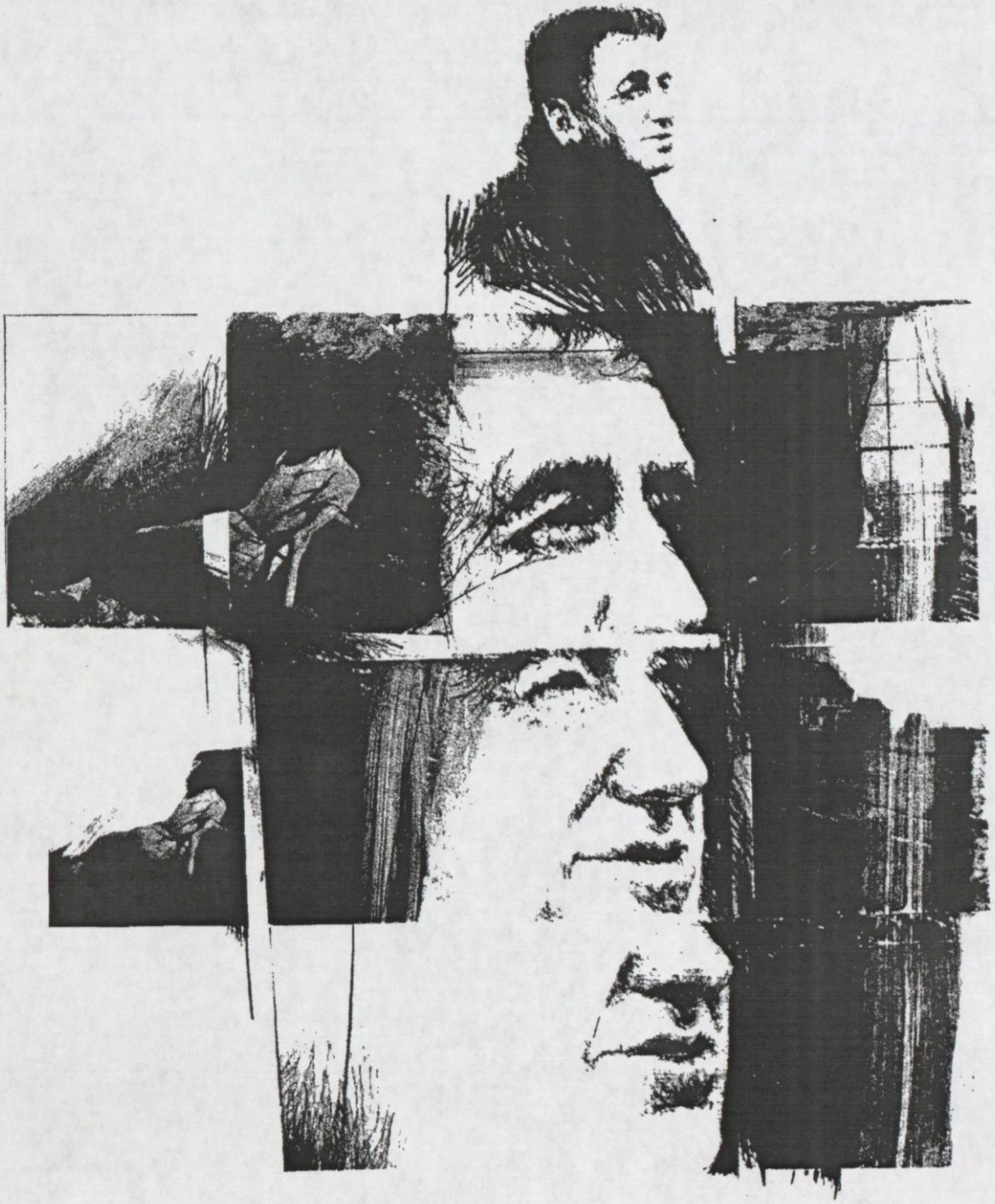

LITTON INDUSTRIES ANNUAL REPORT 1964

THE ANNUAL REPORT
OF LITTON INDUSTRIES, INC.
FOR THE FISCAL YEAR ENDED
JULY 31, 1964

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The body corporate, be it political, economic, or social in character, is but the manifestation of its individual leaders. A free society, therefore, reflects in every facet the dedication, the sense of responsibility, and the moral conviction of the men and women who direct its endeavors. If it is to be vigorous, the corporate structure must remain simply the opportunity and vehicle for expression, not the master of the individual. We look to the individual for leadership. If that member's response is dynamic and resourceful, we will grow. For accomplishments, large or small, are but the expression of the individual.

In recognition of the importance of responsible, personal contribution to mankind's progress. Litton dedicates this annual report to those significant citizens of the world who have assumed the role of responsible participants in society.

The Cover:

Andrew Wyeth has achieved greatness through an intellectual independence to record on canvas his individual conviction about the human soul and the wonders of nature. His deep sense of responsibility would not permit him to be swept up in the artistic cliches of the time. An appreciative free society, on December 6, 1963, awarded Andrew Wyeth the Presidential Medal of Freedom and the accolade, ". . . he has in the great humanist tradition illuminated and clarified the verities and delights of everyday life."

TO OUR SHAREHOLDERS: Litton Industries marked the completion of fiscal 1964 by achieving new peaks in operating results and attaining a degree of financial strength unmatched at any previous point in its history of continued growth. The company once again established records in sales, earnings and earnings per share; its product line was broader than ever before; and the number of persons employed and the total of plant and laboratory facilities in operation reached an all-time high.

Sales for the year, which ended July 31, reached $686,135,497, an increase of 24 per cent from the previous high of $553,146,239 achieved a year earlier. By the beginning of the new year our volume was at an annual rate of more than $750,000,000.

The record 1964 sales were derived from five categories. Data processing and computation equipment, systems and services for commercial and defense applications contributed 31 per cent of the year's revenues; instrumentation and control systems and services and recording equipment accounted for 37 per cent; construction of commercial ships and other marine vessels, including nuclear submarines comprised 12 per cent; business equipment and supplies, a category which consists mainly of office furniture and paper products but excludes business machines, amounted to 9 per cent; and communications and transmission equipment, systems and services accounted for 11 per cent.

Net after-tax earnings rose to $29,767,321. This represented a 28 per cent increase over net income of $23,296,107 reported in fiscal 1963. On the 10,508,365 common shares outstanding on July 31, earnings for 1964 were equal to $2.77 a share, 24 per cent greater than the $2.23 a share the company earned in the previous year. Earnings per share for both years have been computed after preferred dividends, and the 1963 figure has been adjusted to reflect the payment of a 2½ per cent stock dividend.

From the standpoint of financial strength, the company is in a better position than ever to continue implementing its long-term plan for growth. The ratio of our current assets to current liabilities on July 31 was 2.7 to 1, as compared to 2.4 to 1 a year earlier; in the same period, our total assets rose to $423,697,443, up markedly from $354,945,287 reported for fiscal 1963.

The company generated $46,547,000 internally in 1964 — net income and $16,780,000 charged to expense as depreciation. These funds and an available $75,000,000 line of credit from banks provide Litton with ample resources to continue the expansion of its global operations.

During the year we made a highly beneficial change in our capital structure through the creation of a new class of preferred stock. Subsequently, we issued 428,141 shares of the new preferred to our stockholders in return for common stock on a share-for-share exchange offer. The new preferred, which pays three dollars a share per year in dividends, provides an income producing security for shareholders preferring this means of participating in the rewards of our growth and gives us an additional tool for use in making acquisitions.

In 1964 the company achieved approximately one half of its growth internally, through increases in the sales of previously developed products and the introduction of new products. Facilitating this growth was the opening of 15

new plants and plant additions with 831,000 square feet of production space.

The remaining half of our 1964 growth was attained by broadening the base of our operations through the acquisition of other companies.

A significant broadening of the company's line of instruments and controls was effected by a merger with Clifton Precision Products, Inc., which develops and manufactures flight synchronizers, computing resolvers, synchros, and subminiature motors. Through the acquisition of Bruder and Co., Litton added a line of infra-red food heating equipment which complements its microwave oven program, and we obtained a well-developed body of technology in the increasingly important field of automatic revenue control systems when Advance Data Systems Corp. joined the company.

Litton complemented its rapidly growing line of papers and paper products by adding the operations of Fitchburg Paper Co., producer of reproduction papers for office, commercial and general use, and other quality papers for a variety of applications.

The company further expanded its activities through three other mergers consummated subsequent to the end of fiscal 1964. Through Streater Industries, Inc., we gained a broad line of display equipment for retail stores, including merchandise control centers. Profexray, Inc., added an extensive line of medical diagnostic X-ray equipment to Litton's medical electronic product group. In Mellonics Systems Development, Inc., the company obtained a capability for the design and implementation of command and control systems and data processing systems for satellites and other space vehicles.

After the close of fiscal 1964 we reached a preliminary agreement with Royal McBee Corp. to bring together its operations with Litton. The agreement is subject to approval by Royal McBee's directors and also by its stockholders, who will vote on the proposal at meetings during the fall. If approved, the merger will have far-reaching significance for both Litton and Royal McBee. In addition to Litton's extensive line of business machines, office supplies and related equipment, we will be able to offer the Royal line of manual and electric typewriters and electromechanical data processing systems.

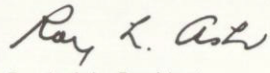
In June, the company announced it had entered into negotiations to purchase all the assets of Universal Controls, Inc. These negotiations were continuing after the year ended, and a further report will be made to Litton's shareholders as soon as developments warrant.

When the company began operations in 1953, it had approximately 300 employees and two manufacturing plants. The total number of Litton employees had grown to more than 46,000 by the end of fiscal 1964, and soon after the close of the year we opened our one-hundredth plant, an electronics production facility in Lubbock, Texas. By the end of calendar 1964, Litton will have 114 plant and laboratory facilities in operation throughout the world.

In conclusion, we declare that in this dynamic era of our history, our environment is replete with opportunities for meaningful progress. We continue to be confident that the initiative of the many individuals who make up Litton Industries will convert the multitudinous opportunities of the present into additional successful, profitable endeavors in the future.

Sincerely yours,

Charles B. Thornton,
Chairman of the Board of Directors



Roy L. Ash, President

DATA PROCESSING AND COMPUTATION

The age of unprecedented technological advancement in which we live has developed a momentum which is continually offering new opportunity in the field of computing and data processing. The business executive, the scientist, and the engineer are constantly seeking new equipment and procedures enabling them to perform their tasks ever more rapidly, accurately and efficiently, and to solve problems beyond the scope of human capability.

By anticipating future requirements and demands of the age, Litton has capitalized on this momentum. In many areas of endeavor — commerce, industry, science — we have welcomed the challenges of our time. Much of our progress in the past year has resulted from this foresight.

One of the major factors in the achievements of our era has been the computer, a field in which Litton participates through several divisions. As a continuation of the company's line of Monroe computers, we will soon introduce the Monrobot XII, a solid state, special purpose electronic computer designed to replace the electromechanical billing and invoicing equipment widely used in commerce and industry. Plans have been completed for the manufacture of the Monrobot XII in Europe, where there is a large potential market for this small-size, low cost computer.

The company also is preparing to introduce a new electronic calculator, a revolutionary product with unique printout capability, including automatic positioning of a decimal point. Prototype models of the new calculator already have

Determined to further the boundaries of existing human knowledge and contribute thereby to contemporary society, Maria Goeppert Mayer has dedicated her lifetime intellectual talents, in part inherited from seven consecutive generations of university academicians, to the study of mathematics and atomic physics. Dr. Mayer's challenge of the unknown resulted in the significant discovery and verification of the "shell model" theory of atomic nuclear structure. On December 10, 1963, Dr. Mayer became the second woman in history to be awarded a Nobel Prize for Physics.

been demonstrated to the company's board of directors, and tooling is in progress for production of the machine.

Fiscal 1964 was a record year for other products bearing our Monroe label. Sales of rotary calculators, in which the company is a world leader, reached new peaks, and a significant further penetration was made in the rapidly expanding printing calculator market, which we entered only two years ago with the introduction of the Monro-Matic Mach 1.07.

Late in the fiscal year our Monroe division began marketing a new printing calculator which represents a major advance in its field of technology. This product, designated the Monro-Matic PC 1421, performs more functions automatically than any other calculator on the market today, and is unsurpassed in the speed with which it conducts a complete transaction, from information input to printed result. The PC 1421 has an automatic decimal placement capability and processes computations involving results expressed in up to 21 digits, overcoming the disadvantage of low digit capacity that has characterized other printing calculators.

