorization and miniaturization for increased reliability of products, plus the development of other allied systems within the scope of the general and business aircraft industry.

New Facility in Culver City

In the fall of 1960, the activity was moved into a new, 55,000 square foot building in Culver City, California, a suburb of Los Angeles.



Motorola aviation electronics products aid the pilot in various phases of flight, from take-off to landing. The Motorola VHF communications system is used to obtain ground clearance and maintain radio contact. The auto-pilot, coupled with the VHF navigation system, holds the craft on course, maintains a constant altitude, navigates the airways, and executes an instrument landing system approach to within 50 feet of the runway. The Motorola ADF (Automatic Direction Finder) acts as a homing device, a secondary navigation aid, and a low-frequency radio receiver.



Experimental radio designs for future car models are built and tested in the automotive model shop many months in advance of car production. This assures high quality and functional reliability upon delivery.

AUTOMOTIVE PRODUCTS DIVISION

Contract radio sales volume followed the trend of the auto business for the year and achieved a sales total second only to the automobile boom year of 1955.

Motorola's Automotive Products Division continued to supply car radios to Ford, Chrysler, and American Motors.

In addition to the general car line, auto radio requirements were met for the Ford "Thunderbird," "Falcon," and "Comet;" the Chrysler "Valiant" and "Lancer;" American Motors "Rambler" and "American;" and the Dodge "Dart."

Motorola also was awarded the contract for the 1961 Lincoln "Continental," based on a high-reliability program which warrants the receiver for two years or 24,000 miles—the same as the vehicle warranty.

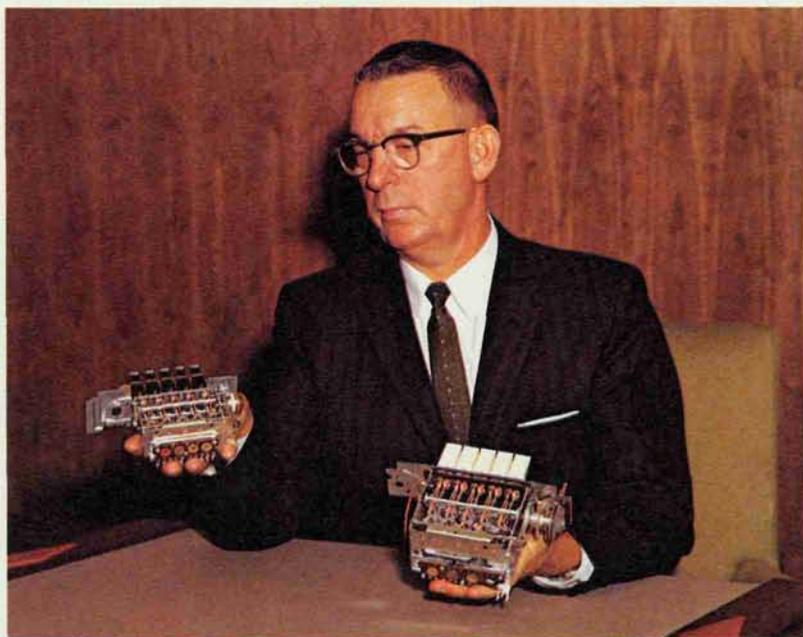
A push-button miniature tuner was developed for all Motorola car radios which replaces various previous types of tuners. This standardization changeover was made to keep pace with the smaller size requirements of transistorized car radios.

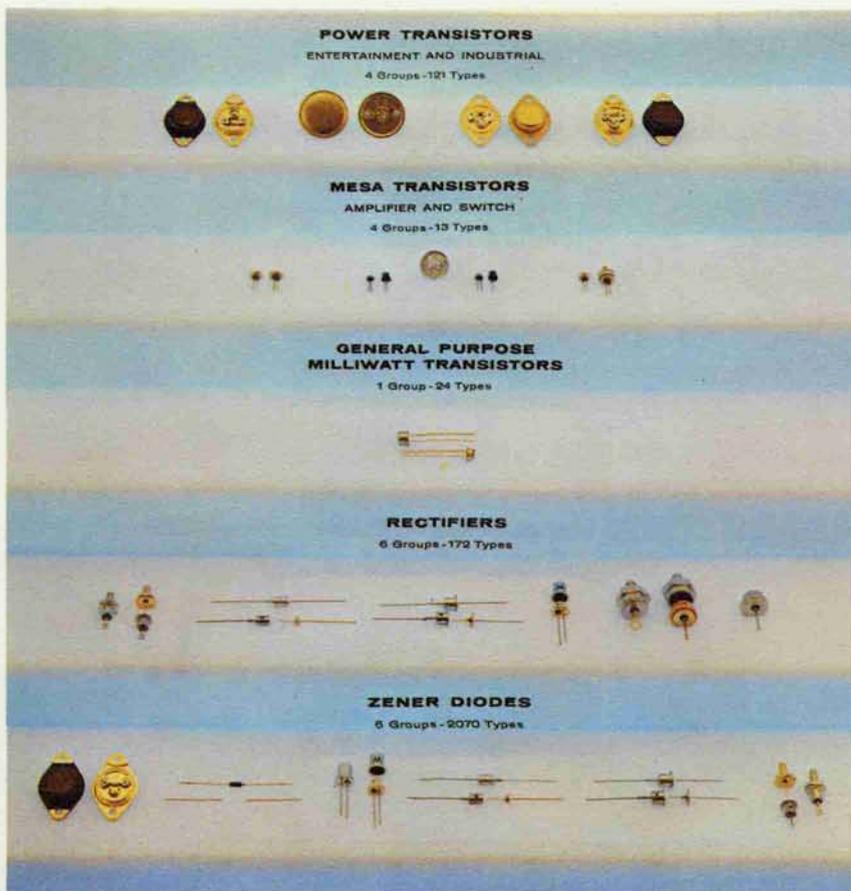
The miniature tuner provides the same quality as the larger tuners but results in a smaller package enabling greater latitude in styling, shipping, and instrument panel design. The push-button tuner can also be adapted into a manual tuner for broader market coverage.

