

MOTOROLA
ANNUAL REPORT
1966

A shareholder visits . . .



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The shareholder with whom you'll become acquainted photographically in this report is Richard L. Joutras of Wilmette, Illinois. His original interest in becoming a Motorola shareholder was prompted by his observations of the company as a supplier. While serving as the central subject of this report, he gave a great deal of his time and submitted to a variety of inconveniences. We acknowledge our gratitude to him on behalf of all shareholders.



**TO OUR SHAREHOLDERS
AND FRIENDS:**

In 1966 the corporation experienced a substantial increase of 32% in sales and a nominal advance of 3.5% in earnings.

Sales and earnings were at record levels. Sales totaled \$682,374,719 compared with \$516,973,065 in 1965. Earnings were \$32,952,843 or \$5.40 per share, compared to \$31,838,678 or \$5.23 per share in 1965.

The sales growth was slightly less than we had anticipated. The ratio of earnings to sales was disappointing.

It was a year of unusual circumstances.

The report on the following pages reviews the events of the year with particular attention to those which exerted exceptional influence on the affairs of the company. The report is designed to present the facts in pictures and words as seen and heard by a shareholder visiting us and making inquiry in depth.

Tape recorded interviews were edited to capsulize the pertinent facts. Edited versions were reviewed by the participants, including the shareholder, to assure accuracy.

We hope you find the novel manner in which this report has been prepared to be of interest.

For the Board of Directors,



CHAIRMAN OF THE BOARD



PRESIDENT

MARCH 21, 1967

1966 CHALLENGES AND PROGRESS

*Chairman Galvin and
President Wavering*

Motorola enjoyed remarkable growth in 1966 by responding to extraordinary market opportunities.

The fine acceptance of Motorola's products at the market place was evidenced in the record sales established by all divisions, with the exception of automotive. However, their leadership position as a supplier of stereo tape players nearly offset the reduced volume occasioned by a major customer making more of its own radios.

The semiconductor division, while maintaining its position as the country's second largest supplier of semiconductor products with the broadest product line in the industry, attained the number two position in the shipment of integrated circuits during the fourth quarter.

The communications division experienced its greatest growth in history and continued its leadership position in the mobile and portable two-way radio communications field.

Color television played the major role in the consumer division's record sales, but there was also a substantial volume increase in black and white receivers.

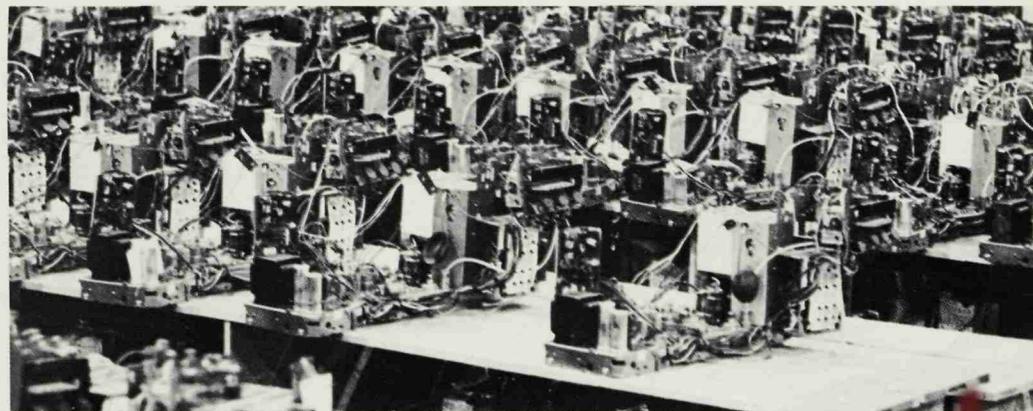
Increased shipments of military and space equipment resulted in a new sales high for the government electronics division.

Emphasis on marketing resulted in continued growth for the control systems division.

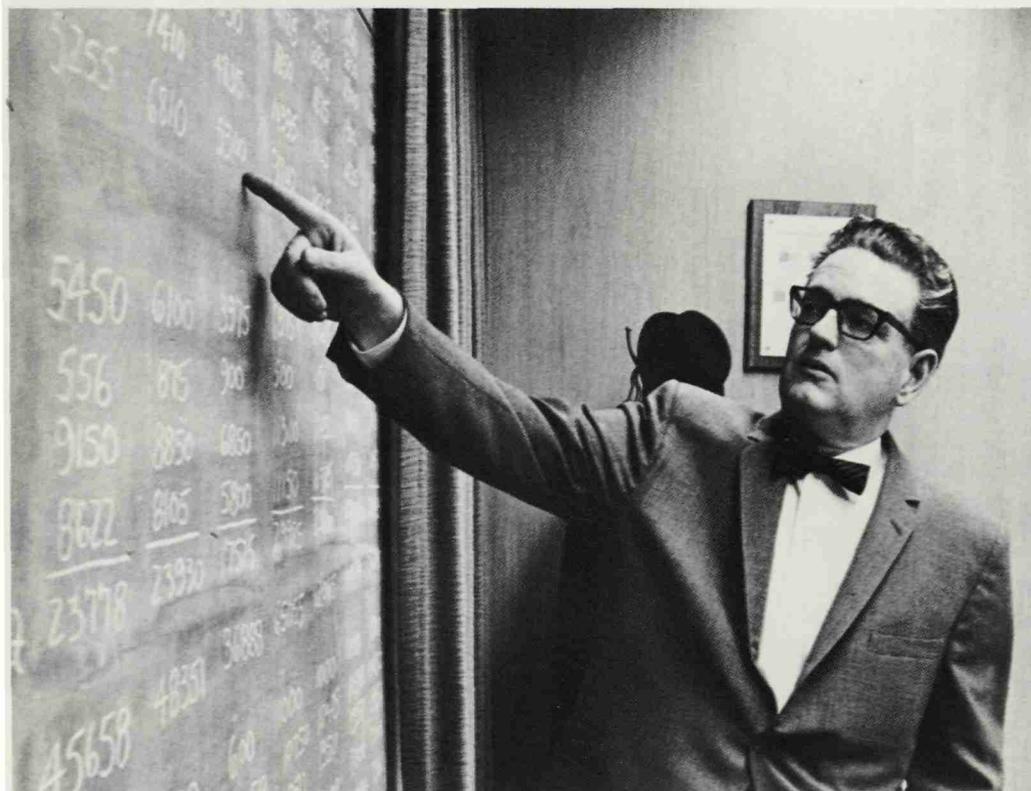
In reaching out to meet these exceptional market demands, we overestimated our ability to solve the materials and labor problems. In-



PRESIDENT . . . SHAREHOLDER . . . CHAIRMAN



WAITING FOR NEEDED COMPONENT . . .



PRODUCTION VP SCOTT ... REVISED SCHEDULES



CHANGES IN PLANT OPERATIONS ...