The new calculator now is being made available in principal markets throughout the country. Acceptance of the PC 1421 has been enthusiastic, and production is being increased rapidly to keep pace with demand.

Another product introduced by the company's Monroe Business Machines division during the year was an advanced model of our Data/Log high speed data printer. The new model prints 1,380 lines per minute, an even greater rate than that of the earlier version which was capable of printing out 1,040 lines in the same period

First marketed during 1964, the new Monro-Matic PC-1421 electronic desk calculator is shown being used by a recent purchaser, AT & T's New York offices. The instantly reacting PC-1421 creates a printed record of calculations and automatically positions the decimal point.

The Kimball punched tag reader, shown here in department store use processing 170,000 tags daily for Alexander's, Bronx, New York, facilitates high speed feeding of information from punched merchandise tags directly into a computer data system by an economical method.

of time. The widespread acceptance of the earlier Data/Log and introduction of the new model resulted in a doubling of sales and production of this equipment in fiscal 1964.

A highly versatile unit, the Data/Log has been adopted as standard equipment in several areas of science and industry where a high rate of speed in printing data from computers or solid state instruments is essential. These areas include medical research, instrument checkout, alarm systems for refineries and chemical plants, and mathematical projects involving the computations of stress and strain.

At all plants making products in the Monroe line, production was increased markedly during the year, and steps were initiated to provide for anticipated additional manufacturing needs. We are utilizing a 100,000-square-foot plant opened during the year at Pomezia, Italy, for production of Monroe products. This modern facility will substantially expand the Monroe division's production capacity.

To keep pace with the heavy demand for Monroe products, the company increased the sales staff in this division by 10 per cent in fiscal 1964. Monroe's staff of service personnel, who provide frequent and thorough preventive maintenance of the division's products, was also increased substantially during the year and now numbers more than 1,700 trained and experienced people. Further additions to both the sales and service staff are planned during fiscal 1965.

Another product area in which the company enjoyed record sales during the year was Monroe/Sweda sales registers and point-of-sale recorders. In fiscal 1964 we added more new customers for these products than in any previous year, further deepening Litton's penetration of this extensive market.

Many of the new purchasers of Monroe/Sweda registers were large chain businesses with many retail outlets, providing Litton with a competitive advantage for future sales as these customers' organizations grow.

The company also developed and introduced additional models of Monroe/Sweda registers to broaden the market for these products. One example, a punched-tape point-of-sale recording system tailored to the needs of small retailers, has generated a strong demand.

Significant additions also were made to the clientele of the Monroe Data Processing division during fiscal 1964 through the introduction of a data processing system designed specifically to fit the needs of small retail stores with annual volume from $250,000 to $2,000,000. Working with punched tapes from sales registers, the company can provide a printed report on a week's sales within 24 to 48 hours after receiving the store's records. The Monroe Data Processing centers are strategically located in Orange, N. J., Chicago, Ill., Burlingame, Calif., and Atlanta, Ga.

During fiscal 1964 the company developed an integrated sales approach for Monroe Data Processing, utilizing the sales staffs of our Monroe, Monroe/Sweda, and Kimball Systems divisions. We are thus able to offer a retailer a complete sales data recording and processing system, consisting typically of Kimball punched sales tags, Monroe/Sweda point-of-sale recorders which produce a tape record of all transactions,

and a complete record and analysis of a week's transactions supplied by Monroe Data Processing.

For larger retailers, the company introduced under its Kimball Systems label a new punched merchandise tag reader which further simplifies sales analysis. This unit decodes data from punched tags and feeds it directly into a computer, eliminating the costly intermediate process of recording the data on punched cards. By reducing data processing costs of punched tags, the new reader makes feasible the use of these products on lower-price items and thus broadens the market for Kimball tags.

During the year the Brooklyn, New York operations of Kimball were moved to East Farmingdale, New York, in a 101,800-square-foot plant nearly twice the size of the previous facility. The company further expanded Kimball's production capacity by installing a high speed punched tag press at the East Farmingdale plant. The new press produces up to 900,000 tags an hour, as compared to 50,000 per hour on our other production equipment.

The company continued to find profitable new applications for its computer and data processing technology. At the Aero Service division a specialized data processing and handling service was established to enhance the city mapping and inventory service it conducts for city and regional planners. The new activity, called the Data Bank, categorizes and stores in computers the information obtained from analyzing aerial photographs of cities. When a city planner seeks certain land use information on a project conducted for him, the Data Bank can supply it immediately, eliminating time-consuming searches through the voluminous amount of

The Diane computer, which integrates the attack and navigation systems of the U.S. Navy's Grumman A6A aircraft, is one of several special purpose computers designed and built by Litton's Guidance and Control Systems division. Here the Diane undergoes final checkout.

At Des Plaines, Illinois, the newest of Monroe's five data processing centers was opened recently as a conveniently located service establishment, to process business data for clients and as a modification center to customize Monroe/Sweda sales registers for customers.

information which has been gathered.

Another field in which the application of computing and data processing techniques shows great promise is revenue control. Through the Advance Data Systems division, Litton's Business Equipment Group has become a leader in this young and growing field. During fiscal 1964, the company entered the development phase of an automatic revenue control system for the London Transport Board's underground (subway) system, designing automatic passenger gates, magnetically coded tickets and ticket readers, and automatic change-making machines. Subsequently, the division conducted the world's first test of an automatic revenue collection system, installing passenger gates and ticket readers at three stations of the London System. The London Transit Board has ordered more of this equipment to expand the tests during our 1965 fiscal year.

Similar tests of our automatic revenue control equipment also were conducted at two stations of the Long Island Rail Road late in the fiscal year. In addition, engineers in the Advance Data Systems division are designing an automatic revenue control system for a new rapid transit network planned for the city of San Francisco, and are conducting feasibility studies for the Illinois Central Railroad.

Automatic revenue control in a mass transportation system would significantly cut fare handling costs, which represent a large percentage of operating expenses. From a vending machine, a passenger would purchase a ticket with its value encoded electronically on its magnetic tape surface. The passenger would be admitted to the transportation system by inserting his ticket momentarily into an electronic gate which would sense whether the ticket is valid. Upon reaching his destination, the passenger would insert his ticket in the exit gate, which would automatically determine the fare, subtract it from the ticket, and indicate the number of rides remaining.

In recent years, computers and data processing techniques have been utilized increasingly by the free world's defense forces to shorten reaction time in high speed weapon systems. Specifically designed for this purpose is the Marine Tactical Data System (MTDS), which was developed at the company's Data Systems division. Initial units of this highly sophisticated mobile air control system, delivered to the Marine Corps by the division in past years, have proved highly satisfactory. As a result, Litton received a $51 million follow-on contract during fiscal 1964 for delivery of six more systems and associated equipment.

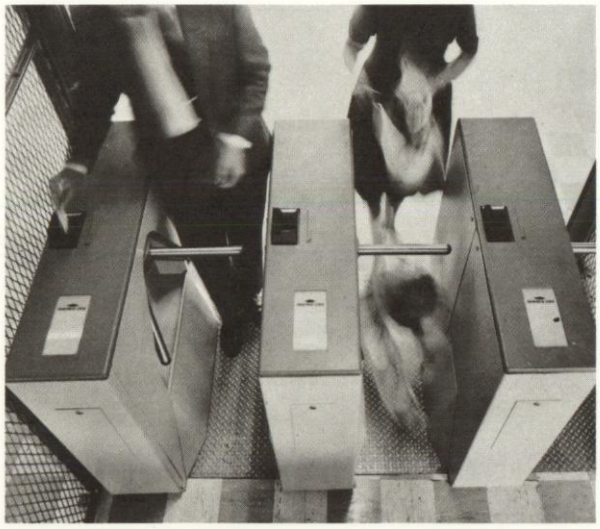
The MTDS remains the most advanced mobile air defense and control system being produced in the world today. It is transportable by ship, aircraft or helicopter to a beachhead at any point in the world and can be deployed rapidly. A versatile system, the MTDS can be used to direct the operations of a variety of defense weapons, including both land-based and carrier-based aircraft, and surface-to-air missiles, and it also is capable of controlling aircraft conducting close air support of ground operations and other offensive missions.

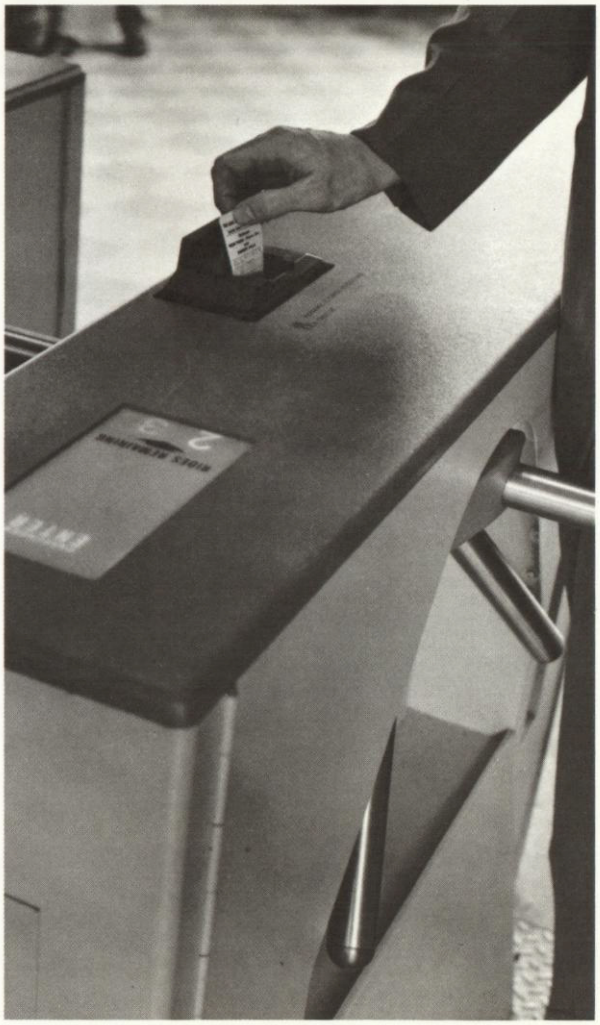
Deliveries of a similar system, the Airborne Tactical Data System (ATDS), were continued during fiscal 1964. This system, employed in the U. S. Navy's E2A carrier-based aircraft, consti-

tutes an automatic airborne combat information center and an early warning capability for the protection of a naval fleet. In a typical application, the ATDS would maintain surveillance over large areas, detecting enemy aircraft, following their course, and evaluating the extent of the threat they pose. The ATDS can function as an airborne command and control center, ordering aircraft aloft to intercept the intruders, or it can relay this information to a ground station which would make the intercept assignments.

By the latter part of this decade the revolutionary new F-111 aircraft will become the standard fighter for both the U.S. Navy and the U.S. Air Force. The company's Guidance and Control Systems division is producing a basic element of the U. S. Navy's version of the F-111—a highly sophisticated digital computer and display system for the aircraft's Phoenix air-to-air missile system. Production under this major contract began during the year, and initial deliveries will be made during fiscal 1965.

At the Data Systems division, Litton made substantial further progress in a government-sponsored project designated as ELINT, which has as its objective the completely automatic processing of electronic intelligence gathered by airborne radar sensors. The company has developed a new technique, called burst-to-burst logic, which makes it possible to sort this information electronically and locate and identify its source. Our progress in this field will place us in an extremely favorable position in the Air Force's program for the development of a real-time data





The electronic revenue collector by Litton's Advanced Data Systems Division, pictured here in service on the Long Island Rail Road, is being developed for several municipal rapid transit systems. To facilitate movement of large numbers of commuters with minimum fare handling costs and delays, the device dispenses magnetic imprinted tickets, "reads" the ticket as it opens the turnstile, and indicates the remaining uncancelled rides as the passenger passes through an exit.

processing reconnaissance capability in aircraft and space vehicles.

During fiscal 1964 the Data Systems division began the development of a group of microelectronic computers for use in its systems. These computers, designated the L-300 series, are constructed of integrated circuits and are easily programmed and maintained. Each of the units is designed so that the computer structure, including word length, instruction repertoire, and type of arithmetic, can be modified to meet the requirements of many applications.