Motorola tuners are manufactured in Arcade, New York, the final radio assembly being done in Quincy, Illinois. Plant expansion was completed in both these locations during the year—a 30,000 square foot addition in Arcade, and an 85,000 square foot addition in Quincy.

The Automotive Products Division completed its move to the new Administration Building in Franklin Park, Illinois, where all of its administration and engineering activities are now centered. The new quarters will provide greatly increased office and engineering space, including a 14-car garage for car radio testing and experimental development of various electronic automotive devices.

Motorola engineers developed a miniature tuner to meet smaller size requirements of transistorized car radios. Elmer H. Wavering, Automotive Products Division Executive Vice President, compares old and new.





Motorola's Semiconductor Products Division added breadth and depth to its product line in 1960, having successfully completed five major families of semiconductor devices. These families include 2,400 different types of transistors, rectifiers, and zener diodes.

SEMICONDUCTOR PRODUCTS DIVISION

Motorola's Semiconductor Products Division set records in sales and earnings for 1960. Sales were more than double those of the previous year. In addition, a highly qualified nationwide sales and servicing network was established. Through the efforts of this organization, the Division's sales to customers, other than Motorola divisions, have grown to more than 75% of total sales.

Extensive Line of Semiconductor Devices

Expansion to achieve a well-rounded line of semiconductor devices was the single most important task realized.

Two years ago, Motorola was a specialty producer of transistors. Only one product—a three ampere power transistor—was in production. A milliwatt driver transistor was in pilot production. All other devices were in development stages.

At this time, Motorola has both breadth and depth in its line of semiconductor products, having in production five major families of semiconductor devices, consisting of 2,400 different types.

New product announcements during the year 1960 evidenced the Division's progress in broadening its line of devices. Prominent among product innovations was the "low silhouette" TO-36 "Doorknob" industrial power transistor. This device, requiring 30% less headroom than similar devices, rounded out the most complete line of germanium power transistors in the



Construction scheduled for completion in April, 1961, will add 307,000 square feet to Motorola's Semiconductor Products Division in Phoenix. Last year's 129,000 square foot addition stands completed at the far right. Including the original semiconductor building (center) erected in 1956, overall facility area will total approximately 534,000 square feet.

industry, and is the highest-power transistor of this type presently available.

The general purpose audio line was expanded during the year to include high voltage units and "high beta at high current" devices in milliwatt dissipation range. Another significant offering in 1960 was the first silicon transistor produced by Motorola—an ultra-high-speed silicon mesa switch. The Division's rectifier line also was expanded to include a glass package series and a high-power industrial rectifier. The zener diode line was expanded to include quarter watt and half watt devices, and additional temperature compensated reference diodes. The automotive rectifier became the highest volume device in production, with deliveries reaching several million units.

An achievement which Motorola considers the most significant of the year in the semiconductor industry was the development and production by the Semiconductor Products Division of epitaxially grown germanium and silicon mesa transistors. With this engineering breakthrough, Motorola perfected an outstanding technique for the construction of transistors. During 1961, all Motorola premium mesa transistor production will be converted to this process which, in addition to producing superior transistors, will increase the yield and substantially reduce material costs.

Research activities in surface passiva-

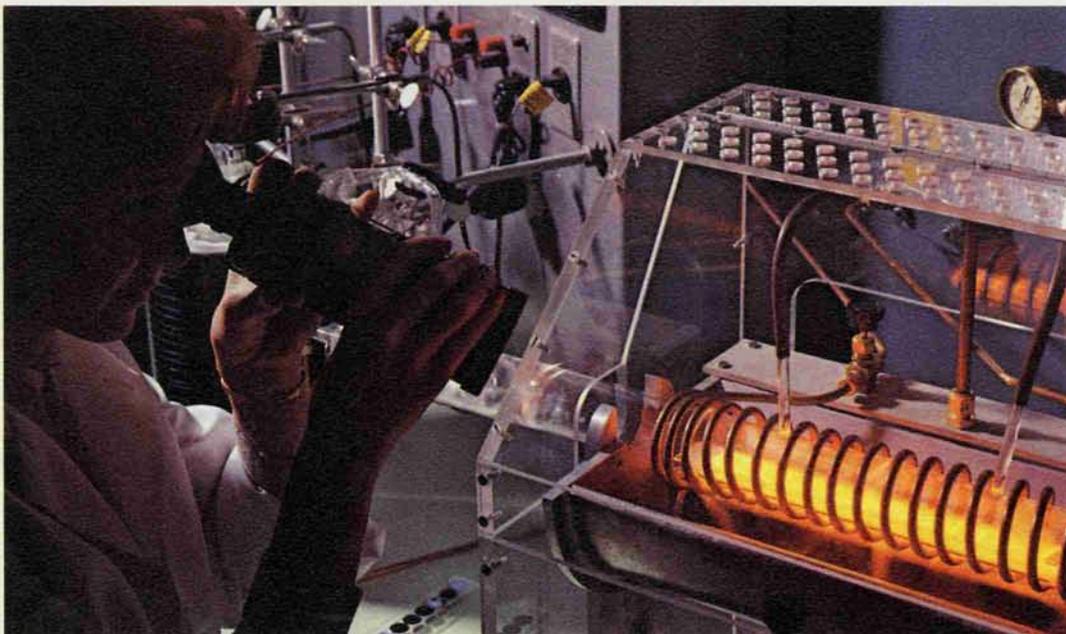
tion being carried on by the Division forecast additional major product advances for 1961. This new approach envisions semiconductors which are protected through surface passivation techniques against contaminants which degrade operation of the device. In fact, some surface passivated transistors improve with use, showing refined electrical characteristics when functioning in equipment.