HUMAN RELATIONS VP PIPER ... THOUSANDS MORE PEOPLE

creases in the cost of materials and, more importantly, the shortages of materials had a significant impact. The shortages necessitated replanning of operations and revised production schedules when almost completed products had to be set aside to wait for a final component.

There were labor price increases, but of even more significance were the inefficiencies resulting from the general labor shortage, with the attendant problems of turnover, hiring, training, vacation leaves, and absenteeism. We increased employment during the year by many thousands.

We rearranged, acquired and built many facilities. These had to be made ready, set up and equipped. Our 1966 capital expenditures for enlarged and new facilities exceeded \$57,000,000.

This rapid expansion caused our operating costs to increase substantially, with a resulting tapering off of profits. Mid-third quarter it became apparent that corrective actions were in order. Those we instituted fall under "moderation" and "control," and the objective is to bring our profit margins back into proper proportions.

A surprise factor hit the industry in the latter part of the year. It turned out that certain markets were not as large as anticipated. The semiconductor market slacked off in the latter part of the year. The use of semiconductors continued its substantial growth but sales were affected by an inventory adjustment. Color television sales were much better than in 1965, but not as good as expected.

We closely analyzed the availability

of materials and labor, and the modified market potentials in color television and semiconductors, and adjusted our plans accordingly.

In total 1966 was a year of considerable progress and a year of splendid preparation. Increased efficiencies in the plants we have brought on stream will contribute to future growth.

Our color picture tube plant, here at Franklin Park, started production in February and by year-end was producing at a good volume and at a profit.

The Elgin, Illinois, plant started production in February and by the third quarter was producing complete color television receivers. A major facility expansion at Quincy, Illinois, now accommodates production of all black and white television receivers.

A plant in Midland, Ontario, was completed in May, and production of car radios reached substantial volume by year-end.

The aerospace center in Scottsdale, Arizona, was expanded to handle programs formerly housed in leased facilities.

A large integrated circuit research and production facility in Mesa, Arizona, is in process of completion.

Construction of the communications division's multi-million dollar plant in Schaumburg, Illinois, nears completion.

The financial condition of the company is firm and strong. The internal affairs of the company, the people structure, is eminently strong—attitudes are superb. Our people have been most responsive to the correc-



CHAIRMAN GALVIN



NEW PRODUCTION LINES . . .



COSTLY NEW EQUIPMENT . . .



PRESIDENT WAVERING . . .

tive actions in which we are engaged. As a visiting shareholder, you're going to hear this story in a variety of forms in the course of touring our facilities and talking with our management.

From reports I've read, the consumer products demand in this country in 1968 is going to be enormous. Will you have most of your 1966 problems solved by then?

We'll have them solved in 1967. A plus factor here which may not have been apparent is that for the first

time in many years we'll have ample and adequate facilities.

How do you look at 1967 for the electronics industry?

The industry is going to do more business in all its segments—consumer, industrial and government. As a consequence, we see Motorola doing more business in 1967.

Do you look forward to any European expansion programs?

We have acquired land at Toulouse, France, to erect our semiconductor operation. We will break ground there soon, and by the end of the year or the first part of next year, the plant should be completed.

Will you manufacture only semiconductors over there?

That plant will be exclusively for semiconductors. We do anticipate that we will have a market expansion in some of the other areas of our international business — notably automotive.

Do you have any other expansion programs planned?

None that we haven't announced. This will be a year of finishing up the expansions which we've put in the works. We're going to start our Executive Institute this year. That will not require a building expansion—we'll lease some space for that. In future years we'll have to build a new headquarters building because the consumer and automotive divisions will take over here.

Will you retain most of the earnings to pay off the expansion?

Yes, we think so. We'll keep about the same dividend policy and use the money to pay our bills.



PLANTS UNDER CONSTRUCTION . . .



PRODUCTION ON STREAM . . .

FINANCIAL PLANS AND CONTROLS

Executive Vice President
Vanderwicken

Each of Motorola's six operating divisions has its own management system and controls which are monitored and unified by five activities at the corporate level. We have a constant and accurate inflow of information related to the week or month at hand, and estimated performance out to 1971, depending on where we want to focus our attention.

Long-term objectives and short-term goals, based on articulated strengths and weaknesses, are formulated each year by our division managers covering return on investment, organization, technology, management capability and succession, policies, facilities and people. After discussion of these with corporate staff executives, each manager is free to conduct the division's affairs knowing he has corporate support.

Five-year plans are prepared each year by each division forecasting sales, costs and profits by product category, and the resulting employment, facility and financing requirements. These plans are reviewed by the board of directors to determine whether they correspond with the over-all objectives of the board.

Budgets are prepared each year by each division to outline in detail the annual plan of operations. These require approval by corporate executives. Then each month the corporate financial executives review with each division its budget performance, progress on goals and objectives, turnover of assets, and other details.

Comprehensive monthly financial reports are submitted to division managers and directors summarizing



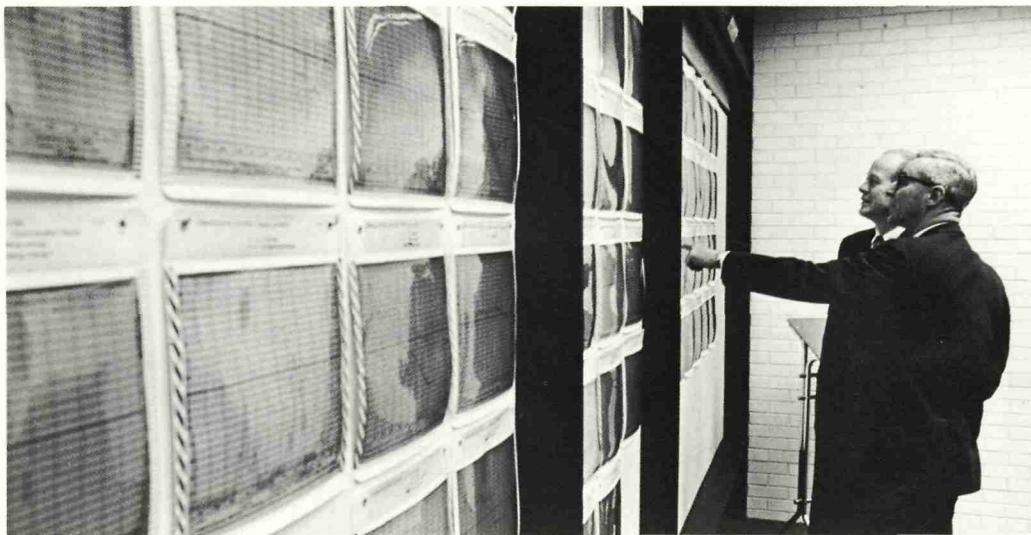
CHIEF FINANCIAL OFFICER VANDERWICKEN ...