In a related program, the company's Information Sciences Laboratory continued its government-sponsored efforts involving the application of its pattern recognition techniques to the problems of sensor image interpretation. The ultimate objective of this project is to provide a device which will scan aerial photographs and automatically sort out those showing strategically important targets such as airports, industrial complexes, and harbors.

The Data Systems division also designed, developed and produced a set of high-efficiency, densely-packaged microminiature power supplies for use in computers. These units will be among the first microminiaturized electronic components to be made standard for use in military equipment. Thus, the Litton power supplies may well be used extensively by other computer manufacturers as well as in the products of the Data Systems division.

Still another area in which the Data Systems division was active during the year was large screen displays. The division received a follow-on contract from the Air Force for development of a new device known as the Multicolor Automatic Projection System, or MAPS. From computer-generated data, the MAPS system produces a wall-size, multicolored display of military targets.

A new product introduced by the company's Winchester Electronics division is expected to find extensive application in computers. This product, a matrix frame incorporating a new concept for mounting magnetic cores for computer memories, performs better under extreme environmental conditions than competitive units designed to serve the same purpose.

Our Triad Transformer division materially increased its profits during fiscal 1964 by the introduction of a completely redesigned line of miniaturized transformers which are far more reliable than any comparable product available. These transformers are being widely employed in commercial computers, and sales are expected to increase still further in the company's 1965 fiscal year.

Litton's Encoder division this year introduced the world's smallest non-contact magnetic encoder. Such encoders are employed to convert analog data to a form usable in digital computers, which are increasing in commercial and industrial usage. The new encoder has a life expectancy 100 times that of present encoders used in comparable applications.

The company also introduced an improved line of standard contact encoders incorporating a new design concept which gives them a life expectancy five times as great as that of previous models. These new encoders were in operation for the first time at the end of the year.

COMMUNICATIONS AND TRANSMISSION

In today's kaleidoscopic world, the needs of commerce, defense and science are continually straining the available means of communications. As each of these areas becomes more complex, the demand intensifies for faster, more efficient, more economical means of transmitting vast amounts of data and information essential to the process of decision-making. Litton has been active in many of the more promising areas of the communications field, developing new and improved equipment and procedures to meet this constant challenge.

At the Amecom division the company built and delivered a unique, air transportable communications system which enhances the free world's ability to react rapidly to brushfire war situations at any point on the globe. This system, which we designed for the U. S. Strike Command, is compatible not only with large stations in the worldwide defense communications network; it also can be used to communicate directly with front line troops equipped with individual manpack radios. Moreover, the Stricom system can be operated in flight as well as on the ground, a capability not found in other transportable communications systems. The entire system can be loaded aboard one C-130E Air Force transport.

During the year Litton established itself as a major factor in the vigorous tropospheric scatter communications market. The company's Airtron division received a contract to upgrade a series of commercial telephone troposcatter sites, installing complete wave-guide runs in place of existing coaxial transmisson lines to improve and

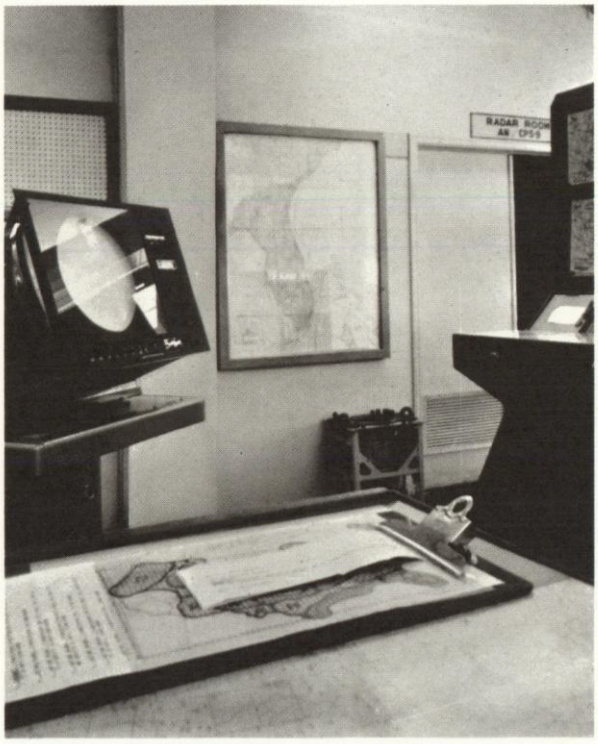
Newly elected to the Presidency of Chile, in the aftermath of a campaign battle among competing ideologies, Eduardo Frei Montalva has now shouldered the great personal responsibility for guiding the destiny of this important and pacesetting Latin American democracy. Eduardo Frei's effectiveness as an individual may well determine the pattern of life and activity for decades to come of Chile's over eight million citizens.

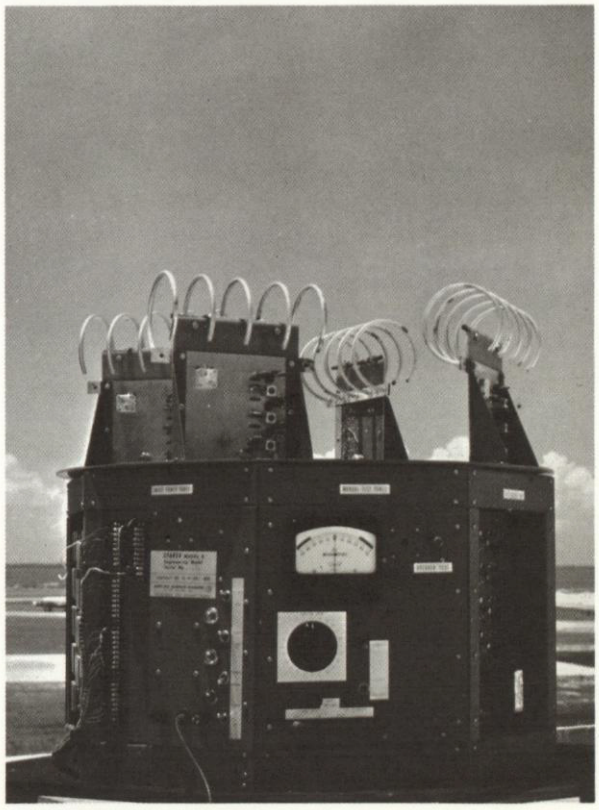
expand the service. Equipment furnished under this contract included every transmission line element from the tube output to the antenna feed. The company has also received a number of additional contracts for other commercial projects and for military tropospheric scatter waveguide installations.

At the Airtron facilities the company continued in pioneering advancements in the development of techniques for the growth of large single crystals of solid state materials for laser and microwave applications. Our Solid State Materials Laboratory, which for some time has produced calcium tungstate and ruby laser crystals and other advanced materials, has been successful in producing small quantities of several experimental laser and semiconductor materials, which show great commercial promise. Litton is now seeking to increase crystal size and yield for these materials to make them suitable for device use.

To provide the necessary support for this program, Litton is installing and staffing a comprehensive crystal analysis laboratory which will contain the latest equipment for its projects. These projects include X-ray diffraction studies, interferometry, spectrophotometry, and laser output measurements, plus special-purpose crystal processing and preparation equipment. This program has as its goal the creation of whole new classes of optical maser devices for communications, range-finding, navigation and related commercial and military applications.

Measurable progress also was made during the year in the development of solid state devices. Litton announced the commercial availability of an electronically tunable solid state pre-





Photographed during installation at the Aerospace Instrumentation Laboratory, Patrick Air Force Base, Cape Kennedy, the SPARSA storm warning equipment is produced by Litton's Applied Science Division. The SPARSA system is designed to measure the strength and position of electromagnetic disturbances within a radius of 200 miles and to display data for detecting development of potentially dangerous storms on a closed circuit television triangulation console.

selector filter operating in the frequency range of 250 to 500 megacycles. The device, developed at our Airtron facility, is the lowest-frequency filter of this type now available and marks another successful realization of a new type of working device based on a long-term Airtron materials program.

The company is in the advanced stages of development of a complete line of these filters, covering bands from 125 through 18,000 megacycles, and Litton anticipates that broad commercial and military markets will soon develop for these devices. Several promising applications already have been noted, with potential sales of several thousand units in each case.

Our extensive experience in building hundreds of different types of components led to the receipt of orders for key elements of the new pushbutton dial telephone, which is being adopted throughout the United States. At our USECO facilities, we are making terminal boards and other hardware for this unit; transformers are being produced in our Triad division; and printed circuits are being manufactured in our new Advanced Circuitry plant. We expect this market to grow rapidly as installation of the new pushbutton telephone is accelerated throughout the United States.

During the year Litton augmented its staff of design engineers at Triad and also added specialized assemblers and other personnel to attain a capability for the production of filters, used in a variety of commercial communications equipment and in tape recorders. Sales of these products is expected to double in fiscal 1965.

At Amecom we also completed and delivered to the U. S. Air Force a versatile telephone and telegraph communications system which can double as an air traffic control center. This system, known as Redwood, can be airlifted to any remote trouble-spot in the world and be in operation within an hour. The advanced transmitting and receiving equipment utilized in Redwood provides the system with reliable multichannel communications over a 1,000-mile range.

Another advanced high frequency radio telecommunications system produced during the year at Amecom was the Transcom system, a long-range telephone and telegraph communications system. Fourteen of these units, each of which can transmit and receive more than three telephone and 16 teletype channels simultaneously, were delivered to the U. S. Air Force. A compact, modular system, Transcom can be airlifted to any area of the world in three military transport aircraft. Transcom systems can be operated in remote locations for up to three months without technical logistic support, providing the same reliable worldwide contact through the global defense communications network as major fixed stations.

The company's Amecom division also designed and constructed a number of fixed communications systems in fiscal 1964. These projects included a communications control system for the 5,000-mile Atlantic Missile Range, from Cape Kennedy to Ascension Island in the South Atlantic, and a telephone system between Patrick Air Force Base and Merritt Island, two key units of the Cape Kennedy center.

During the year, the company intensified its

research and development program in cross-field amplifiers and M-type backward wave oscillators, key elements of electronic countermeasures systems. As a result, Litton became a technological leader in these areas. This achievement led to the receipt at the Electron Tube division of initial orders for large quantities of miniature M-type backward wave oscillators for new countermeasures systems being produced for the U. S. defense establishment.

Litton's engineers and scientists also are investigating the suitability of crossed-field amplifiers for use in phased array radars, which will be installed in growing numbers for missile defense. We believe these products have a considerable potential for use in this application.

Another important achievement realized during the year was the development of new coaxial magnetrons for airborne weather radar systems, bomb navigation systems, terrain avoidance systems, and navigation radar. These electronic components also are produced at the facilities of our Electron Tube division.

Litton also received several new contracts for klystrons and power supplies for the Stanford Linear Accelerator Center Program sponsored by the Atomic Energy Commission. We anticipate substantial follow-on orders in this project.

A rapidly expanding area of the communications field is that of educational television, or ETV. Many educational authorities feel increasingly greater use must be made of ETV as the U. S. school-age population continues to grow.

During the year the company made measurable progress in this young field. As a result of the development and testing programs conducted by our Amecom division, the Federal Communica-

Amecom's closed circuit television system is useful in demonstrating before several classrooms the manipulation and fingering techniques of otherwise difficult to observe demonstrations. During 1964, at the H. Frank Carey High School, Floral Park, Long Island, New York, typing was one of the courses adapted to instructional television.

During 1964, a telephone communications system providing 220 telephone circuits was developed and installed by Litton's Amecom division at the NASA-Atlantic Missile Range headquarters in Florida.

tions Commission reserved a block of 31 television channels in the 2,500-megacycle frequency range for instructional broadcasts by public and private schools, colleges and universities.

As part of its continuing program of product development, the division introduced a broadband converter which enables each school served by a 2,500-megacycle instructional TV system to receive as many as four channels simultaneously with a single converter. Previously, a separate converter was required for each channel. The FCC changed its rules to permit use of this new product which will result in significantly lower costs for instructional TV systems.

Through these pioneering activities, Litton has achieved a highly favorable competitive position in the field of ETV. Through the Amecom division, the company serves the educational TV field with low power ultra high frequency TV as well as 2,500-megacycle TV equipment and systems. During fiscal 1964, Amecom received orders for 2,500-megacycle instructional TV installations at public schools in Floral Park, Mineola and Plainedge, New York; in Parma, Ohio; and in the parochial schools of the Los Angeles diocese. The FCC rulings and the growing interest in educational TV among educators assures us of substantial further orders for ETV systems.