Motorola's "Meg-A-Life" program of component reliability assurance was further expanded during 1960 with the inclusion of a series of 34 industrial power transistors. Under the "Meg-A-Life" program, each production lot is subjected to complete electrical, mechanical, environmental, and life tests identical to those required for military use, yet are available to industrial customers. All tests represent the most adverse conditions under which the device would be used, and provide evidence of its extreme reliability.

Further Expansion and Facilities

The increase in activities of the Semiconductor Products Division in recent years necessitated a 129,000 square foot enlargement of the original Phoenix facility. This was completed in the summer of 1959. To meet new requirements, further production expansion was undertaken early in 1960, and when completed during mid-1961 will bring the semiconductor facilities to a total of 534,000 square feet.

Dr. C. Lester Hogan (L), Vice President in charge of the Semiconductor Products Division, discusses yield of medium-power rectifiers with Product Manager John Welty.

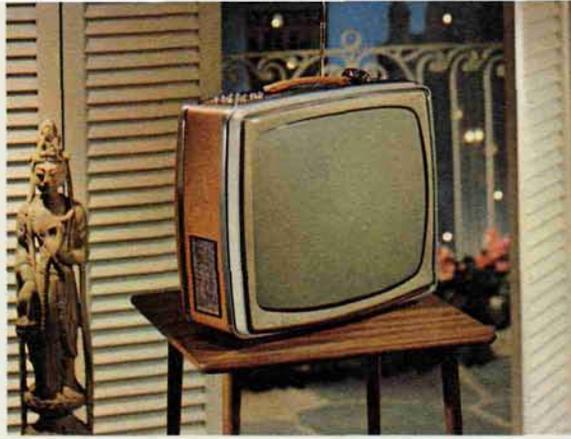


One of Motorola's top achievements of 1960 was the mass production of epitaxially grown germanium and silicon transistors. Here, a technician inspects wafers undergoing the epitaxial growth process.

CONSUMER PRODUCTS DIVISION

Motorola-Heritage "Cantonese" stereo high fidelity console.





Motorola introduced and marketed in 1960 the first large-screen, transistorized portable TV, the 19P1. It operates both indoors and outdoors on regular house current or on a self-contained energy cell.

Consumer products sales volume decreased modestly for 1960 compared with the prior year but was higher than any of the previous five years.

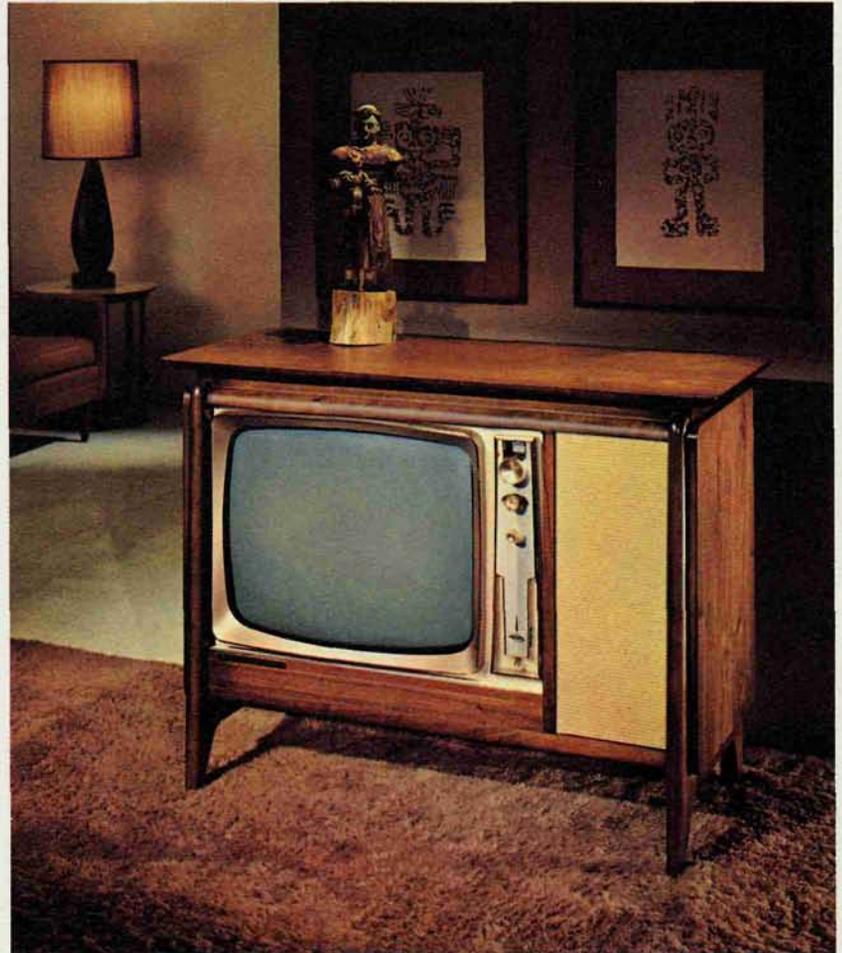
There were two major factors affecting Motorola's consumer products performance in 1960: first, the down-trend in the general economy that affected most consumer durable goods; and secondly, the highly competitive condition that prevailed in the television industry caused by some manufacturers pricing TV sets unreasonably low, ostensibly to make room for the newly-introduced 19 and 23-inch models. Motorola refrained from this unwarranted price-cutting. Instead, the company chose to reduce inventories in an orderly manner as an aid to distributors and dealers as well.

Upgrading the quality of merchandise was a prime objective for 1960 and continues this year. Facts revealed by Electronic Industry Association figures show that the average Motorola factory TV selling price is 11% higher than the industry as a whole. This indicates further progress in gaining consumer acceptance of the increasing quality and value built into the Motorola product, and the styling attraction of Motorola's higher priced models.

Another acknowledgment of Motorola's superior quality image is the consistently high percentage of industry sales Motorola has achieved in the higher price categories of stereophonic equipment . . . 32% in portable stereo over \$150; 20% in stereo consoles over \$300.