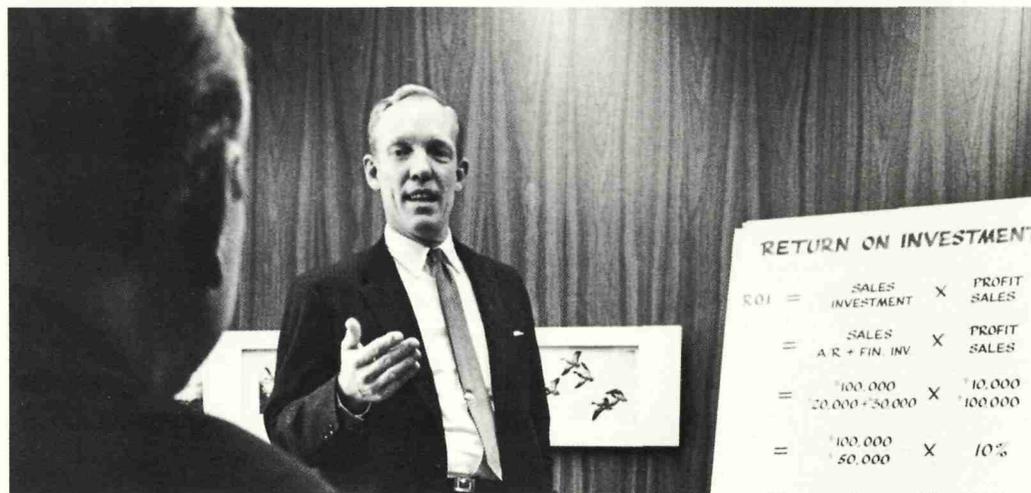
CONTROLLER HUBENY (RIGHT) ...



INFORMATION PROCESSING ...



BRIEFING ROOM...



TREASURER SMITH...

RETURN ON INVESTMENT		
ROI =	SALES INVESTMENT	X PROFIT SALES
=	SALES A.R. + FIN. INV.	X PROFIT SALES
=	100,000 20,000 + 50,000	X 10,000 100,000
=	100,000 50,000	X 10%



PLANNING VP HICKEY (LEFT) ... OPERATIONS REVIEW MEETING

the month's and year-to-date results. *Briefing room reports*, including narratives and graphs, are submitted each week by the division managers covering their sales, operating problems, receivable and inventory turnover, factory productivity and quality indices, field quality problems and any significant developments. The graphs are posted on the walls of the briefing room to permit a quick progress review.

How do you look at 1967?

The last half of 1966 was a disappointment. As we faced up to the problems of the economy and of our business, we moderated our plans. While the first half of 1967 may show unfavorable comparisons with 1966, it is our hope the last half will turn out favorably on a comparative basis. This naturally is dependent on the course of the economy.

Do you anticipate further progress or a leveling out of the things you started in 1966?

We expect to continue our growth in 1967, but at a more moderate pace than in 1966. We're seeking a more profitable growth rate, rather than growth simply for growth's sake.

CONSOLIDATED BALANCE SHEET as of December 31

Motorola, Inc. and Subsidiaries

ASSETS	1966	1965
CURRENT ASSETS		
Cash	\$ 21,993,844	\$ 9,311,856
Short-term investments, at cost	5,763,058	21,059,960
Accounts receivable		
United States government	12,537,878	14,059,782
Other	98,954,974	73,243,350
Allowance for doubtful accounts	(3,013,801)	(2,665,799)
Costs recoverable under United States government contracts, less progress billings . . .	14,204,119	8,130,556
Inventories, at the lower of cost (first-in, first-out) or market	106,106,282	67,263,601
Other current assets	5,183,301	3,556,119
TOTAL CURRENT ASSETS	<u>261,729,655</u>	<u>193,959,425</u>
 PLANT AND EQUIPMENT, at Cost		
Land	7,276,817	5,186,181
Buildings	91,596,202	62,717,940
Machinery and equipment	82,341,169	57,580,147
Accumulated depreciation	(53,994,969)	(44,401,680)
NET PLANT AND EQUIPMENT	<u>127,219,219</u>	<u>81,082,588</u>
Sundry assets, net.	3,964,084	4,219,466
	<u>\$392,912,958</u>	<u>\$279,261,479</u>

NOTES TO FINANCIAL STATEMENTS

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

	1966	1965
4 ³ / ₄ % debentures due April 1, 1986 (less \$500,000 debentures held in treasury for 1967 sinking fund payment)	\$29,500,000	\$30,000,000
Revolving credit notes	30,000,000	—
Notes payable		
3 ³ / ₄ % due \$500,000 annually to 1972	3,000,000	4,500,000
4 ³ / ₈ % due \$500,000 annually to 1976	5,000,000	5,500,000
Real estate mortgages	314,452	632,218
	<u>67,814,452</u>	<u>40,632,218</u>
Less current maturities, included in current liabilities	1,070,880	2,317,766
Noncurrent portion of long-term debt	<u>\$66,743,572</u>	<u>\$38,314,452</u>

Under the terms of a revolving credit, the company has the option of converting the notes to a five year term loan on or prior to February 1, 1969; no reduction is contemplated during 1967. The agreement contains provisions restricting, among other things, the payment of cash dividends which are not to exceed \$10,000,000 plus earnings (as defined) after December 31, 1965. It also requires the company to maintain consolidated working capital of not less than \$75,000,000. At December 31, 1966, \$38,000,000 of retained earnings was available for dividend payments.

2 Under the Employee Share Option Plan adopted in 1960, options have been granted to key employees to purchase Motorola, Inc. shares. Authority to grant options terminated in 1965. The options become exercisable two years after date of grant; they expire at the end of ten years if granted prior to

LIABILITIES AND SHAREHOLDERS' EQUITY

1966

1965

CURRENT LIABILITIES

Notes payable	\$ 38,500,000	\$ —
Current maturities of long-term debt.....	1,070,880	2,317,766
Accounts payable	40,689,380	32,301,338
Accrued compensation	8,044,225	6,348,538
Federal income taxes, less United States Treasury obligations of \$18,404,814 in 1965....	8,349,597	—
Other (including withheld) taxes.....	5,672,009	5,182,528
Contribution to employees' profit sharing fund.....	11,528,890	11,442,542
Product and service warranties.....	4,057,609	2,973,026
Other	15,658,523	15,379,007
TOTAL CURRENT LIABILITIES.....	<u>133,571,113</u>	<u>75,944,745</u>
LONG-TERM DEBT (note 1)	<u>66,743,572</u>	<u>38,314,452</u>

SHAREHOLDERS' EQUITY

Capital stock, \$3.00 par value (note 2)

Authorized: 10,000,000 shares

Outstanding: 1966, 6,104,263 shares; 1965, 6,088,868 shares..... 18,312,789 18,266,604

Additional paid-in capital (note 2)..... 16,781,521 16,083,471

Retained earnings (note 1)..... 157,503,963 130,652,207

TOTAL SHAREHOLDERS' EQUITY..... 192,598,273 165,002,282
\$392,912,958 \$279,261,479

January 1, 1964, and five years if granted thereafter, and are contingent upon continued employment by the company or its subsidiaries.