During the year Litton also applied its technology in communications to the field of storm warning equipment.

Engineers and scientists at our Applied Science division completed the development of a new system which automatically detects and warns of approaching thunderstorms and tornadoes. The system, known as Sparsa, constitutes a unique adjunct to weather radar, presently the most widely employed storm warning equipment. The Sparsa system utilizes electronic techniques to make continuous determination of the bearing and intensity of atmospheric electrical discharges within a 200-mile radius. The first Sparsa system, consisting of a three-station network, was installed by our engineers and technicians at Cape Kennedy during the year to provide warning against potentially damaging storms approaching the area.

A new photofacsimile recorder developed by our Amecom engineers played a key role in the operation of the Nimbus A weather satellite launched shortly after the close of the company's 1964 fiscal year. The combination of the newly developed equipment in the Nimbus and our recording equipment made possible first pictures of the earth's cloud cover at night. Radio signals transmitted from the satellite to our new high resolution infrared equipment were converted into 70 millimeter continuous film strips showing the earth's night cloud cover from horizon to horizon.

In another phase of our space activities we developed and delivered the first electrostatically focused klystron — a 32 ounce device which will provide 20 watts continuous wave power for the Apollo space vehicle's voyage to the moon late in the decade. This new device, produced at our Electron Tube facilities, also is applicable to other forms of space vehicles, telemetry systems, and tropospheric scatter systems. Its light weight also makes it suitable for use at remote locations in brushfire war situations.


20

SHIPS AND OTHER MARINE VESSELS

For as long as the earth's oceans and waterways have been a factor in commerce and defense, skill in shipbuilding has been a prized capability. This is no less true today than it was two hundred or two thousand years ago; the need for faster and more efficient vessels of many types poses a continuing challenge to shipbuilders throughout the world.

We believe Litton has risen to this challenge, and we are constantly endeavoring to seek out new areas of opportunity through the enhancement of our shipbuilding technology.

Further improving this capability is an automated system now being installed for handling the thousands of tons of steel utilized each year at our Ingalls shipbuilding facility. From the time steel is delivered at Ingalls as raw stock until it is fabricated and delivered at shipside, it will be processed automatically, at a significant reduction in cost.

In the completely pushbutton-controlled system, magnetized cranes and motorized conveyors will guide the Ingalls steel through its processing, and automatic controls will operate the system. Operations conducted by the system will include cutting, cleaning, scaling, painting, repainting, drying, and delivery for assembly, all of which are now done manually. When installation of this new system is completed during fiscal 1965, Ingalls will have the only completed integrated steel handling system in the U. S., providing Litton with an important competitive advantage as a shipbuilder.

During the year the company's Ingall's division

Inspired creativity springs primarily from the individual rather than from organizations. For oceanographer Roger Revelle, personal responsibility has been expressed by probing the oceans' depths and by the realization that the individual, resourceful and perceptive, has the ability to reveal the answers to a needful society. Dr. Revelle will warrant the appreciation of unborn generations for his study of ocean chemistry and heat flow from the sea floor. In 1963 the National Academy of Science honored Dr. Revelle with the Aggasiz Medal.

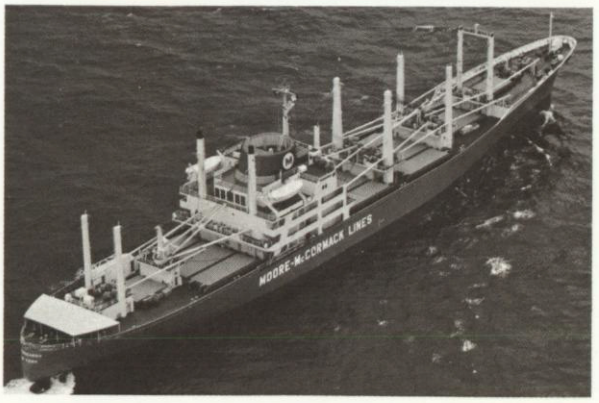
completed the most advanced cargo ship ever built, the SS Mormacargo. One of six such vessels ordered from the company by Moore-McCormack Lines, the Mormacargo ushers in a new era in U. S. maritime operations — the era of automatic ship operation.

The Mormacargo is the first vessel in the history of U. S. shipping to be centrally controlled through electronics. From the bridge, the ship's officers can control the engine, boilers, pumps and cargo refrigeration. A console in the engine room makes pushbutton control possible for more than 150 separate operations which are performed manually on non-automated ships of comparable size. The effect of these and other economies is a reduction in the crew to 32 members, 20 per cent fewer than is needed on a similar but non-automated vessel. Moreover, the Mormacargo's overall design makes it the fastest cargo ship in the world, with an operating speed of more than 24 knots.

Delivery of the five other automated vessels, all of which are now under construction, will be made during Litton's 1965 fiscal year.

Subsequent to the close of fiscal 1964, the U.S. Maritime Administration and American President Lines, a leading shipping company operating from the west coast of the United States, declared Ingalls to be low bidder for four automated cargo ships, with an option on a fifth vessel.

The American President Lines' ships will be among the largest and fastest cargo vessels ever constructed at the company's Ingalls facility. Each ship will be 572 feet long, with a displace-



In the attack center of the nuclear submarine Dace, the course, speed, range and bearing of enemy submarines is electronically computed and fed into subroc missiles, the most modern in undersea weapons.

The SS Mormacargo, built by Litton's Ingalls Shipbuilding division, was the first of six Constellation class ships delivered to Moore McMormack Lines this year. This automated ship is designed for electronic control of more than 150 operations from the bridge, enabling rapid maneuverability with a minimum of manpower.

ment of 21,000 tons. A service speed of 23 knots will be made possible by engines generating 24,000 maximum horsepower. The contract for these vessels will extend our backlog for commercial cargoliners through 1968, and we are a leading competitor for similar contracts certain to be awarded in the next few years.

Further expanding the company's future business at Ingalls was an agreement concluded after fiscal 1964 ended. The agreement, with McLean Industries of Mobile, Alabama, will consist of two phases.

In the initial phase, our new Litton Industries Leasing Corporation will purchase six C-4 cargo ships currently allocated to a subsidiary of McLean under the Ship Exchange Act. These will be converted into specialized cargo vessels known as container ships, at the Ingalls facility. Upon completion of the conversion process, the ships will be leased to McLean's Sea-Land Service subsidiary for use in transporting cargo between U. S. ports. Conversion of the first ship purchased from McLean is scheduled to begin in January 1965, and will be delivered to Sea-Land by September 1965. The five other vessels to be converted will be delivered thereafter at two-month intervals.

Under the second phase of the agreement, we will build new container ships at Ingalls for Sea-Land. Engineering for these new vessels began soon after the close of the year; initial keel laying is scheduled for late 1965, and first deliveries will be made early in 1967.

The agreement with McLean is particularly significant in that it represents a first in modern shipbuilding history. Never before in modern times have cargo ships designed and constructed to carry containers of this quantity and type been provided by an American shipbuilder for domestic shipping without a Federal Government subsidy or federal loan guarantee.

As the world's petroleum companies continue their search for new deposits of oil and natural gas, exploration beneath the oceans is increasing.

Oil seekers require specially designed vessels capable of remaining at sea indefinitely while conducting drilling operations. The demand for such vessels has increased markedly during the past two years, and according to authoritative estimates, the market for them will amount to several hundred million dollars a year for the next several years.

Litton has built such vessels at its Ingalls facility, and our experience has qualified us as a leader in this area. Under a contract from Southeastern Drilling, Inc., we began construction during the year on a vessel which will be the largest submersible, floating offshore platform ever built; it will measure 300 feet from hull to derrick top, and its triangular body will extend approximately 280 feet on each side. Operators will be capable of drilling both from the ocean floor in shallow waters or from a semi-submerged floating position in waters too deep for previous platforms. A contract for another vessel of a similar type was pending after the close of our fiscal year.

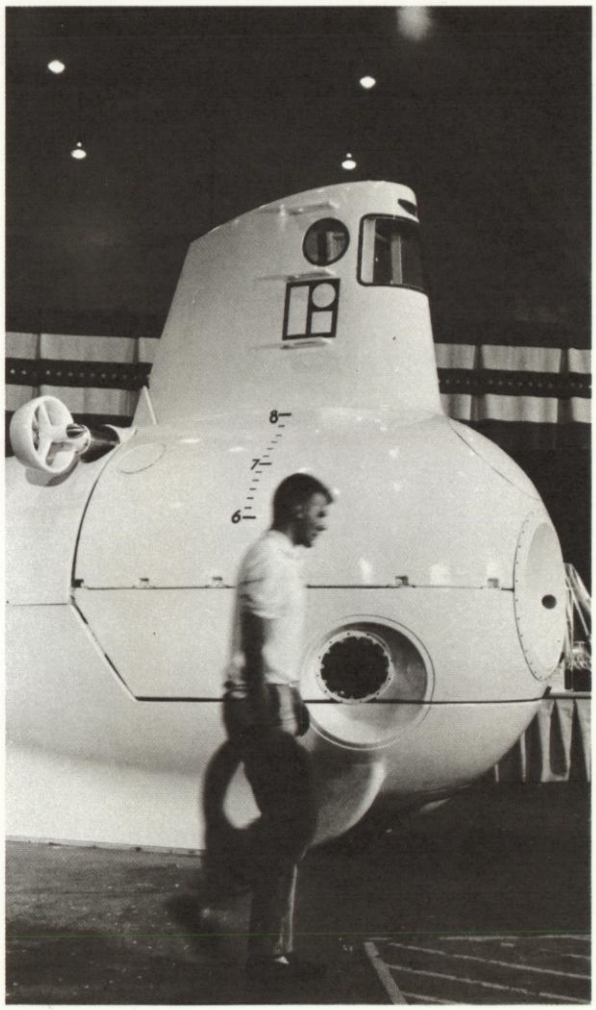
Rising interest in the field of oceanography has created a pressing requirement for vessels capable of descending and maneuvering freely in the seas at great depths. At the facilities of

our Applied Science division, the company completed such a vessel during the year, funded by the U. S. Navy, and delivered to the Woods Hole Oceanographic Institution. This research vessel, called Alvin, is ideally suited for performing useful projects at depths of 1,000 to 6,000 feet, an undersea area which is of particular interest to oceanographers and to commercial and industrial organizations seeking to tap the wealth of the sea and the undersea. We believe the Alvin vehicle has extensive potential application for a variety of such endeavors, including oil exploration and undersea mining.

Another area in which the company employed its shipbuilding facilities was the U. S. space program. Our Ingalls division produced and delivered a large additional quantity of precisely formed, 5,400-pound aluminum rings used to join the fuel and liquid oxygen tank heads for the huge Saturn rocket. The Ingalls facility also was used to perform the conversion of a number of barges to transport liquid oxygen and liquid nitrogen for the Saturn.

Fiscal 1964 was a highly significant year in our construction of ships for the free world's defense. At the Ingalls facility, the company completed and delivered two more nuclear-powered attack submarines, bringing to four the number of such vessels Litton has delivered to the U. S. Navy. Four other nuclear attack submarines were in various stages of construction at Ingalls at the end of the year.

As a result of our experience in the nuclear submarine program, we believe Litton has estab-



ALVIN, a 22-foot, two-man, 13-ton scientific and exploratory submarine was delivered during 1964 by Litton's Applied Science Division to the Office of Naval Research and the Woods Hole Oceanographic Institution. ALVIN will be used for biological, geological and physical research in the potentially productive sea depth of 1,000 to 6,000 feet.

lished a high degree of competence and skill in the construction of vessels employing this new source of ship propulsion. It is also our belief that in the near future, nuclear power will prove economically practical and preferable for the propulsion of all classes of ships. We are conducting an intensive study and development program in collaboration with nuclear reactor manufacturers in preparation for the day nuclear power becomes standard, and we expect to be among the leading contenders for the construction of new vessels employing nuclear power.

Another event in our defense shipbuilding activity during the year was the beginning of construction on another Polaris submarine tender, the USS Canopus, a sister ship to the USS Holland, which the company delivered early in fiscal 1964. Like the Holland, the new vessel is designed to perform a wide variety of service, supply and maintenance activities at sea for the increasing number of Polaris missile-carrying submarines which are constantly on duty beneath the oceans.