The association of Motorola with the quality styling of the Drexel Furniture Company and Heritage Furniture, Inc. continued to contribute to Motorola's leadership in appearance design. The Motorola-Heritage "Laureate" won top honors in the Mahogany Association competition, the second consecutive time, for

The "Projection", a contemporary-styled television console by Motorola-Drexel.



the finest designed instrument in the electronic entertainment category. The Motorola-Drexel "Triune" stereo and television units won the Certificate of Exceptional Merit in the same competition.

A major breakthrough in television engineering in 1960 was the first large-screen, transistorized portable TV. The set, having a 19-inch screen, can be played both outdoors and indoors on a self-contained energy cell or on regular house line voltage. The introduction of this receiver marks the practical beginning of a gradual

evolution in television from vacuum tubes to transistors.

"Harbinger" Series of Console TV's

Another "first" was the "Harbinger" series of 19-inch console TV's. High-style, slim-line cabinet designs especially suited for the smaller living room or family room, yet having 19-inch tube size were featured in the series. Five console models, each having identical chassis, were presented in three basic design categories—a contemporary lowboy, a swivel console, and a Danish upright.

A "Vibrasonic" reverberation system was added to those Motorola stereo instruments introduced last year having three separate amplifiers and speaker systems. The "Vibrasonic" system adapts the initial sound reproduction to closely simulate conditions found in a concert hall.

Motorola maintained its strong position in home radio during 1960 despite intensified competition of low-cost imported models. Portable radio unit volume was the highest in company history. Table and clock radio sales were off slightly from the all-time high of 1959.

The trend in portable radio continued toward small, pocket-size sets. Motorola's long experience with this type set gave the company a selling advantage which, in large measure, accounted for the record performance this year in portable radio.

Motorola-brand car radio enjoyed its second best sales year in 1960, only a few percentage points behind record 1959.

The FM-900, the first American made mass-produced FM car radio, was marketed in March and attained sales for the remaining nine months 60% higher than had been projected for a full year.

Warranty on all Motorola-brand car radios was extended to one full year on both parts and labor. This is, at present, the most encompassing warranty program in the industry. The company also introduced in 1960 the first all-transistor car radios priced at the same level as the standard car radio line.

Motorola's new Administration Building in Franklin Park, Illinois, is now headquarters for the Consumer Products Division. The building consolidates in a single location all the departments comprising the division in the Chicago area, with an obvious increase in efficiency. The building also serves as evidence of the company's confidence in the future.



Rigid quality-control standards must be met in each phase of production. Here, Frank O'Brien (L) Vice President, Purchasing, and Walter Scott, Vice President, Manufacturing, watch the focus and picture tube inspection.



Edward R. Taylor, Executive Vice President, Consumer Products Division, demonstrates to distributors the new Motorola transistor-powered FM-900 car radio at a meeting introducing new product lines.

An extensive selection of home radios was available to Motorola customers in 1960. The line featured a variety of AM/FM sets, clock-radio, table models, regular portables, and the popular miniature receivers.





Thomas P. Collier, in charge of international operations, visits Motorola's London car radio licensee. With him are R. M. Papelian (L), Director-Founder of World Radio, Ltd., and A. A. Fearn (R), Engineering Director.



MOTOROLA INTERNATIONAL OPERATIONS

Political unrest and the consequent economic chaos in certain countries of Latin America, Africa, and the Far East, had an adverse effect on direct exports of both consumer and communications products. These conditions, however, were not entirely unanticipated. Major efforts were concentrated by Motorola's International group in opening new markets to offset the loss of sales in troubled areas.

As a result, the total number of Motorola distributors in the overseas markets increased from 80 to 119, with export sales up 23% over the previous year.

In 1960, two wholly-owned and separate international subsidiaries were formed. Motorola International, S. A. was organized in Switzerland, with its base office in Zurich. The second—Motorola Overseas Corporation—is a domestic company with responsibility for handling direct export sales of all products manufactured by Motorola, Inc.

Arrangements with other companies for manufacturing have been completed in Mexico and Canada, and negotiations are underway in other countries. Income from licensees in foreign countries showed an increase during the year of more than 20% over 1959.

THE DAHLBERG COMPANY

The Dahlberg Company, a Minneapolis, Minnesota, subsidiary manufacturing hearing aids and hospital communications systems, completed its first year of association with Motorola during 1960.

Progress during the year in the hospital communications section was marked by cooperation with the Motorola Communications organization. In certain areas, sales and marketing activities were combined and all installation and maintenance responsibilities for hospital communications equipment were assigned as functions of the Motorola service organization. In addition, the product line identity, "Motorola/Dahlberg Hospital Communications Systems", was established and nationally advertised.

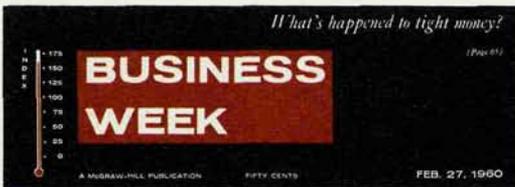
A newly designed, complete hospital communications system, the first new product line developed as a joint effort by the Motorola/Dahlberg organization, was introduced in September. The system features a custom-designed "Televiewer", a transistorized audio-visual nurse call unit, and a VHF radio paging system. The equipment provides swift communications for both the patient and the hospital staff, as well as the convenience of bedside radio and TV control.

Product highlight of 1960 for the hearing aid section was the "Clarifier", an eye-glass hearing aid which contains all the circuitry components forward of the ear. The "Clarifier" has established a new design standard for the hearing aid industry.

Extension of the product line to include audiometers is underway to further strengthen the company's position in the medical and hospital markets.

Complete communications for patient and hospital staff.





Motorola's diversified participation in today's electronics art was the subject of a BUSINESS WEEK review during 1960. The cover of the issue pictured Daniel E. Noble, Executive Vice President in charge of Motorola's Military, Semiconductor, and Communications divisions in front of the Phoenix Military headquarters.