During 1966 options on 15,395 shares were exercised; the excess (\$698,050) of the option price over the par value of the capital stock issued was credited to additional paid-in capital. At the year end 94,415 shares were under option, at an aggregate option price of \$5,586,832, of which 65,165 shares were currently exercisable, in the total amount of \$3,134,688.

3 The company is sharing in National Video Corporation's profit from the sale of color television tubes for a three year period ending in November, 1968. Per share earnings for 1966 include 49¢ earned from the cooperative color tube development program.

4 The companies are obligated under repurchase and other agreements, principally in connection with the financing of sales of products to consumers, and are defendants in suits and claims, which it is believed will have no material effect on the business of the companies.

**STATEMENT OF CONSOLIDATED
EARNINGS AND RETAINED
EARNINGS** *Motorola, Inc. and Subsidiaries*

YEARS ENDED DECEMBER 31	1966	1965
SALES AND OTHER REVENUES	\$682,374,719	\$516,973,065
Manufacturing and other costs of sales.....	491,417,637	359,486,354
Selling, service, and administrative expenses.....	100,452,633	76,023,648
Depreciation of plant and equipment.....	13,859,021	10,202,882
Contribution to employees' profit sharing fund.....	11,528,890	11,442,542
Interest and amortization of debenture expense.....	5,103,695	1,978,961
TOTAL COSTS AND OTHER EXPENSES	<u>622,361,876</u>	<u>459,134,387</u>
Income before federal income taxes.....	60,012,843	57,838,678
Federal income taxes, net of investment credit of \$1,793,000 in 1966; \$923,000 in 1965.....	<u>27,060,000</u>	<u>26,000,000</u>
 EARNINGS		
(per share outstanding at end of year: 1966, \$5.40; 1965, \$5.23) (note 3).....	32,952,843	31,838,678
Retained earnings at beginning of year.....	<u>130,652,207</u>	<u>110,939,315</u>
	<u>163,605,050</u>	<u>142,777,993</u>
DEDUCT:		
Cash dividends declared—\$1.00 per share.....	6,101,087	6,068,033
Three-for-two share distribution—par value of 2,019,251 shares transferred to capital stock.....	—	6,057,753
TOTAL DEDUCTIONS	<u>6,101,087</u>	<u>12,125,786</u>
Retained earnings at end of year (note 1).....	<u>\$157,503,963</u>	<u>\$130,652,207</u>

See accompanying notes to financial statements.

PEAT, MARWICK, MITCHELL & CO.
CERTIFIED PUBLIC ACCOUNTANTS,
CHICAGO, ILLINOIS

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

We have examined the consolidated balance sheet of Motorola, Inc. and subsidiaries as of December 31, 1966 and the related statement of earnings and retained earnings and the statement of 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. It was not practicable to confirm accounts receivable from United States government departments

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 consolidated balance sheet and statement of consolidated earnings and retained earnings present fairly the financial position of Motorola, Inc. and subsidiaries at December 31, 1966 and the results of their operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year. Also, in our opinion, the accompanying statement of consolidated source and use of funds for the year ended December 31, 1966 presents fairly the information shown therein.

PEAT, MARWICK, MITCHELL & CO.
February 28, 1967

STATEMENT OF CONSOLIDATED SOURCE AND USE OF FUNDS

Motorola, Inc. and Subsidiaries

YEARS ENDED DECEMBER 31	1966	1965
SOURCE OF FUNDS		
Earnings	\$32,952,843	\$31,838,678
Depreciation	13,859,021	10,202,882
Increase (decrease) in long-term debt.....	28,429,120	(2,714,767)
Proceeds from exercise of share options.....	744,235	1,698,215
Total	<u>75,985,219</u>	<u>41,025,008</u>
USE OF FUNDS		
Additions to plant and equipment, net.....	59,995,652	23,448,635
Cash dividends	6,101,087	6,068,033
Increase (decrease) in sundry assets.....	(255,382)	1,119,599
Increase in working capital.....	10,143,862	10,388,741
Total	<u>\$75,985,219</u>	<u>\$41,025,008</u>

TEN YEAR FINANCIAL SUMMARY

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
SALES AND OTHER REVENUES	\$228,431,385	218,909,968	293,081,127	301,049,185	298,219,845	346,881,779	377,852,809	419,066,694	516,973,065	682,374,719
INCOME BEFORE INCOME TAXES	\$ 15,756,431	15,171,013	27,756,237	26,548,813	19,900,308	26,514,514	27,126,526	38,926,724	57,838,678	60,012,843
EARNINGS	\$ 7,824,431	7,356,213	14,171,237	12,633,813	9,517,308	13,206,514	12,926,526	20,666,724	31,838,678	32,952,843
EARNINGS PER SHARE*	1.35	1.27	2.39	2.09	1.57	2.02	2.14	3.41	5.23	5.40
WORKING CAPITAL	\$ 56,425,360	59,585,830	63,336,998	73,790,019	95,078,616	96,804,189	92,358,852	107,625,939	118,014,680	128,158,542
NET INVESTMENT IN PLANT AND EQUIPMENT	\$ 27,167,597	27,615,287	33,436,676	44,594,599	48,427,446	54,783,818	67,283,543	67,836,835	81,082,588	127,219,219
SHAREHOLDERS' EQUITY	\$ 66,172,446	71,533,020	83,338,386	97,166,850	102,655,506	111,835,713	120,735,367	137,533,422	165,002,282	192,598,273

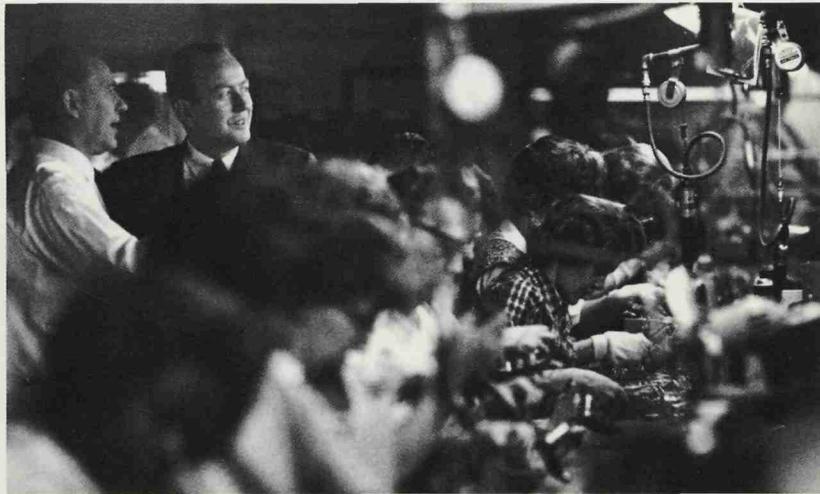
* Earnings per share are based on the number of shares outstanding at the end of the respective years, adjusted for share distributions. Earnings per share shown above for 1962 do not include 17% of nonrecurring capital gain from sale of finance subsidiary.