During the year we also began construction of the LPH-10, one of a new type of versatile amphibious assault ships and the first of its class to be constructed by a private shipbuilding facility. This 600-foot-long vessel will be capable of carrying 30 helicopters, 2,000 combat-ready Marines and a crew of 900 Navy personnel. Designed to implement the Marine Corps' new tactic of vertical envelopment, the LPH vessel would make it possible for U. S. troops to engage an enemy behind his own lines as well as at a beachhead.

Construction on two other assault-type vessels began during the fiscal year. Designated the LPD-7 and LPD-8, these assault ships will combine the functions of four types of previously employed vessels, carrying troops, cargo, tanks and other vehicles, and small amphibious landing boats. Although most of the troops would be put ashore in the landing boats, each of the LPDs will be assigned six transport helicopters, enabling them also to participate in vertical envelopment operations.

As the U. S. fleet of nuclear attack and Polaris-carrying submarines continues to expand, there is a growing need for facilities at which these vessels may be periodically overhauled and repaired after extensive stays at sea. Litton will become eligible to participate in this program by building a 20,000-ton drydock at the Ingalls division. This new facility will include extensively equipped laboratories, shops and service facilities to fulfill all the requirements for overhaul and repair. Plans for the drydock were completed during the year and construction will start in fiscal 1965.

In recent years the use of radioactive materials has rapidly increased in industry, medicine, and research. Wherever such materials are utilized, extensive and elaborate safety precautions are required by federal law. Our Ingalls division has acquired extensive experience in this field through its nuclear submarine construction program, and in 1964 we acted to capitalize on this background by introducing a Radiological Safety consultation and control service. By utilizing this service, one of the first of its type to be offered, a newcomer to the field of radioactive materials avoids the immediate heavy investment required to detect, monitor and analyze radiation hazards.


NEVER GROW OLD!
NO! I WON'T SEE HIM!! AFTER WHAT HE DID...
THAT'S NOT FAIR, HONEY... HE'S NO WORSE THAN I AM!... MAYBE NOT AS BAD..
GIRLS
Action, Security, Big Pay -
DON'T WORRY

BUSINESS EQUIPMENT AND SUPPLIES

The rapid growth of the free world's economy, intensified by the technological revolution of our era, has created a demand for equipment and supplies that make the office a more efficient place to plan, execute and appraise our progress and achievements. Litton has responded to the challenge for such new and improved products in a number of areas.

At its Cole Office Equipment division the company introduced a complete new line of executive furniture during the year, augmenting Cole's popular and well-established range of moderately priced office furniture. The new Cole line includes desks, chairs, credenzas, tables, and related office furniture.

As a result of strong demand for Cole furniture in fiscal 1964, we are making major additions to the production capacity of this division. Soon after the close of the year, the company completed plans for doubling the size of the 75,000-square-foot Cole plant in Toronto, Canada by the spring of 1965, and is seeking additional production space in the U. S. Subsequent to the end of the year, the company formed a joint venture called Cole España to produce Cole products in Spain and market them in Europe and Africa. Although Cole products have been marketed in many countries for a number of years, the formation of Cole España will result in the first production of the Cole line outside North America.

The Cole product line will be further broadened during fiscal 1965 through the introduction of a complete line of popularly priced business machines designed expressly for mass distribu-

Privileged to speak freely of a society that offers an opportunity to prosper from self-criticism, Professor Richard Hofstadter has expressed well the individual responsibility of the historian: to transmit the past, to increase the body of knowledge, and to interpret our development as reflected by the diffusing prism of our many interests. On May 6, 1964, historian Hofstadter was awarded his second Pulitzer Prize, this time for his examination of America's alternating deference or reaction to intellectualism in his recent book on the subject.

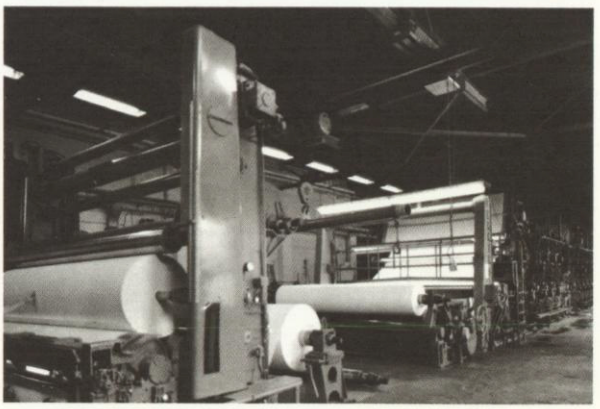
tion through the Cole dealer network. Shortly after fiscal 1964 ended, we introduced the first of these new products, an office dictating machine available in either a desk model or a portable version.

In a related field, the company's Fitchburg Specialty Papers division realized a substantial increase during the year in the sale of plastic saturating base paper, a decorative material which is laminated into the tops of tables, desks, and other furniture. This material is being utilized increasingly in office furniture as more attractive designs are created. During the year the company opened a new Fitchburg plant in Belgium to participate in the growing European free trade market for these products.

At Fitchburg, the company makes office copy papers for every type of reproduction machine manufactured today. The fastest-growing segment of this field is electrofax machines. We are planning to increase Litton's penetration of the market for electrofax papers through the development of even more advanced types of paper for use in these machines.

In the Specialty Papers division the company began a full-scale production of electrosensitive recording papers. Through this division, we supply all of the electrosensitive papers used in the U. S. Air Force's weather reporting and forecasting networks, and nearly all of the supply consumed by U. S. commercial airlines.

The extreme sensitivity of these electrosensitive papers is apparent in that they are also being used to record the data produced by a computer as rapidly as a computer can operate. The University of California's Lawrence Radiation Laboratory, for example, uses the company's



The Cole Business Equipment division, another part of Litton's Business Equipment Group, produces a wide range of desks, bookcases, chairs, cabinets and office furnishings. The Monrobot computer clerical furniture pictured is a portion of the eight floors of Cole furniture recently installed in the Celanese headquarters building in New York City.

With this modern equipment, as long as a city block, our Fitchburg Specialty Papers division produces office reproduction papers, offset printing papers and specialty papers used for a variety of purposes.

Timemark paper for its computer operations in thermonuclear research.

During the year, Litton developed a process which enables us to apply a white coating to the conventional gray surface of electrosensitive papers. This improves resolution and tonal response, making this low-cost medium more suitable for recording photographs, ocean floor profiles, geological survey pictures and other signal data presentations.

Anticipating further sales gains, the company acted in fiscal 1964 to increase its production capacity for pressure sensitive products. Volume deliveries of release coated papers, used as the backing of pressure sensitive products such as adhesive labels, were begun from our Moosic, Pa., facility, and a new press for production of these products was ordered for our Kimball Systems division. Further, additional plants and expansion of existing plants is planned for increased production of pressure sensitive products by Kimball Systems.

The company's line of specialty papers was further broadened during the year by the addition of heat sensitive papers, used in medical measuring equipment such as electrocardiographs, and pressure sensitive papers employed in industrial and scientific recorders.

Through its Eureka Specialty Printing division, Litton has become a leading manufacturer of outserts, the small instructional or promotional pamphlets attached to medicine and food containers. In fiscal 1964 the company designed and engineered a new, advanced machine for applying these miniature pamphlets to the containers they accompany. Development and installation of the new equipment increases the efficiency of the company's outsert operations by lowering costs and consequently broadening the market for these products.

Another significant development at Eureka Specialty Printing during fiscal 1964 was the development of a new method of perforating for trading stamps, of which we are a major producer. The new process makes possible the use of Eureka stamps with all types of dispensing units, thus broadening the field for these products.

Eureka also introduced a new audit control system for trading stamps, facilitating the handling of stamps in retail stores. Control numbers are printed at designated intervals on each coil of stamps, providing a simple, accurate method for determining the number of stamps remaining.

As an adjunct to the data processing and point-of-sale equipment offered through the Monroe/Sweda sales register division, the company now is able to offer the broad line of merchandise display equipment of Streater Industries, which was merged into Litton after the close of the year.

Along with the merchandise control centers and checkout and sales register related equipment it manufactures, the Streater division provides planning and design services for merchandising enterprises, including supermarkets, chain drug outlets and other retail organizations. The division operates three strategically located plants in the U. S., and maintains sales offices in New York; Los Angeles; San Francisco; Minneapolis; Kansas City; Atlanta; Portland, Ore.; and Chatham, N. Y.


EUROPE

INSTRUMENTATION AND CONTROLS

A distinguishing characteristic of this age of unparalleled technological progress is the precision it demands. A degree of precision unmatched in any previous era is necessary to implement the new systems of today and to effect the improvements demanded in established techniques and procedures.

This high level of precision is made possible through the development of instruments and controls capable of assuming increasingly broad and varied tasks. Through the design and production of such instruments and controls for a number of major areas of endeavor, Litton has contributed in substantial measure to the progress of this decade.

For a number of years Litton has been the leader in the design and development of aircraft inertial navigation systems, through the Guidance and Control Systems division. During the year the company continued in this leadership with the production and delivery of the first inertial navigation system for the F-111 fighter. Litton is producing these systems for both the Air Force and the Navy versions of the F-111.

In addition, Litton made volume deliveries of inertial systems for the U. S. Air Force's F4C and RF4C tactical aircraft, and continued peak production of similar systems for F-104 NATO fighters in our new German and Italian plants, the most modern of their type in Europe. Volume production of inertial systems for the Air Force's new F4D fighter and the Navy's RF4B reconnaissance aircraft will begin during fiscal 1965 under still another contract received by our

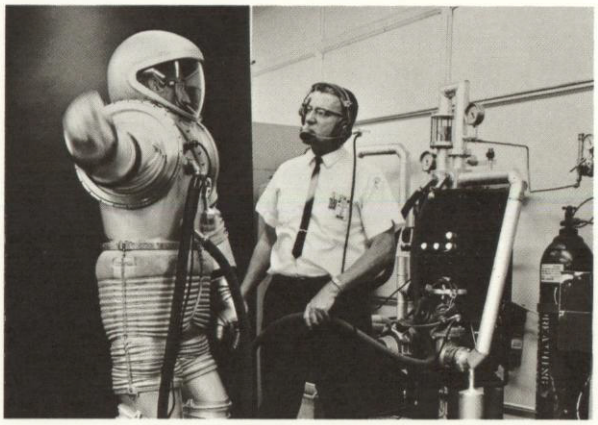
Immune to transient disappointments, French statesman Jean Monnet, as a single individual in a complex society, championed the cause of European unity and Atlantic partnership as the indispensable basis for lasting peace. In the words of John Fitzgerald Kennedy, "He built with the mortar of reason and the brick of economic and political interest" a community where defense is indivisible and economic life is interdependent. On December 6, 1963, Mr. Monnet was awarded the American Presidential Medal of Freedom and the citation: ". . . statesman of the world, he has made persuasion and reason the weapons of statecraft, moving Europe toward unity, and the Atlantic nations toward a more effective partnership."

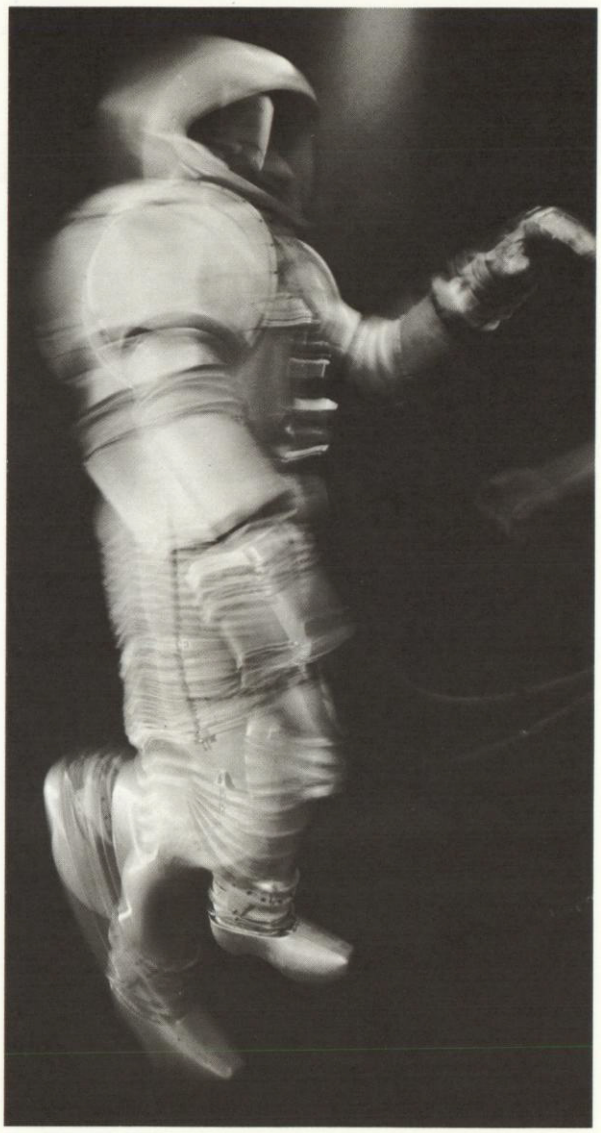
Guidance and Control Systems division.