MILITARY ELECTRONICS DIVISION

Contract backlog for the Military Electronics Division increased considerably during the last half of 1960 to a point where it is now higher than it has been for more than three years. This backlog will increase research and manufacturing activities for the next few years.

Increased emphasis has been placed by this Division on aerospace electronics systems, an area in which Motorola is receiving growing recognition for its competence.

Military electronics activity is divided among six facilities—two at the Chicago Center, two at Western Center in Scottsdale, Arizona, and two at the Systems Research Lab in Riverside, California.

Major development programs conducted in the Chicago Center during 1960 included a mobile, VHF, single-sideband radio "Communication Central" system for the Army; a transistorized single-sideband high frequency radio system for the Navy; a high-speed solid state electronic teleprinter; and a transistorized radar relay system for the Air Force. Additional production awards were received for sonobuoys, and an advanced electronic system for the Navy A3J aircraft.

At the Western Center, management's confidence in the B-70 "Valkyrie" Bomber program was rewarded when the Air Force and North American Aviation reinstated Motorola as systems manager for the "Mission and Traffic Control" sub-system. The award of this important program per-

mits the Division to expand further its weapons system management capabilities.

Also noteworthy was an award to design and produce ground checkout equipment for the "Skybolt" missile. This program, together with a study program concerning ground support equipment for the Air Force done in cooperation with a major air frame manufacturer, are significant in the Division's efforts to obtain a larger share of this important defense business.

Significant follow-on contracts were received during 1960 for the airborne and ground support electronics of the Strategic Air Command's B-58 bomber, and an advanced guidance head for the Navy's air-to-air "Sidewinder" missile.

Increasing emphasis on the aerospace market is reflected in the many new and continuing assignments related to this nation's key missile and space projects. Programs in which the Division participates include the Polaris, Quail, Bomarc, Pershing, Scout, and Minuteman missile programs; the Saturn rocket program; Subroc; Explorer; Project Mercury; Pioneer V; Juno II; Vega/Agenda/Centaur; Echo; Tiros; Thor/Able/Star; and Vanguard.

The Systems Research Laboratory in Riverside has completed and delivered for evaluation to the Federal Aviation Agency, a device called a Pilot Warning Indicator. The purpose of the PWI is to provide a pilot with range and bearing of any aircraft in his vicinity.

A major portion of the engineering and development effort at Riverside is devoted to electronic warfare. The laboratory also has engineered and is installing a microwave data transfer system in a flight test range for use in the Air Force X-15 and Dyna Soar manned-space programs.



John F. Byrne, Manager of the Motorola Riverside Systems Research Laboratory, with a newly developed Pilot Warning Indicator. The device alerts the pilot in flight to aircraft in his vicinity.



Irving S. Koss, Chicago Center Manager, checks the new AN/MRC-66 Communication Central system developed for the U.S. Army Signal Corps.

William S. Wheeler (R), Vice President, Military Electronics Division, discusses Motorola's function as "Mission and Traffic Control" system manager of the B-70 trisonic global bomber. With him is Joseph A. Chambers, Vice President of the division's Western Center.



SOLID STATE

ELECTRONICS DEPARTMENT

Expansion of materials, devices, and integrated circuitry capabilities at Motorola's Solid State Electronics Department in Phoenix is proceeding under the direction of some of the country's finest creative scientists and engineers.

This initial solid state work has been directed toward military requirements where the urgent need for greatly increased reliability has stimulated government funding. The work already has resulted in applications in equipment used in deep space satellite tracking, radio astronomy, and special radars.

Motorola's integrated solid state circuitry research is yielding an entirely new family of "two-dimensional" modules—minute, lightweight, low in power consumption—widely recognized in the art as the most promising sources of reliability improvement.

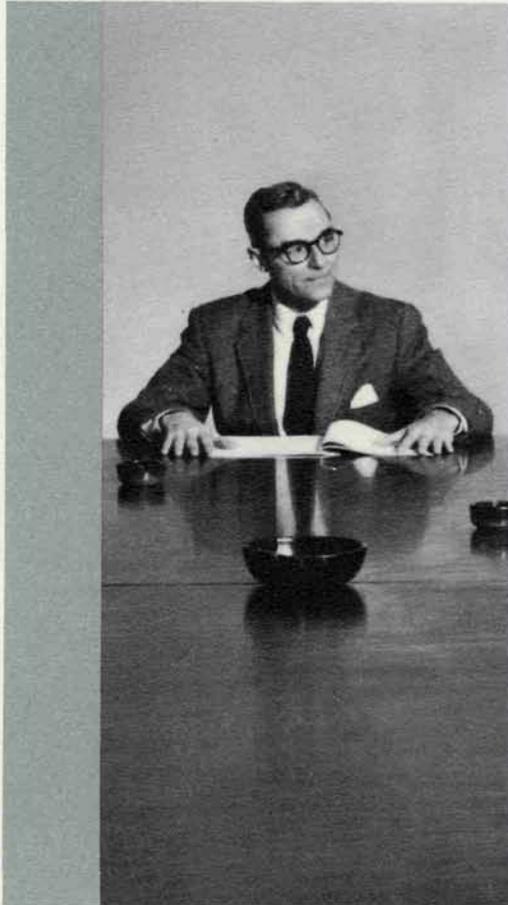
The Solid State Department is producing microwave ferrite materials, and devices such as isolators, circulators, parametric and tunnel diode amplifiers, as well as specialized multi-aperture ferrite logic cores for advanced designs of voltage digitizers, binary counters, and shift registers.

The Solid State Controls Department was established during the year for the development of a full line of controls for public utilities and the petro-chemical industry. The department already has some of these systems in operation, and others under development, covering a wide range of applications including data link remote control, telemetering, process control, and telememory systems. The use of solid state materials and highly sophisticated techniques is providing this new equipment with a versatility and reliability not possible in past designs.