**CONSUMER PRODUCTS
DIVISION**

Executive Vice President Reese



GENERAL MANAGER REESE . . .



ACCELERATED PRODUCTION . . . EXPANDED FACILITIES



MARKETING VP HERKES . . . SOLID STATE TV



FINAL INSPECTION . . . COLOR TV



BLACK AND WHITE TV . . .

The division enjoyed record sales. Color television provided the main sales thrust, but we also experienced substantial sales of black and white receivers, recording an increase in volume in this product category whereas the total industry suffered a decline.

Our radio and phonograph business contributed importantly to division sales and enhanced our position as a major full line producer of home entertainment products.

Late in the year we introduced an 8-track stereo tape player for automobiles which promises to be an important new product. We began shipments of FM stereo car radios to round out our product assortment, and to keep the Motorola brand in the front rank of the auto entertainment field.

The products introduced during the year continued to reflect the increasing utilization of solid state circuitry. Several black and white television models are now completely solid state, except for a high voltage rectifier tube and the picture tube.

The year produced many severe challenges as we attempted to meet the booming demand for our products while building, expanding and relocating production facilities. The division added 1,028,658 square feet to its total plant capacity.

In February our Elgin, Illinois, plant took on its first employee. By the third quarter this plant was producing complete color television receivers in addition to many components supporting other consumer manufacturing operations.

In January we began to transfer black and white television production from Franklin Park to Quincy, Illinois. The latter plant was under a major expansion program at the time. All black and white receivers are now being manufactured in Quincy, while the Franklin Park plant is almost entirely taken up with color receivers.

In September ground was broken for a plant in Pontiac, Illinois. This will be in operation about April and will serve as a feeder plant to support the Franklin Park color television operation. Meantime, we have leased a building in Pontiac to start production and to train a nucleus of manpower.

Added to the complexity of expanding production facilities was the difficult task of seeking out, hiring and training thousands of new employees during a period of critical labor shortage. Serious material shortages also hampered production during much of the year, with color picture tubes being a controlling factor.

However, corrective actions have been taken to resolve these problems. There will be a major improvement in the efficiency and effectiveness of our manufacturing facilities in 1967. We plan a continuing increase in color television volume in 1967. Black and white sales will maintain a high level but still will reflect a reduced industry volume from 1966. Sales increases are forecast in all other electronic entertainment products.

How is the labor market in Pontiac?

We researched the area very thoroughly in order to identify labor

potential to support our plant. Pontiac can support this activity and an expansion very well.

How large will the plant be?

The plant will be 135,000 square feet.

With these additional manufacturing facilities, what do you project the sales could be increased to?

Using 1965 as a base, because we did not have these additional facilities then, we now have the capacity for a sales volume double that of 1965.

**AUTOMOTIVE PRODUCTS
DIVISION**

Vice President Kusisto



GENERAL MANAGER KUSISTO...ALTERNATORS



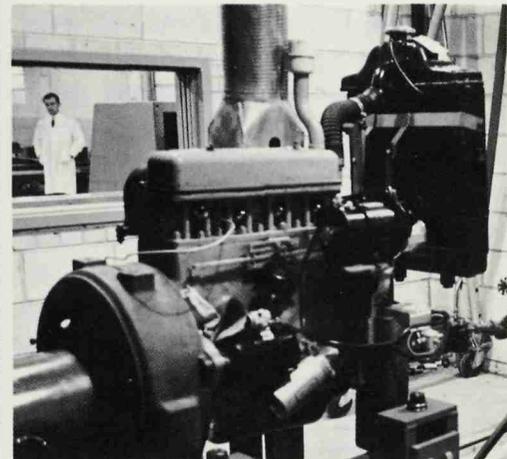
COMBINATION RADIO AND TAPE PLAYER...



NEW PRODUCTS...



EXCITING STEREO...



DYNAMOMETER LAB...

The division had a good year. Car radios, 8-track stereo tape players, alternators and new products all contributed to near record sales.

Our 8-track stereo tape player program continued to expand, with deliveries to Ford, American Motors, and Volkswagen-U.S., as well as others. We firmly established ourselves as the major supplier of the 8-track system to the automotive and home entertainment industries.

During the year and on a continuing basis, an extensive engineering development program was instituted to add features to the tape player, to design for future automotive safety program requirements, and to improve product performance and reliability, while reducing costs.

We expanded our alternator product line with the introduction of two major models. Our excellent line has resulted in a greater penetration of the entire noncaptive market.

We introduced a new capacitor discharge ignition system to the aftermarket. Two major marine engine manufacturers have contracted for this system. We have development programs with several engine manufacturers involving a new concept in a reliable electronic ignition system. To adequately support these and future programs, we established a new dynamometer laboratory test facility which includes both engine and chassis dynamometers.

The division also introduced lines of transistorized tachometers and solid state elapsed time indicators.

Construction of a plant in Midland, Ontario, was completed in May of

1966. In June production of car radios began and reached substantial volume by year-end. The decision to build this manufacturing facility was a direct result of the trade agreement between this country and Canada. This plant now produces car radios for Chrysler and American Motors.

In the international area, S.E.V.-Motorola S.A. in France continued to expand its production of alternator systems to meet the increasing needs of the European market. Our associate in Mexico, Corporacion Nacional Distribuidora, substantially increased its share of both alternator and car radio business with the major car manufacturers. A joint-venture company, Motorola South Africa, commenced production of alternators. Our licensees in South America are capturing greater shares of the original equipment car radio business. Currently we have a number of excellent licensing candidates in the European and Far Eastern market areas.

The combination of new products, deeper penetration of existing markets and a broadening of our international operations will contribute to growth in the years ahead.

Do you manufacture any aircraft alternators?

There are a number of our alternators being adapted to aircraft but we're not specifically aiming at that market, and for good reason. It's a highly specialized program in which we could invest substantial engineering effort and in return get very limited sales and profits. We aim at a product with which we can obtain an excel-

lent unit multiplier—we look for volume against which we build our profit base.

Do you expect the stereo tape player sales volume to surpass that of car radios?

We thought in the last quarter of 1966 that this would occur in 1967. However, we ran into some problems. Although we received Underwriters Laboratory approval on the synchronous motor which drives the tape deck, each of our customers must get UL approval for each of their models which utilize the deck. This is primarily because the cabinet tends to affect the environment and temperature in which the deck and the other components operate. So this has caused a delay in terms of absorption at the market place. But I can foresee the time within the reasonable future when tape player sales volume could equal or exceed that of our car radios.

THE ADVANCING TECHNOLOGY

Vice Chairman Noble

While the technological progress in the last twenty years has been extremely fast, the rate of change in the next twenty-year period will be characterized by substantial additional acceleration. The most significant achievements in the next few years will evolve from the continuing development of computer technology, or, to be more generic, from the development of new and versatile information processing systems.