At this division we made a significant advancement in the technology of inertial navigation systems during the year through the development of a new type of gyroscope, a component which constitutes a basic building block of all inertial systems. The new gyroscope represents a radical departure from the classical floated sphere employed in nearly all previous inertial systems. It promises to be more reliable and much simpler and economical to manufacture than the conventional gyros which hitherto have been employed.

Coupled with the new gyro will be a new type of accelerometer also developed by scientists and engineers at the company's Guidance and Control Systems division. The new accelerometer and gyro together will form the basic sensory element of a completely new inertial navigation system. The system will make extensive use of microcircuitry, a field in which we have conducted an intensive research and development program. Contained in the memory unit of the system's computer will be a number of test routines to indicate the source of any malfunctions, thereby greatly simplifying maintenance procedures.

At the Guidance and Control Systems division we are continuing our efforts in the area of manned fighter aircraft systems, an area which still offers much opportunity for the development of new products. Litton's confidence in the future of manned aircraft has been justified by the receipt of large and significant orders for new and additional systems, and for further research and development work.





This unique prototype space suit, created by the Space Sciences Laboratory for NASA, is unusual for its articulated swivel joints and rigid aluminum sections. The construction permits an evenness of air pressure within the suit and a minimum of suit weight upon the wearer.

For a number of years Litton has been engaged in the production of precision potentiometers, another key element of inertial navigation systems. During fiscal 1964 Litton became one of the free world's largest manufacturers of these specialized components, produced by our Potentiometer Division. We have also achieved significant technological advancements in these products; the company's new potentiometer is one-fourth the size of earlier units performing the same task. Sales of potentiometers for commercial use have grown as these components have become more widely employed in medical electronic equipment and commercial computers. During the year we also began volume production of conductive film potentiometers, a newly developed type which is gaining rapidly in usage, because of its extremely long life.

At our Amecom division, a long-established producer of aircraft altimeters, we developed a new type of altimeter which constitutes the most advanced version available today. This product, called a low range radio altimeter, represents a major technological contribution toward the commercial airlines' goal of developing the capability for landing in any type of weather. Successful tests of the new altimeter were made by a leading aircraft manufacturer and several major airlines during the year, and the company anticipates this product will be widely accepted for use in commercial airliners and in the growing number of business aircraft.

Another product introduced during the year for application in aircraft and missiles was a line of torquer motors designed by our Poly-Scientific division. These are electromechanical devices used in inertial navigation systems and in other sophisticated electronic systems to supply torque, or twist force, with extreme accuracy, eliminating bulky, expensive gear trains.

Basic to the operation of Litton's Aero Service division are highly sensitive electronic instruments used in aerial searches for oil, minerals and water throughout the world. During fiscal 1964, we further strengthened Aero's competitive position by acquiring rights to the use of a recently-developed rubidium vapor magnetometer, the most sensitive of its type in existence. The resolution provided by the new magnetometer is ten times greater than that of any previously available instrument, permitting even more accurate magnetic measurements in Aero's global search for oil.

During the year, Aero and its affiliates flew approximately 550,000 miles of surveys, exploring in 16 countries and mapping in 15 others. These projects included a 144,000-square-mile survey for oil beneath Europe's North Sea; an 81,000-square-mile survey for water in Spain; a 42,000-square-mile magnetometer survey for petroleum in the Arctic areas of Canada; and a photomapping and magnetometer search for oil in the Great Barrier Reef area off the northeast coast of Australia.

Delicate electronic instruments are equally as important to our Western Geophysical division in its worldwide seismological surveys. The division's development of new equipment and techniques for its marine surveys was a major factor in winning the largest single geophysical contract ever awarded. This project, begun and

completed during the year, involved a 14,000-square-mile seismological survey of the Persian Gulf, in conjunction with an exploration program involving a group of 31 oil companies.

Western Geophysical also participated extensively in the same massive North Sea oil search which involved Aero Service. These two projects and a number of other programs made fiscal 1964 a record year for Western Geophysical in total dollar volume of business.

Additionally, a significant enlargement of Western Geophysical's data reduction facilities in Shreveport, Louisiana, was completed during the year. This expansion included the installation of new data processing equipment of the division's own design. The Louisiana facility is the primary processing and reduction center for data gathered in Western Geophysical's marine surveys throughout the world.

Another growing field requiring highly precise instruments is the science of oceanology, the exploration of the seas for both scientific and commercial benefit. At the Amecom division, where Litton has established itself as a leader in the design and manufacture of instruments for a variety of marine purposes, we made a further contribution to this field during the year with the introduction of a new precision depth recorder. Litton also broadened the scope of its research and development activities at Amecom during the year to further enhance our competitive position in the field of depth recording and ocean profiling. The Amecom division also delivered a quantity of precision depth recorders for installation in the navigation systems of Polaris missile-carrying submarines, and received additional orders from the Navy for other applications.

This is one of the several Litton-built Atherton Division high-speed microwave oven units that provide appetizing food, individually heated with sufficient rapidity to serve cafeteria line customers.

LODAR (Locomotive Data Recording), a product of Litton's Amecom Division, is a data recorder system designed to increase the operating efficiency of locomotives. Located both in the locomotive and at railroad terminals, LODAR records data on acceleration, deceleration, braking and serves as an aid in the prevention of engine malfunctions.

During the year Litton's Atherton division made major strides in the application of microwave energy to food preparation and industrial heating and processing. To its line of Heat-n-Eat infra-red ovens, the company added a microwave oven incorporating a magnetron, the energy-producing unit, designed by the Litton Electron Tube division. This model is designed for food vending; ultimately, the company's line of microwave ovens will also include units for use in restaurants and in private homes.

The company believes microwave energy can be employed in many areas of industry in which conventional heating equipment is now used. Among the most promising of these areas is the curing of foam and other plastics. During the year our Atherton division developed and delivered equipment for this purpose, and early in fiscal 1965 made initial deliveries for another application, the high speed processing of photographic film and paper.

After the close of the year Litton announced the development and availability of three models of microwave heating equipment for industrial processing and experimentation. These systems, designed to provide industry with microwave energy for various applications, are available in conveyorized tunnel, cavity and waveguide transmission-type configurations. The equipment is the first to be offered in standard modules to meet a variety of industrial requirements.

Litton is participating in the microwave cooking, heating and curing industry not only by developing and marketing its own equipment but also by producing components for other manufacturers. Again in fiscal 1964 our Electron Tube division was a major supplier of microwave heating components for all segments of this industry.

Our Clifton Precision Products division maintained its position in fiscal 1964 as the leading manufacturer of rotary components for electronic equipment applications. Clifton is the largest single producer of synchros and resolvers, elements of servomechanism control systems used in such applications as aircraft navigation computers. The company also improved Clifton's position as a supplier of components for the machine control industry, a field which is expected to show rapid continued growth as manufacturers intensify their cost-cutting efforts.

When the United States sends its first unmanned scientific probe to Mars, Litton-developed instrumentation will be aboard. Late in the year, the company's Applied Science division received additional funding from the National Aeronautics and Space Administration for development of equipment which will be landed on Mars to sample the soil of the planet for measurement of microorganic content. This information, which will be radioed back to earth, is expected to help answer the long-pondered question of whether there is life on Mars.

Litton also is active in the development of equipment for manned space flight. During the year our Space Sciences Laboratory delivered to the National Aeronautics and Space Administration a prototype of a space suit that ultimately may be worn by U.S. astronauts on the moon. The Litton suit differs from suits now used by

astronauts in that it is made of aluminum with flexible joints instead of fabric. Because it is sectionally rigid, the Litton space suit permits normal arm and leg movements to be made without causing pressure changes inside the suit. In most conventional fabric suits, pressure is altered throughout the suit when the torso or limbs are bent.

During fiscal 1964 the company broadened its participation in the expanding market for medical electronic instruments. At the Fritz Hellige division, we introduced a new device called the Erymat, a human-engineered instrument for determining red blood cell count and hemoglobin content. This product is characterized by its easy handling, high standard of performance and its moderate, competitive price.

The company also increased its Hellige division sales from the design, manufacture and installation of complete systems used for the supervision of a hospital patient's physical condition before, during, and after surgery. The market for both the Erymat and the patient supervision systems is extensive, since such instruments and systems may well be used in hospitals throughout the world.

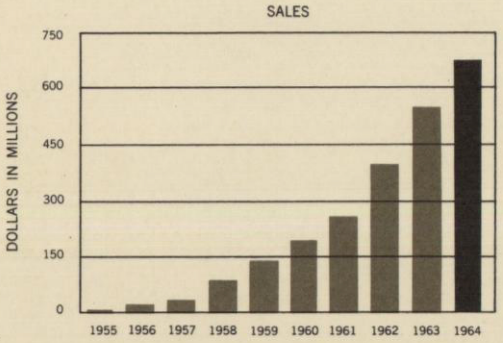
Further complementing our line of medical electronics are the products of Profexray, Inc., which combined its operations with Litton soon after the fiscal year ended. Profexray, one of the largest manufacturers of medical diagnostic X-ray equipment in the United States, produces a wide variety of complete X-ray systems, including models capable of meeting nearly every medical diagnostic requirement. The new Litton division also manufactures many of the mechanical and electrical X-ray components used in its systems.

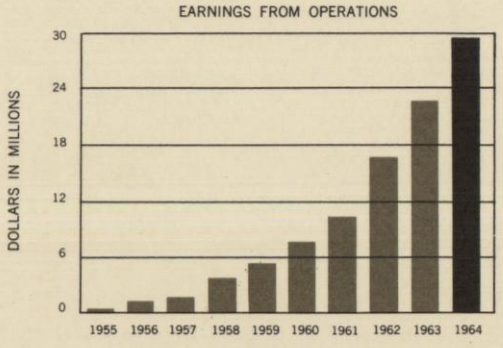
Litton continues to participate in the growth of the television industry through the production of a variety of precision components for TV sets. At our Utrad division, sales of deflection components to television manufacturers increased approximately 50 per cent above the fiscal 1963 level, in part because of the introduction of color television deflection yokes. We also made quantity deliveries of Utrad components for closed circuit television systems during the year. Moreover, television manufacturers used an increasing number of printed circuits made at our Advanced Circuitry division.

Since the birth of the stereophonic record player, the StereoDisk recorder developed and produced by Litton's Westrex division has been the most widely used for the commercial recording of stereophonic records. During the year the company introduced a new model of the StereoDisk which provides improved response and dynamic stability in stereo recording. This new product further enhances the quality of the records purchased by consumers, but does not require the consumer to purchase any new or additional equipment.

In the USECO division, the company took steps to participate in the air conditioning and refrigeration system market. Through USECO, we sponsored a program aimed at the development of a ceramiplastic that will constitute a true hermetic seal with good insulating qualities, ruggedness, and low production cost. The company is highly satisfied with the results of this program, and during fiscal 1965 we will introduce molded products in a full range of plastics.