CONCERNING THE FINANCIAL REPORT

Edwin P. Vanderwicken, Vice President, Finance



A principal objective of the Company is to increase the return on assets employed in the business. The equation

$$\frac{\text{Profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets at Work}} = \frac{\text{Return on}}{\text{Assets at Work}}$$

is applied in each of our divisions, and each has a goal it seeks to achieve. In addition to added sales volume, we seek to control the cost-price relationship and to improve the turnover of our assets. Our basic objective is thus to increase the productivity of dollars in the form of expense and in the form of assets used in the business. Progress to this end was made in 1960.

Because the sales increase of \$74 million in 1959 resulted in added requirements for working capital, and also because of continued high plant and equipment requirements in 1960, it was deemed desirable in March of 1960 to effect a \$10 million, five-year term loan with our principal banks. This would have enabled the Company to be free of current bank debt at the year-end were it not for the effects of the recession on our balance sheet.

In July, 1960, the Company made a 100% stock distribution, and the dividend on the newly outstanding shares has been at the rate of \$1.00 per year, representing a one-third increase over the previous rate. A conservative policy was continued in the light of the capital needs referred to.

At year-end, working capital totaled \$66,161,511 compared with \$57,061,939 the previous year, and our current ratio was 2.70 to 1 compared with 2.18 to 1 the previous year.

On December 31, 1960, our stockholders totaled 7,017.

MOTOROLA INC.
AND CONSOLIDATED SUBSIDIARIES

Years ended
 December 31,
 1960 and 1959

Statement of Consolidated Earnings and Retained Earnings

	1960	1959
Sales and other revenues	\$299,065,992	\$291,543,290
Net earnings of Motorola Finance Corporation—subsidiary not consolidated	353,449	333,668
<i>Total income</i>	<u>299,419,441</u>	<u>291,876,958</u>
Manufacturing and other costs of sales	218,874,056	215,241,106
Selling, service, and administrative expenses	43,492,510	38,924,768
Depreciation of plant and equipment	4,475,463	3,696,916
Contribution to employees' profit sharing fund	4,610,393	5,147,133
Interest expense	1,790,206	1,460,798
<i>Total costs and other expenses</i>	<u>273,242,628</u>	<u>264,470,721</u>
Income before federal income taxes	26,176,813	27,406,237
Federal income taxes	13,543,000	13,235,000
Earnings (per share outstanding at end of year: 1960, \$3.14; 1959, \$3.59, adjusted for share distribution)	12,633,813	14,171,237
Retained earnings at beginning of year	68,429,207	57,175,667
<i>Total</i>	<u>81,063,020</u>	<u>71,346,904</u>
Deduct:		
Cash dividends declared (per share: 1960, \$.9375; 1959, \$.75, adjusted for share distribution)	3,777,163	2,917,697
Share-for-share distribution—par value of 2,014,326 shares transferred to capital stock account	6,042,978	—
<i>Total deductions</i>	<u>9,820,141</u>	<u>2,917,697</u>
Retained earnings at end of year (note 2)	<u>\$ 71,242,879</u>	<u>\$ 68,429,207</u>

See accompanying notes to consolidated financial statements.

ACCOUNTANTS' REPORT

The Board of Directors and
 Shareholders of Motorola, Inc.:

We have examined the balance sheet of Motorola, Inc. and consolidated subsidiaries as of December 31, 1960 and the related statement of consolidated earnings and retained earnings for the year then ended, and the balance sheet of Motorola Finance Corporation as of December 31, 1960. 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. It was not practicable to confirm accounts receivable from United States Government de-

partments or agencies by communication with them but we satisfied ourselves as to such accounts by means of other auditing procedures.

In our opinion, the accompanying financial statements present fairly (a) the financial position of Motorola, Inc. and consolidated subsidiaries at December 31, 1960 and the results of their operations for the year then ended and (b) the financial position of Motorola Finance Corporation at December 31, 1960, all in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Chicago, Illinois
 February 23, 1961

PEAT, MARWICK, MITCHELL & Co.

MOTOROLA INC.

AND CONSOLIDATED SUBSIDIARIES

Balance Sheets as of December 31, 1960 and 1959

ASSETS	1960	1959
<i>Current Assets:</i>		
Cash.....	\$ 8,678,462	\$ 9,764,963
Accounts and notes receivable:		
United States Government.....	8,085,819	8,211,446
Other trade receivables (less allowance for doubtful accounts: 1960, \$1,817,000; 1959, \$1,280,000)....	42,439,833	42,177,791
Other.....	925,006	811,391
Costs recoverable under United States Government contracts, less progress billings.....	5,921,763	6,987,467
Inventories, at the lower of average cost or market....	37,746,611	37,073,833
Prepaid expenses.....	1,322,741	586,072
	<hr/>	<hr/>
<i>Total current assets</i>	105,120,235	105,612,963
<i>Investment in Motorola Finance Corporation, subsidiary not consolidated (see accompanying balance sheet)</i>	7,628,508	6,275,059
<i>Other assets</i>	3,949,880	4,268,196
<i>Plant and equipment—less depreciation (note 1)</i>	44,594,599	33,436,676
<i>Patents, trademarks, and other items—less amortization</i>	1,642,169	170,666
	<hr/>	<hr/>
	<u>\$162,935,391</u>	<u>\$149,763,560</u>
	<hr/>	<hr/>
See accompanying notes to consolidated financial statements.		