The words "information processing" identify, to a primary degree, Motorola's broad interests in the electronic field. All of our products, including color television receivers, process control equipment, computer-logic controlled systems, and communications systems, as well as integrated circuits, are related to information processing. There will be a proliferation of new products which, using other terminology, are also identified as automatic control, automation and brain extension systems. The key to the future rapid growth of information processing technology is the continuing refinement of integrated circuit design and production. As industry discovers new approaches which will make possible the design of increasingly complex and sophisticated integrated and other solid state circuits, which can be produced economically, the information processing technology is destined to make essential contributions to the progress of all industry. We must develop equipment to speed up our procedure for assimilating new information. The rising flood of newly generated technical information is threatening to inun-



date our libraries, swamp our teaching systems, and frustrate our attempts at administrative control. Unless we introduce step-function improvements in our information handling methods, we are destined to stagnate at some low level of equilibrium related to the saturation of our processing systems.

Our present libraries, which are in effect primitive artificial memory systems, must give way to electronic libraries with means, not only for storing the information in solid state memory systems of prodigious capacity, but also with provisions for programming the search for viable relationships and for the high-speed reproduction and display of the selected information. The library of the future must be more than a storage and retrieval system; it must be an information processing center, with instant access to the total active store of human knowledge. The electronic library will become the ultimate in teaching machine design.

Practical electronic teaching machines must be developed and put into use promptly. It is easy to conclude intuitively that a programmed electronic teaching system, which will permit instant feedback of corrections and answers to questions, will increase teaching efficiency. The child's brain is an unprogrammed computer which must be taught the procedures for logical thinking, and must be supplied with disciplined related information to use as raw material for thinking. Electronic teaching systems will provide an efficient means for accomplishing this basic preparation, and free the

teachers for the job of developing value judgment, the ability to formulate questions, and the techniques for organizing and synthesizing information into patterns of understanding and new creative combinations. The development of adequate teaching machines will not be easy, but it is both possible and inevitable.

One new approach to equipment design, which will accelerate the creation of adequate information processing systems, makes use of computers programmed to help the engineer with the job of designing circuits. By the use of computer programmed design procedures, it is possible, for example, to reduce the time required to design an integrated circuit and related masks, from two weeks to a single day. Cut-and-try procedures are rendered obsolescent by the new techniques. The same basic technology which will revolutionize teaching systems, library systems, and design procedures, will also revolutionize administrative structures in all organizations, where the rising complexity and the slowness of response have made the rapid exercise of value judgment impossible.

The slow people-paper administrative systems in use today are rapidly becoming obsolescent. In every large industrial organization, the continual expansion of the administrative systems must eventually transform the managers, from dynamic directors of destiny, to specialists in autopsy. Only through the use of high-speed processing to make possible fast reaction time to management questions and direc-

tives, can the manager's control be restored. Only through the development of electronic information processing administrative systems, can we hope to achieve the speed-of-reaction necessary for such control. The use of brain extension systems is essential to the continuing progress of the new scientific revolution. An effective man-machine symbiosis must create new approaches to thinking and new organizational administrative structures. Obviously, electronic information processing patterns are fundamental to the design needs for systems which will avoid processing saturation.

Aside from administration, how will these systems benefit industry?

While effective processing procedures are basic to administrative systems design, they are also importantly related to automation, to traffic control, to chemical processing and to manufacturing procedures of all kinds. In addition, the application of electronics to systems affecting our daily lives is amazingly widespread, and this rising trend more than justifies the statement that the use of electronic equipment and subsystems is generic both to modern industry operations and to the evolving patterns of our scientific culture as a whole.

Is Motorola moving toward these newer areas?

The continuing growth of the electronics industry is as inevitable as it is essential to the growth of all industry. Motorola will continue to move in the broad, expanding mainstream of electronic industry growth.

**COMMUNICATIONS
DIVISION**

Vice President Weisz



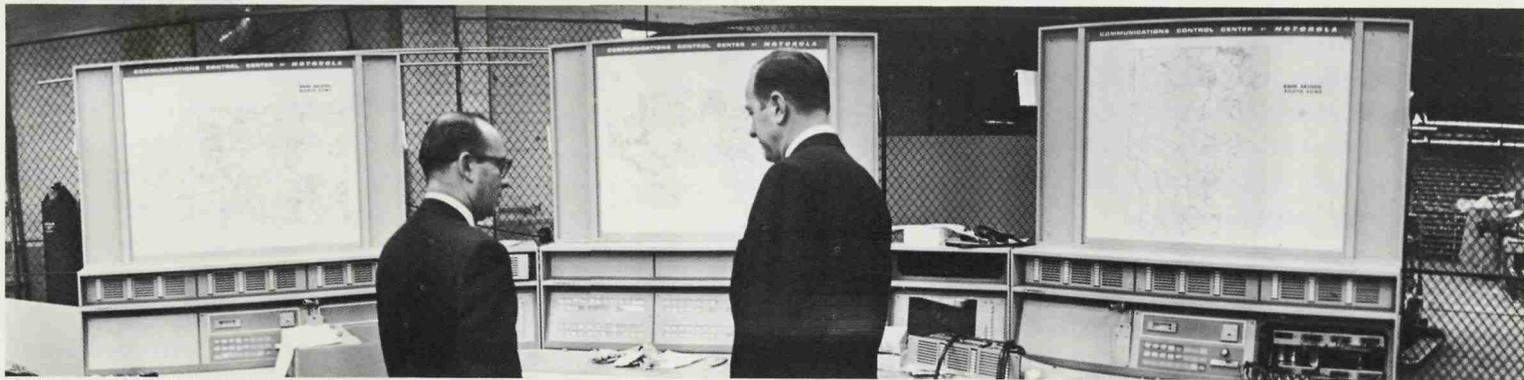
GENERAL MANAGER WEISZ . . . WE RESPONDED



TWO-WAY RADIO . . . CLOSED CIRCUIT TV



RELIABILITY . . . A MUST



POLICE COMMUNICATIONS SYSTEMS . . .



SALES VP MARRS . . .



COMMUNITY RADIO WATCH . . .



HOSPITAL COMMUNICATIONS . . .

The division established record sales and earnings for 1966. However, our profit ratio was lessened somewhat because of certain inefficiencies and a public responsibility to respond to some unusual demands.

As a result of the increased activity in Vietnam, we delivered substantial amounts of equipment on short notice. We put this business ahead of our normal business. We also felt a responsibility to respond to other emergency situations. This was an unusual year in the way of disasters—floods, hurricanes, riots, forest fires, and in one case the largest manhunt in a city's history. We were called upon by police, fire fighting and other public service agencies to deliver equipment with twenty-four hour notice or less.

These priority orders on top of our normally planned increase of production presented problems at a time when the economy boom had created materials and labor shortages.