FINANCIAL STATEMENTS





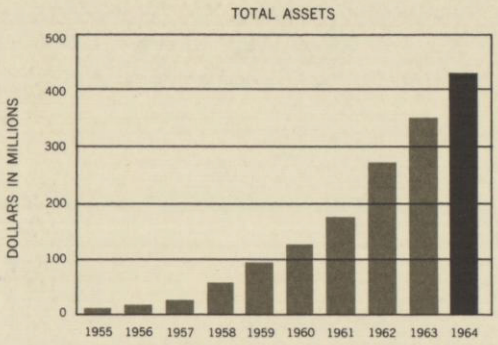
HIGHLIGHTS OF TEN YEARS' OPERATIONS

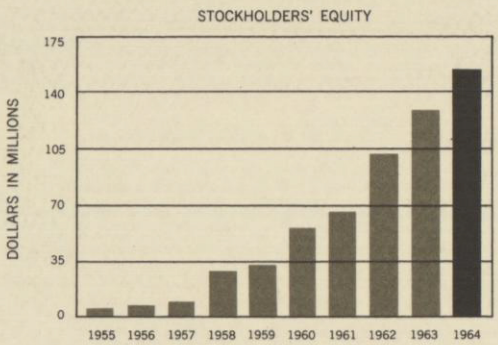
As reported in the Company's annual reports (see note)

	Fiscal Years Ended July 31		
	1964	*1963*	*1962*
Operating Results			
Sales and service revenues	$686,135,497	$553,146,239	$393,807,709
Earnings before taxes on income	56,151,444	43,796,403	30,849,499
Federal and foreign taxes on income	26,384,123	20,500,296	14,533,547
Net earnings	29,767,321	23,296,107	16,315,952
Per common share outstanding at year-end***	2.77	2.23	1.60
Depreciation	16,780,000	11,467,000	8,527,000
Financial Position (Year-End)			
Net working capital	$198,260,860	$156,913,302*	$113,478,440
Property, plant and equipment — at cost	175,228,276	159,183,824*	106,787,138
Accumulated depreciation	70,560,357	62,383,796*	43,820,326
Net property, plant and equipment	104,667,919	96,800,028*	62,966,812
Total assets	423,697,443	384,136,455*	269,491,286
Stockholders' equity	154,749,892	131,729,683*	102,934,058
General Statistics (Year-End)			
Shares of common stock outstanding***	10,508,365	10,398,847	10,157,142
Number of common stockholders of record	57,323	43,417	32,755
Number of employees	46,900	43,000	37,700

Note: In its annual financial statements the company consistently reports the operations of businesses acquired under the pooling of interests concept from the beginning of the year in which the acquisition occurs. On the basis of including operations of pooled businesses prior to their years of acquisition, operating results would have been as follows:

	Sales and Service Revenues	Net Earnings	Earnings Per Common Share
1963	$594,155,305	$23,532,108	$2.17
1962	475,719,000	18,503,000	1.71
1961	341,342,000	12,690,000	1.19
1960	292,992,000	11,370,000	1.07





1961	*1960*	*1959*	*1958*	*1957*	*1956*	*1955*
$250,114,456	$187,761,242	$125,525,561	$83,155,473	$28,130,603	$14,920,050	$8,898,797
19,687,457	15,365,182	10,805,756**	7,044,437	3,232,493	1,995,703	679,413
9,529,134	7,910,328	5,851,725	3,342,234	1,426,000	976,000	243,000
10,158,323	7,454,854	4,954,031**	3,702,203	1,806,493	1,019,703	436,413
1.07	.80	.60**	.47	.33	.21	.10
5,131,267	3,213,720	2,235,128	2,090,083	693,218	430,607	340,000
$ 73,631,064	$ 53,846,309	$ 38,741,071	$23,117,831	$ 6,731,958	$ 2,655,003	$1,130,111
60,860,252	41,545,708	29,633,695	22,781,070	7,277,766	4,648,181	3,632,193
22,987,124	17,563,971	11,850,224	7,915,605	1,939,535	1,144,109	788,231
37,873,128	23,981,737	17,783,471	14,865,465	5,338,231	3,504,072	2,843,962
172,771,125	119,004,373	83,254,170	57,750,861	16,823,383	10,826,182	7,647,918
63,730,972	50,568,249	34,546,600	27,994,799	7,785,419	4,533,177	3,442,160
9,408,305	9,180,637	7,930,693	7,654,606	5,403,543	4,737,586	4,374,454
21,936	16,322	8,589	5,801	4,500	3,000	1,700
23,000	17,400	12,400	8,600	2,700	2,000	1,100

*Restated to include businesses acquired in 1964 in poolings of interests.
**Excluding special income credit of $1,021,000 or 13¢ a share.
***Adjusted for stock dividends and stock splits.

LITTON INDUSTRIES, INC. AND SUBSIDIARY COMPANIES

CONSOLIDATED BALANCE SHEET JULY 31, 1964

ASSETS

Current Assets:		
Cash, and marketable securities of $43,152,750 at cost (approximate market value)		$ 56,481,254
Accounts receivable:		
Trade accounts	$141,808,924	
Reimbursable unbilled expenditures under government contracts	4,602,839	146,411,763
Inventories, at lower of cost or market, less progress billings of $64,828,040		103,263,088
Prepaid expenses		3,740,352
Total Current Assets		309,896,457
Investments		1,994,435
Property, Plant and Equipment — at cost:		
Land	5,996,332	
Buildings	50,584,543	
Machinery and equipment	118,647,401	
	175,228,276	
Less accumulated depreciation	70,560,357	104,667,919
Other Assets:		
Patents	364,709	
Excess of cost of businesses acquired over related net assets	4,930,258	
Other	1,843,665	7,138,632
		$423,697,443

See notes to financial statements.

LIABILITIES AND STOCKHOLDERS' EQUITY

Current Liabilities:			
Notes payable to banks			$ 2,137,450
Accounts payable			64,749,735
Payrolls and related expenses			24,883,814
Federal and foreign taxes on income			18,069,598
Current portion of long-term debt and debentures			1,795,000
Total Current Liabilities			111,635,597
Long-Term Liabilities (Note B)			73,615,404
Deferred Service Contract and Other Income			10,389,650
Convertible Subordinated Debentures (Note C)			73,306,900
Stockholders' Equity (Note D):			
Capital stock:			
Voting preferred, convertible, cumulative, par value $5 a share, issuable in series: Authorized 3,000,000 shares			
Series A issued and outstanding 463,681 shares		$ 2,318,405	
Common, par value $1 a share: Authorized 17,000,000 shares			
Issued 10,936,506 shares less 428,141 shares in treasury		10,508,365	
Additional paid-in capital		69,045,689	
Earnings retained in the business	$127,704,648		
Less amounts transferred to paid-in capital for stock dividends paid	54,827,215	72,877,433	154,749,892
			$423,697,443

See notes to financial statements.

LITTON INDUSTRIES, INC. AND SUBSIDIARY COMPANIES

CONSOLIDATED STATEMENTS OF EARNINGS

	Year ended July 31, 1964	*Year ended July 31, 1963 (Note A)*
Sales and service revenues	$686,135,497	$553,146,239
1963 sales of companies not acquired until 1964 and treated as poolings of interests		41,009,066
	686,135,497	594,155,305
Costs and expenses (including depreciation of $16,780,000 and $12,473,000):		
Cost of sales	516,393,521	447,334,874
Selling, general and administrative	107,423,529	97,262,900
Interest	6,167,003	5,282,271
	629,984,053	549,880,045
Earnings before taxes on income	56,151,444	44,275,260
Federal and foreign taxes on income	26,384,123	20,743,152
Net earnings	29,767,321	23,532,108
Deduct 1963 net earnings of companies not acquired until 1964 and treated as poolings of interests		236,001
Net earnings, as reported	$ 29,767,321	$ 23,296,107

See notes to financial statements.

CONSOLIDATED STATEMENT OF EARNINGS RETAINED IN THE BUSINESS

Year Ended July 31, 1964

Balance at beginning of year:		
Litton Industries, Inc. and subsidiary companies		$ 63,433,095
Companies acquired — accounted for as poolings of interests		4,651,048
		68,084,143
Net earnings for the year		29,767,321
		97,851,464
Deduct:		
Premium on redemption of convertible subordinated debentures	$ 6,369,090	
Cash dividends on preferred stock — $3 annual rate	637,592	
Market value of 2½% stock dividend	17,967,349	24,974,031
Balance at end of year		$ 72,877,433

CONSOLIDATED STATEMENT OF ADDITIONAL PAID-IN CAPITAL

Year Ended July 31, 1964

Balance at beginning of year:	
Litton Industries, Inc. and subsidiary companies	$ 47,130,413
Companies acquired — accounted for as poolings of interests	4,499,308
	51,629,721
Excess of market value of stock dividend over par value of common stock issued	17,595,208
Excess of market value over par value of common stock issued to purchase businesses	177,141
Excess of principal amount of debentures and $100 par value voting preferred stock converted over par value of common stock issued	1,184,288
Premium on sale of convertible subordinated debentures	417,160
	71,003,518
Deduct excess of par value of preferred stock issued over par value of common stock exchanged therefor	1,957,829
Balance at end of year	$ 69,045,689

See notes to financial statements.

NOTES TO FINANCIAL STATEMENTS

NOTE A—Principles of Consolidation

The accounts of the Company and its wholly-owned subsidiaries have been consolidated in the accompanying financial statements.

During the year ended July 31, 1964, the Company acquired the net assets of Adler Electronics, Inc., Clifton Precision Products, Inc. and Fitchburg Paper Company. These acquisitions have been accounted for as poolings of interests and the figures for the year ended July 31, 1963 included in the comparative statement of earnings have been restated to give effect to these transactions.

Also during the year the Company purchased all of the outstanding stock of Bruder and Company, Incorporated, the net assets of Advance Data Systems Corporation and the aerospace research and engineering department of the electronics division of General Mills, Inc. Operations of these businesses are included since dates of acquisition.

For events subsequent to July 31, 1964 see the Letter to Shareholders on page 4 of this report.

NOTE B—Long-term Liabilities

Long-term liabilities consisted of the following:

Long-term debt:	
Notes payable to insurance companies	$55,044,000
4½% subordinated corporate notes, due January 2, 1969	2,675,045
Other	5,038,422
	62,757,467
Less current portion	1,325,000
	61,432,467
Deferred federal and foreign taxes on income	12,182,937
	$73,615,404

Notes payable to insurance companies included $50,000,000 due December 1, 1984, payable annually commencing December 1, 1968 at the rate of $2,750,000 with interest at 4½%, $2,400,000 due May 1, 1971, payable at the rate of $325,000 annually with interest at 3⅜%, and $2,644,000 due January 1, 1977, payable at the rate of $200,000 annually with interest at 5.35%.

Under the various borrowing agreements the Company has agreed to maintain certain ratios of assets to debt and stockholders' equity to debt. The Company is in compliance with the terms of the agreements.

NOTE C—Convertible Subordinated Debentures

Convertible subordinated debentures were as follows:

3½% due April 1, 1987, issued 1962, 1963 and 1964	$64,943,900
5¼% due December 1, 1974, issued 1959	4,105,000
4¾% due June 1, 1974, issued 1959	4,700,000
5% due September 1, 1965, issued 1955	28,000
	73,776,900
Less current portion	470,000
	$73,306,900

The debentures are convertible into common stock of the Company at conversion prices as follows: 3½% debentures—$80 a share until April 1, 1972, $85 a share until April 1, 1982, $90 a share thereafter; 5¼% debentures—$40 a share; 4¾% debentures—$32.50 a share; 5% debentures—$3.13 a share. These conversion prices are subject to antidilution provisions.

The Company has agreed to retire annually principal amount of debentures as follows: 3½% debentures—$2,576,000 commencing April 1, 1972; 5¼% debentures—$600,000 commencing December 1, 1965; 4¾% debentures—$470,000 commencing June 1, 1965; 5% debentures—$150,000 commencing September 1, 1958. Required annual retirements of the 5¼% and the 5% debentures have been met through December 1, 1967 and September 1, 1964, respectively.

The debentures are subordinated to all existing debt and future debt of the Company with limited exceptions. The Company is in compliance with the terms of the debentures.

NOTE D—Stockholders' Equity

At a special meeting held on September 16, 1963 the stockholders of the Company authorized the issuance of a new $5 par value voting preferred stock, which is convertible into common stock on a share-for-share basis. The one-for-one conversion price is subject to antidilution provisions. At the time of issuance of each series of the new preferred stock, the Board of Directors of the Company may fix, among other things, the dividends payable thereon and the times and prices of redemption.

In February 1964, 428,141 shares of Series A $3 Cumulative Convertible Preferred Stock, $5 par value were issued in exchange for 428,141 shares of common stock, which are being held in treasury. Shares of Series A preferred stock are redeemable at any time on or after April 1, 1972 at $100 a share plus accrued dividends and, in the event of liquidation, are entitled to receive $50 a share plus accrued dividends.

At July 31, 1964, there were reserved 1,067,985 common shares for conversion of debentures and 463,681 common shares for conversion of preferred stock.