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(1) The companies' investment in plant and equipment at December 31, 1960 and 1959 was as follows:

	1960	1959
Land—at cost.....	\$ 3,416,284	\$ 2,902,444
Buildings—at cost, less depreciation (1960, \$6,906,679; 1959, \$5,126,978).....	26,459,507	18,947,221
Machinery and equipment—at cost, less depreciation (1960, \$10,881,098; 1959, \$8,743,004).....	12,856,592	10,117,611
Dies, tools, and leasehold improvements—at cost, less amortization.....	1,862,216	1,469,400
	<u>\$44,594,599</u>	<u>\$33,436,676</u>

(2) Long-term debt at December 31, 1960 and 1959 consisted of the following:

	1960	1959
Notes payable:		
3¼%, due \$1,000,000 annually to 1965, \$1,500,000 in 1966, and \$500,000 annually thereafter to 1972.....	\$ 9,500,000	\$10,500,000
4½%, due \$500,000 annually 1963 to 1976.....	7,000,000	7,000,000
4¾%, due \$2,000,000 in 1963 and 1964 and \$6,000,000 in 1965..	10,000,000	—
Real estate mortgages.....	1,369,833	1,435,908
	<hr/>	<hr/>
	27,869,833	18,935,908
Less current maturities, included in current liabilities.....	1,060,016	1,061,758
	<u>\$26,809,817</u>	<u>\$17,874,150</u>

LIABILITIES	1960	1959
<i>Current liabilities:</i>		
Notes payable to banks.....	\$ 6,350,000	\$ 12,150,000
Current maturities of long-term debt.....	1,060,016	1,061,758
Accounts payable—trade.....	9,547,165	9,530,791
Accrued taxes.....	8,177,549	11,566,558
Contribution to employees' profit sharing fund.....	4,610,393	5,147,133
Product and service warranties.....	915,328	590,000
Other.....	8,298,273	8,504,784
<i>Total current liabilities</i>	<u>38,958,724</u>	<u>48,551,024</u>
<i>Long-term debt (note 2)</i>	<u>26,809,817</u>	<u>17,874,150</u>
<i>Shareholders' equity:</i>		
Capital stock, \$3.00 par value (note 3):		
Authorized: 1960, 6,000,000 shares; 1959, 3,000,000 shares.		
Outstanding: 1960, 4,028,652 shares (net of 1,610 treasury shares); 1959, 1,975,131 shares.....	12,085,956	5,925,393
Additional paid-in capital (note 5).....	13,838,015	8,983,786
Retained earnings (note 2).....	71,242,879	68,429,207
<i>Total shareholders' equity</i>	<u>97,166,850</u>	<u>83,338,386</u>
	<u>\$162,935,391</u>	<u>\$149,763,560</u>

At December 31, 1960 approximately \$18,000,000 of retained earnings was free from dividend restrictions contained in the long-term notes payable agreements.

(3) Options for the purchase of 45,800 shares of capital stock have been granted to employees under the company's employee share option plan adopted during 1960; options for 2,200 shares were terminated, leaving options for 43,600 shares outstanding. These options become exercisable in 1962, at a price of \$73.25 per share (95% of market value at date of grant of option) and expire in 1970. An additional 156,400 shares are reserved for options which may be granted by the Board of Directors until May 2, 1965.

(4) In connection with the financing of sales of products to con-

sumers, Motorola, Inc. and consolidated subsidiaries are obligated under repurchase and other agreements with Motorola Finance Corporation and other financing agencies. It is believed that these obligations will have no material effect on the business of the companies.

(5) During 1960 the company purchased certain assets pertaining to aviation radio, navigation, and flight control products of Lear, Incorporated, under an agreement entered into in November, 1959, and issued 39,195 shares (prior to share-for-share distribution) in payment therefor. The shares were issued at an amount representing market value at date of the agreement, and the excess of market value over par value (\$4,854,229) was credited to additional paid-in capital.

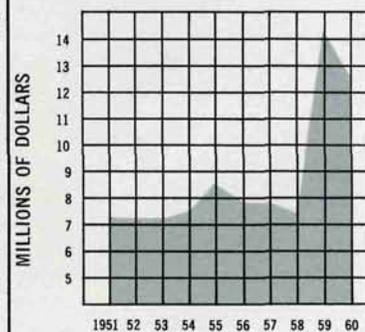
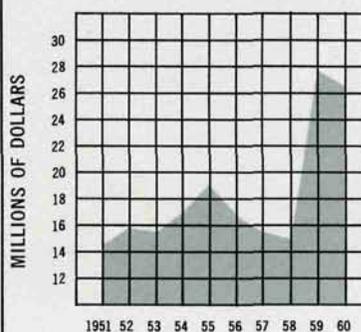
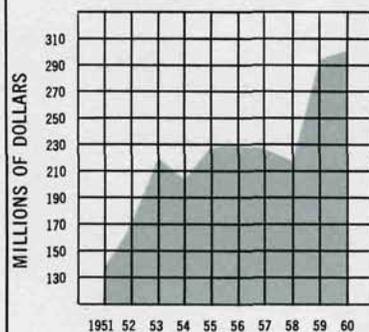
MOTOROLA FINANCE CORPORATION

Balance Sheets as of December 31, 1960 and 1959

ASSETS	1960	1959
Cash	\$ 4,724,258	\$ 4,160,881
Receivables:		
Lease and conditional sales contracts (including install- ments maturing beyond one year: 1960, \$19,690,000; 1959, \$12,915,000)	29,837,244	20,210,058
Notes receivable, distributors—maturing within one year	6,627,562	7,842,626
Total	36,464,806	28,052,684
Less unearned income on lease and conditional sales contracts	5,884,863	3,794,675
Net	30,579,943	24,258,009
Other assets	657,883	359,727
	<u>35,962,084</u>	<u>28,778,617</u>
LIABILITIES		
Current liabilities:		
Notes payable to banks	28,000,000	22,000,000
Accrued taxes	222,370	235,296
Other	111,206	268,262
Total current liabilities	28,333,576	22,503,558
Subordinated notes payable to Motorola, Inc.	4,500,000	3,500,000
Shareholder's equity:		
Capital stock, \$1.00 par value. Authorized and outstand- ing, 20,000 shares	20,000	20,000
Additional paid-in capital	1,980,000	1,980,000
Retained earnings (earnings since inception, March 7, 1956)	1,128,508	775,059
Total shareholder's equity	3,128,508	2,775,059
Total subordinated notes and share- holder's equity	7,628,508	6,275,059
	<u>\$35,962,084</u>	<u>\$28,778,617</u>
<small>Note—All receivables of Motorola Finance Corporation are covered by the repurchase and other agreements mentioned in note 4 of notes to consolidated financial statements.</small>		