The division plays an increasingly important role in the area of public services. Our products help people in the protection of their lives and property, in industry, in transportation, in health care.

Products ranging from two-way radio to complete communications systems for hospitals, from closed circuit television to precision instruments affect the lives of everyone, either directly or indirectly. The policeman in his radio equipped car, the radio dispatched fuel oil truck, the doctor on instant call anywhere in the city through his paging re-

ceiver, each serves the public faster and less expensively through the use of Motorola products.

We have instituted a public service program throughout the United States called Community Radio Watch. This program invites the participation of the American public, individuals and businesses, in an all-out effort at the community level to support the police in their efforts to protect life and property. Sponsored by Motorola, it is run by the local city government. Personnel who drive two-way radio equipped vehicles of any kind are being enlisted in a program to report suspicious acts to their radio dispatcher, who relays the reports to the police. We think this program will increase police effectiveness without additional manpower or cost, greatly help to prevent loss of life and property, and reduce the crime rate. It has been enthusiastically received and is in the process of being implemented by hundreds of U.S. cities.

We continued to enjoy excellent growth in our international operations. Currently our products are manufactured in six countries outside the U.S. and, through local businessmen, we distribute U.S.-made products in all the other free countries of the world.

Construction of our multi-million dollar plant in Schaumburg, Illinois, is well underway and will be ready for initial occupancy in early 1967.

When do you anticipate you will start production in Schaumburg?

Our first operation is now scheduled

for March of 1967. We will begin to consolidate into the Schaumburg plant many of our dispersed facilities in the Chicago area.

Do you think your labor market out there will be able to support your proposed buildup?

Yes, from the studies we have made and experts have done for us, the northwest suburban area is a long-term growth area. We took all these factors into account when we formulated our plan to expand in Schaumburg on a gradual basis. Our Augusta Boulevard facility, of course, will continue in full operation.

Do you anticipate continued growth for the division?

The demands for our products parallel the increased demands of the public for services and the need for cost reduction in industry. Assuming that the general U.S. economy continues its growth and that the Federal Communications Commission allocates sufficient frequencies for private land mobile radio, we should continue ours.

**SEMICONDUCTOR
PRODUCTS DIVISION**

Vice President Hogan



GENERAL MANAGER HOGAN ...



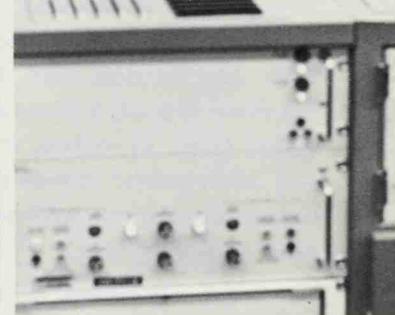
PRECISE OPERATIONS ...



COMPUTERIZED TESTING ...



DELICATE HANDLING ...



COMPUTERIZED TESTING ...



INTEGRATED CIRCUIT MASK ...



COMPUTER CONTROLLED OPERATIONS ...



PLASTIC-ENCAPSULATION ...

The division achieved record sales and earnings for 1966. We maintained our position as the country's second largest supplier of semiconductor products, with a growth rate substantially greater than that of the industry, despite increasingly intense competition in product and price categories.

We now have the broadest product line in the industry, cataloging nearly 14,000 semiconductor types in 18 product categories. Further product diversification will be limited to areas in which large potential markets are developing.

This last year we established ourselves in a dominant position in integrated circuitry—number two. So we now have the same position in this product area as we do in the semiconductor field as a whole. We increased our integrated circuit line to the point where every major family of integrated logic circuits was available as an off-the-shelf item.

Linear integrated circuit leadership was achieved with the introduction of state-of-the-art amplifier circuits which received widespread recognition in the industry.

Integrated circuitry will enjoy excellent growth in the years ahead. To prepare ourselves for our role in it we are nearing completion of a 300,000 square foot research and production facility in Mesa, Arizona.

We invested a large amount of time and engineering talent in production techniques for all product families. Special emphasis was placed on increasing production efficiency through increased mechanization.

Our plastic-encapsulation technique, for example, enables an automatic machine to index and handle as many as 100 devices at a time, rather than one at a time. In one electrical testing operation, we have been able to cut our direct labor cost by a factor of ten.

Our facilities for this low-cost, plastic-encapsulation process were expanded to produce several million units per week of integrated circuits, small- and large-signal transistors, thyristors and other products.

A European Service Center in Geneva, Switzerland, was established to service our overseas sales effort with quicker delivery and better applications assistance. We also expanded other international sales operations.

Arrangements were completed for the construction of a facility in Toulouse, France, which will manufacture semiconductors to serve the European market. We'll be able to move in production equipment in early 1968.

How is the European market?

It has been growing very rapidly. Our sales have just about doubled each year. We feel if we have an operation in France capable of serving the Common Market our total sales in Europe will increase substantially, not just for products produced there but also for products imported from Phoenix. After you are established as a competent supplier, you tend to get more and more business.

Are you doing anything in the Far East?

Until recently our sales were limited to technical leadership items—devices they couldn't build but which were needed for the manufacture of equipment. With our new production technology, we now can compete with the Japanese prices. We recently took a look at the Far East market place and we're anticipating a multi-million dollar business in 1967. We'll be hiring salesmen and appointing distributors in Hong Kong, Taiwan, Korea and other places. We are considering the construction of a factory in the Far East, as we have done in France.

Do you feel your technological improvements in manufacturing have been as great as the new products you're creating?

Yes, we are very proud of it. We feel we have attained a leadership position, not only in terms of technology and the kinds of devices we can offer, but also in production techniques.