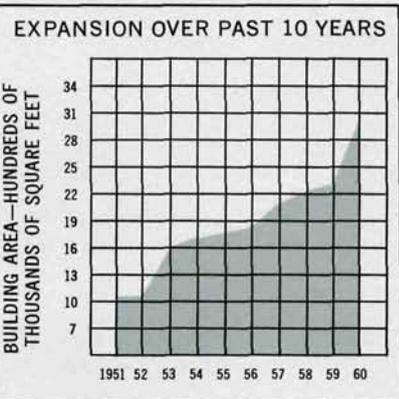
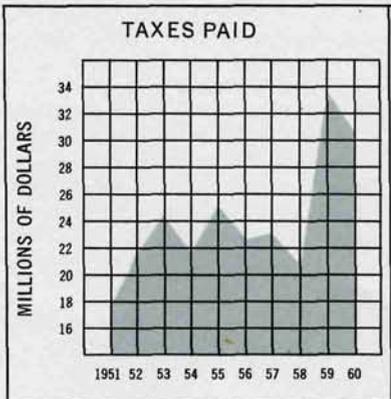
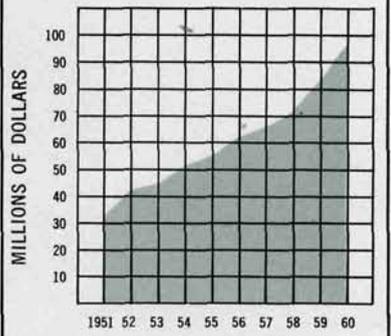
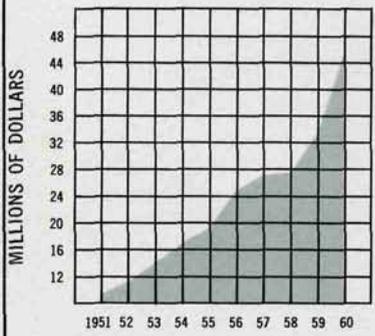
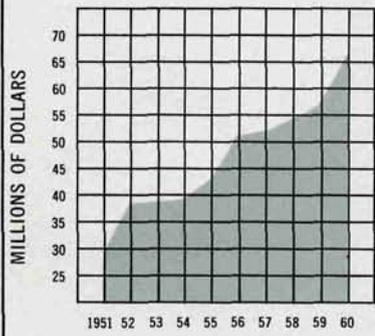
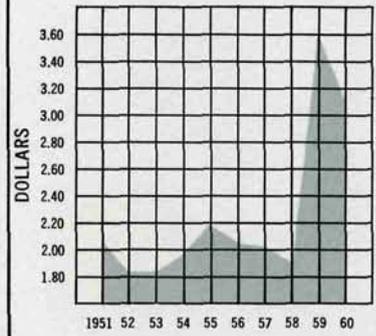
TEN YEAR FINANCIAL SUMMARY

YEAR	SALES AND OTHER REVENUES	INCOME BEFORE INCOME TAXES	EARNINGS
1951	\$135,844,529	\$14,020,739	\$ 7,240,452
1952	169,191,047	15,576,165	7,012,700
1953	219,089,238	15,512,489	7,076,335
1954	206,821,801	16,523,889	7,572,024
1955	228,428,063	18,740,426	8,490,539
1956	228,982,853	16,887,834	7,966,817
1957	227,687,391	15,597,031	7,824,431
1958	217,863,339	14,931,213	7,356,213
1959	291,543,290	27,406,237	14,171,237
1960	299,065,992	26,176,813	12,633,813



*Earnings per share are based on the number of shares outstanding at the end of the respective years, adjusted for subsequent share distributions.

EARNINGS PER SHARE*	WORKING CAPITAL	NET INVESTMENT IN PLANT AND EQUIPMENT	SHAREHOLDERS' EQUITY
\$2.06	\$29,851,003	\$ 9,005,880	\$31,920,882
1.81	38,007,247	11,429,532	41,755,780
1.83	38,222,001	14,301,004	45,929,419
1.96	38,308,612	16,579,531	50,598,747
2.19	42,892,165	19,179,992	56,186,590
2.06	50,882,200	25,388,866	61,305,080
2.02	52,215,832	27,167,597	66,172,446
1.90	54,644,439	27,615,287	71,533,020
3.59	57,061,939	33,436,676	83,338,386
3.14	66,161,511	44,594,599	97,166,850



DIRECTORS AND OFFICERS OF MOTOROLA

ROBERT W. GALVIN Director, President

DANIEL E. NOBLE Director, Executive Vice President, Communications, Semiconductor, and Military Electronics Divisions

EDWARD R. TAYLOR Director, Executive Vice President, Consumer Products Division

ELMER H. WAVERING Director, Executive Vice President, Automotive Products Division

MATTHEW J. HICKEY, Jr. Director

FRANK J. O'BRIEN Director, Vice President, Purchasing

ARTHUR L. REESE Director, Vice President, Communications Division

WALTER B. SCOTT Director, Vice President, Consumer and Automotive Production

EDWIN P. VANDERWICKEN Director, Vice President for Finance, Treasurer, and Secretary

ALEX ARNOLD Vice President, Controller

ALLEN H. CENTER Vice President, Public Relations

JOSEPH A. CHAMBERS Vice President, Western Center, Military Electronics Division

JOHN I. DAVIS Vice President, Consumer Products Engineering

SYLVESTER R. HERKES Vice President, Consumer Products Marketing

C. LESTER HOGAN Vice President, Semiconductor Products Division

WILLIAM S. WHEELER Vice President, Military Electronics Division



MOTOROLA INC.

9401 West Grand Avenue, Franklin Park, Illinois

MAJOR FACILITIES LOCATED IN:

Arcade, New York • Chicago, Illinois • Franklin Park, Illinois • Quincy, Illinois

Minneapolis, Minnesota • Phoenix, Arizona • Culver City, California • Riverside, California