**GOVERNMENT
ELECTRONICS DIVISION**
Vice President Chambers



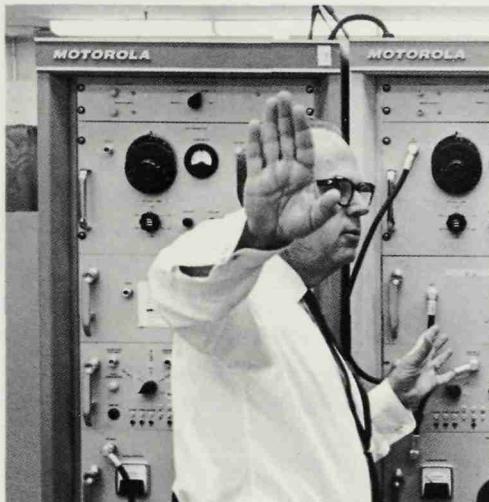
GENERAL MANAGER CHAMBERS... FUZES



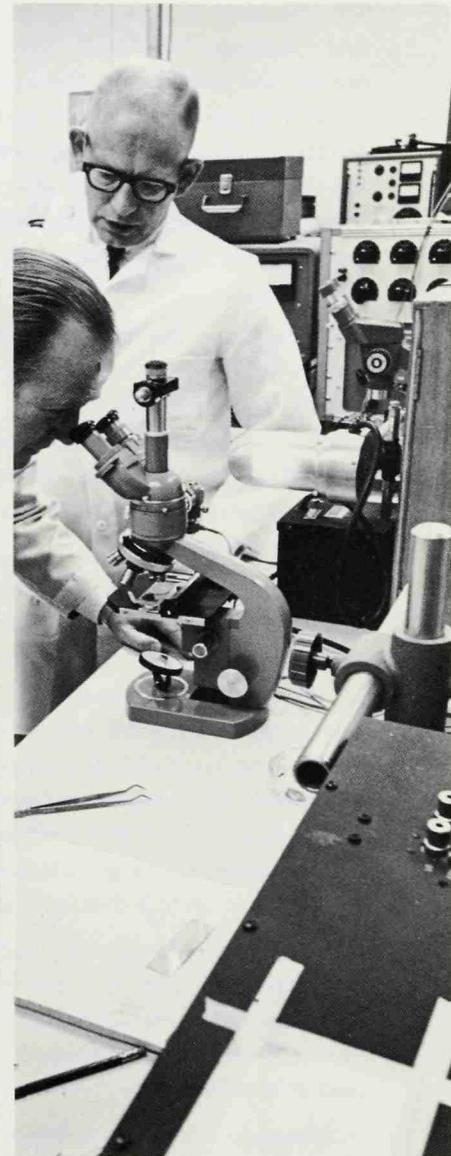
CENTER MANAGER WINTER... TELEPRINTERS



FLIGHT TEST FACILITY...



SPACE PROGRAMS...



ASST GEN MGR & VP JONES... INTEGRATED CIRCUITRY



INTERNATIONAL BUSINESS...

The division was challenged during the year by the escalation in Vietnam and by the buildup of the Gemini and Apollo programs. In responding, we achieved new highs in sales and profits.

During the year we changed the name of our division and one of our plants to more accurately identify our activities. Because of our heavy involvement in space work, we chose Government Electronics for the division and Aerospace Center for our facility in Scottsdale, Arizona. The aerospace center was specially designed for the development and production of ultrareliable electronics equipment for critical space and defense programs. This year we added 188,000 square feet to accommodate programs that were operating in numerous leased facilities.

An integrated circuit facility was included to expedite the application of integrated circuits to our systems and equipment designs. The semiconductor products division lends its capabilities, thus giving us a distinct competitive advantage in this important and growing field.

The record of perfect performance for Motorola's space equipment was maintained throughout the Gemini program.

We continued to expand our participation in the Apollo program. We delivered two-way communication S-band transponders and "up data links" for the spacecraft, and digital test command systems for prelaunch checkout. We also developed a helmet mounted antenna for moon probing astronauts.

The division received numerous other space contracts. One of note was from Jet Propulsion Laboratories for the development of the computer and subsystems for Mariner 69.

We were very active during 1966 in the development and production of classified weaponry and electronic devices for our fighting forces in Vietnam and elsewhere.

A department was established to handle some \$20 million of fuze orders from the U.S. Army. A plant was leased in Elk Grove, Illinois, for the development and production of special bomb and rocket fuzes.

We continued the development, production and installation of airborne surveillance equipment and data transfer systems. Much of this equipment is installed in military aircraft and tested at our own flight test facility in Mesa, Arizona.

Numerous other military contracts were received for troposcatter communications systems, electronic teleprinters, bathythermograph transmitters, UHF communications systems, radar intercept calculators, and for research and development of other specialized equipment.

Production commenced on additional models in our microwave communications product line, including the MR-30 transmitter/receiver and the MC-30 multiplex.

During the year we established a subsidiary corporation, Motorola Military and Aerospace Electronics Inc., to better handle our growing international business. We now have 31 offices in 30 countries.

Is your primary concern with research and development?

Yes, we're very heavily scientifically oriented. About half of our total population is comprised of engineers and technical people.

Does the government give you a project and then tell you to find the solution?

Nearly all our work is of that kind. Their contract will state a problem, the limits as to how to go about it and what kind of solution they expect. Study contracts are often followed by development and production programs, and in some cases by installation and testing programs—such as our radar surveillance equipment.

If the Vietnam situation should come to a halt, would this affect your business very much?

No. It would affect the mix of things we are doing but not our total business. With a change in the Vietnam situation, the President could make funds available to implement many of NASA's approved plans which have been temporarily shelved. We're involved in those plans, so some of our work could be switched right over. Our contingency plans dovetail with the government's.

CONTROL SYSTEMS DIVISION

General Manager Zack



INTRINSICALLY SAFE EQUIPMENT... ZACK



DATA SYSTEMS FOR SELF-SERVICE...



PROCESS CONTROL SYSTEMS...



SUPERVISORY CONTROL SYSTEMS...

The division enjoyed its best year. Of significant note were the variety, volume and rate of orders received.

Our three product lines—supervisory control systems, data systems, and process control systems—experienced increased sales volume and deeper market penetration. We are now acknowledged as a major supplier to the chemical, petroleum, transportation, distribution and power industries. This is confirmed by some of the largest orders ever

placed with any supplier for industrial automation equipment.

Product development is a continuous process. In 1966 we introduced an "off-the-shelf" 10-command supervisory control system for electric and water utilities, pipelines and in-plant applications. This provides low-cost monitoring and controlling of up to ten status points.

We introduced the industry's first intrinsically safe instrumentation equipment. In explosive environments, this not only ensures greater safety for employees and facilities, but greatly reduces the cost of installation by eliminating cast metal, airtight housing, and accompanying heavy conduit. We received an award from the chemical processing industry for this design concept.

Has this division reached a profit position yet?

No. In 1965 we invested heavily in product development. In 1966 the marketing of these products received particular emphasis. We expect that the benefits which accrue from the successes of these two programs will improve our position considerably during 1967.

How do you market your products?

Our products are marketed directly by factory-trained and strategically deployed sales engineers. We have selected men with considerable experience and control systems empathy in the fields in which we have major potential—petroleum, chemical, steel, etc. These men have been thoroughly trained in the application of our products to these fields.

DIRECTORS AND OFFICERS

ANNUAL MEETING

The annual meeting will be held on Monday, May 1, 1967.

A notice of the meeting, together with a form of proxy and a proxy statement, will be mailed to shareholders on or about April 1, 1967, at which time proxies will be solicited by management.

TRANSFER AGENTS

Harris Trust and Savings Bank
111 W. Monroe St., Chicago, Illinois 60690
Chemical Bank New York Trust Company
165 Broadway, New York, New York 10015

REGISTRARS

Continental Illinois National Bank and
Trust Company of Chicago
231 S. LaSalle St., Chicago, Illinois 60690
Irving Trust Company
1 Wall St., New York, New York 10015

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Chicago, Franklin Park, Quincy,
Elgin, and Schaumburg, Illinois
Phoenix, Scottsdale, and Mesa, Arizona
Arcade, New York
Midland, Ontario

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... end of tour