In addition, under certain acquisition agreements common shares are to be issued as additional consideration for businesses acquired. The number of shares to be issued is dependent, among other things, upon future earnings of acquired businesses and future market value of Litton stock. Based upon estimates of earnings and present market value, the maximum number of common shares which could be issued as additional consideration is approximately 250,000.

Under terms of the Company's borrowing agreements, consolidated earnings retained in the business of approximately $43,700,000 are available for cash dividends on common stock at July 31, 1964.

On August 11, 1964, the Board of Directors of the Company declared a common stock dividend of 2½% payable November 25, 1964 to holders of record of such common stock at the close of business October 16, 1964. This transaction has not been reflected in the financial statements.

NOTE E—Contingent and Lease Obligations

Approximately 50% of the Company's sales for the current year are subject to the Renegotiation Act of 1951. Adequate provision has been made for possible refunds.

Annual rentals under long-term leases are approximately $2,700,000 plus property taxes and insurance in some instances.

TOUCHE, ROSS, BAILEY & SMART
Certified Public Accountants

3350 Wilshire Boulevard
Los Angeles 5, California

October 5, 1964

Board of Directors
Litton Industries, Inc.
Beverly Hills, California

We have examined the consolidated balance sheet of Litton Industries, Inc. and subsidiary companies as of July 31, 1964, and the related statements of earnings, earnings retained in the business, and additional paid-in capital for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the financial statements referred to above present fairly the consolidated financial position of Litton Industries, Inc. and its subsidiary companies at July 31, 1964, and the consolidated 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.

Touche, Ross, Bailey & Smart

Certified Public Accountants

PRODUCTS, SYSTEMS AND SERVICES OF THE WORLD WIDE DIVISIONS OF LITTON INDUSTRIES

DATA PROCESSING AND COMPUTATION Accounting machines—Monroe • Adding machines—Monroe • Air data computers—Litton Systems (Canada), Guidance and Control • Air data equipment—Data Systems • Air data equipment and systems—Duluth • Analog computers—Litton Systems (Canada), Guidance and Control • Analog to digital converters—Encoder • Automatic change makers—Svenska Dataregister • Business machines, accounting—Monroe • Business machines, data processing—Kimball, Monroe, Monroe/Sweda • Calculating machines—Monroe • Cash registers—Svenska Dataregister, Monroe/Sweda • Change makers, automatic—Svenska Dataregister • Circuits, flexible—Advanced Circuitry • Coin handling devices—Advance Data Systems • Components testing—Paratron • Computer generated displays—Guidance and Control • Computers, air data—Guidance and Control, Litton Systems (Canada) • Computers, display—Guidance and Control • Computers, electronic—Monroe • Computers, general and special purpose—Guidance and Control, Monroe, Litton Systems (Canada) • Computing service—Monroe • Currency recognition equipment—Advance Data Systems • Converters, analog to digital—Encoder • Data links—Data Systems • Data logging equipment—Monroe • Data processing business machines—Monroe/Sweda, Monroe, Kimball • Data processing and display systems—Data Systems • Data processing & management systems—Advance Data Systems • Data processing equipment—Monroe, Data Systems, Westrex Co., Ltd. • Data processing, reconnaissance r & d—Information Sciences Laboratory • Data processing services—Monroe Data Processing • Digital computers—Monroe, Duluth, Guidance and Control • Display computers—Guidance and Control • Displays, computer generated—Guidance and Control • Drum and core memory systems—Guidance and Control • Drums, magnetic—Data Systems, Guidance and Control • Electronic computers—Monroe • Flexible circuits—Advanced Circuitry • General and special purpose computers—Monroe, Litton Systems (Canada), Guidance and Control • High speed tabulators studies—Svenska Dataregister • Identification, automatic speech and speaker—Information Sciences Laboratory • Magnetic drums—Monroe, Data Systems, Guidance and Control • Mirror microscopy—Applied Science • Navigation systems—Duluth • Perforators and printers, tape—Monroe • Pickoffs, gyro computing and multipole—Clifton • Processing facilities, punched tape—Monroe Data Processing • Readers, punched tag—Kimball • Recording equipment, point of sale—Monroe/Sweda • Revenue control systems—Advance Data Systems • Resistors, variable—Potentiometer • Space information systems—Data Systems • Special application connectors, terminals—Winchester • Special Engineering—Advance Data Systems • Specification writing—Paratron • Sputtering—Applied Science • Statistical studies—Paratron • Surveillance systems—Data Systems • Systems engineering—Aero Service • Systems, air data equipment—Duluth • Systems, air defense—Data Systems • Systems, air traffic control—Data Systems • Systems, command and control—Data Systems • Systems, data processing and display—Data Systems • Systems, digital computer—Data Systems • Systems, medical electronic—Hellige • Systems, reconnaissance—Data Systems • Systems, space information—Data Systems • Systems, surveillance—Data Systems • Systems, tactical communications—Data Systems • Tabulators, high speed—Svenska Dataregister • Tactical Communications Systems—Data Systems • Tags, product identification—Kimball, National Tag • Tag/Tape translators—Westrex Co., Ltd. • Tape perforators and printers—Monroe • Tapes, pressure sensitive—Kimball • Target detection, sonar—Information Sciences Laboratory • Transformers, miniature—Triad **COMMUNICATIONS AND TRANSMISSION** Absorbers, microwave—Airtron • Amplifiers—Electron Tube • Amplifiers, audio—Westrex Co., Ltd. • Amplifiers, parametric—Airtron • Amplifiers, servo and booster—Clifton • Announcing systems—Westrex Co., Ltd. • Antenna feeds—Airtron • Antennas—Airtron • Antenna systems—Emertron • Anti-submarine warfare—Data Systems • Anti-submarine warfare detection—Litton Systems (Canada) • Assemblies, microwave—Airtron • Attenuators—Airtron • Audio transformers—Triad, Utrad • Automatic voltage regulators, commercial and industrial—Triad de Mexico • Backward wave oscillator tubes—Electron Tube • Band pass filters—Triad • Broadcasting systems—Adler Educational Systems • Castings, precision—Airtron • Cathode ray tubes—Electron Tube • Chemistry, surface—Applied Science • Choke transformers—Triad • Circuits, printed—Advanced Circuitry • Circulators—Airtron • Coaxial filters—Airtron • Coils, focus—Electron Tube • Communication equipment, radio and facsimile—Adler/Westrex • Communication systems—Westrex • Communications systems, tactical—Data Systems • Communications systems, transportable and fixed—Adler/Westrex • Communications underwater—Information Sciences Laboratory • Components, strip line and waveguide—Airtron • Connectors, high voltage—Electron Tube • Countermeasures systems—Emertron • Couplers, directional—Airtron • Couplings, quick disconnect—Airtron • Crossed-field amplifiers tubes—Electron Tube • Crystal filters—Airtron • Crystal protectors—Airtron • Crystals for solid state devices—Airtron • Crystals, laser—Airtron • Crystals, garnet—Airtron • Crystals, piezoelectric—Airtron • Deaf education equipment—Westrex Co., Ltd. • Demodulators—Airtron • Devices, microwave—Emertron • Directional couplers—Airtron • Direct writing cathode ray tubes—Electron Tube • Display tubes—Electron Tube • Dividers, power—Airtron • Dummy loads—Airtron • Duplexes—Airtron • Educational & instructional television—Adler Educational Systems • Electromagnetic and laser devices—Space Sciences Lab. • Electrostatic printers—Electron Tube • Encapsulation cups—USECO • Environmental connectors—Winchester • Equalizers—Westrex • External miniature rectangular connectors—Winchester • Feeds, antenna—Airtron • Ferrites—Airtron • Fibre optic tubes—Electron Tube • Film pulling mechanisms—Westrex • Filters, band pass—Triad • Filters, coaxial—Airtron • Filters, crystal—Airtron • Filters, high pass—Triad • Filters, low pass—Triad • Filters, microwave—Airtron • Fine particle technology—Applied Science • Fixed communications systems—Adler/Westrex • Flexible waveguides—Airtron • Flying spot scanners—Electron Tube • Focus coils—Electron Tube • Hardware, microwave—Airtron • Heads, magnetic recording—Westrex • Hermetically sealed connectors—Winchester • High definition display tubes—Electron Tube • High pass filters—Triad • High voltage connectors—Electron Tube • Hospital communications—Westrex Co., Ltd. • Hotel communication systems—Westrex Co., Ltd. • Instructional and educational television—Adler Educational Systems • Isolators—Airtron • Joints, rotary—Airtron • Klystron tubes—Electron Tube • Laser devices, electromagnetic—Space Sciences Lab • Lasers—Electron Tube • Loads, dummy—Airtron • Loudspeakers—Westrex Co., Ltd. • Low pass filters—Triad • Magnetic recording heads—Monroe, Westrex • Magnetic recording systems—Westrex • Magnetron tubes—Electron Tube • Mechanical waveguide switches—Airtron • Microwave absorbers—Airtron • Microwave, assemblies—Airtron • Microwave devices—Emertron • Microwave filters—Airtron • Microwave hardware—Airtron • Microwave systems—Adler Educational Systems • Microwave tubes—Electron Tube • Millimeter wave tubes—Electron Tube • Miniature rectangular connectors—Winchester • Miniature round connectors—Winchester • Mixed duplexers—Airtron • Modulators—Electron Tube, Monitor diodes—Electron Tube • Mono disc recording systems—Westrex • Motion picture projection equipment—Westrex Co., Ltd. • Parametric amplifiers—Airtron • Phase shifters—Airtron • Physics, surface—Applied Science • Physics, upper atmosphere—Applied Science • Plasma ion interaction—Applied Science • Power amplifier tubes—Electron Tube • Power dividers—Airtron • Power supplies—Electron Tube, Data Systems • Power transformers—Triad, Utrad • Precision castings—Airtron • Printed circuits—Advanced Circuitry • Printed circuit connectors—Winchester • Printers, electrostatic—Electron Tube • Projection equipment, motion picture—Westrex Co., Ltd. • Protectors, crystal—Airtron • Punch tape equipment—Westrex Co., Ltd. • Quick disconnect couplings—Airtron • Radiation shields—Electron Tube • Radio & facsimile communications equipment—Adler/Westrex • Recording equipment—Westrex Co., Ltd. • Recording & reproducing equipment systems sound and data—Westrex • Recording, special purpose optical systems & modulators for photographic center consoles—Westrex • Removable contact connectors—Winchester • Rigid waveguides—Airtron • Rotary joints—Airtron • Scanners, flying spot—Electron Tube • Shields, radiation—Electron Tube • Shifters, phase—Airtron • Shutter switches—Airtron • Signal sources—Electron Tube • Slotted sections—Airtron • Sockets—Electron Tube • Strip line components—Airtron • Supplies, power—Electron Tube • Surface chemistry—Applied Science • Surface physics—Applied Science • Switches, mechanical waveguide & shutter—Airtron • Switch tubes—Electron Tube • Systems, announcing—Westrex Co., Ltd. • Systems, antenna—Emertron • Systems, broadcasting—Adler Educational Systems • Systems, communications—Westrex • Systems, countermeasures—Emertron • Systems, hotel communications—Westrex Co. Ltd. • Systems, sonar—McKiernan-Terry • Systems, sound reinforcement—Westrex Co. Ltd. • Systems, translator—Adler Educational Systems • Systems, transportable & fixed communications—Adler/Westrex • Teleprinter high speed punches (modifications)—Westrex Co., Ltd. • Teletype machines—Litton Italia • Television, instructional and educational—Adler Educational Systems • Thermocouple leads—Airtron • Thermopiles—Electron Tube • Toroidal transformers—Triad, Utrad • Transducers—Westrex • Translator systems—Adler Educational Systems • Transportable communications systems—Adler/Westrex • Traveling wave tubes—Electron Tube • Tubes, backward wave oscillators—Electron Tube • Tubes, cathode ray—Electron Tube • Tubes, crossed-field amplifiers—Electron Tube • Tubes, direct writing cathode ray—Electron Tube • Tubes, display—Electron Tube • Tubes, fibre optic—Electron Tube • Tubes, high definition display—Electron Tube • Tubes, klystron—Electron Tube • Tubes, magnetron—Electron Tube • Tubes, millimeter wave—Electron Tube • Tubes, monitor diodes—Electron Tube • Tubes, oscillator—Electron Tube • Tubes, power amplifier—Electron Tube • Tubes, switch—Electron Tube • Tubes, traveling wave—Electron Tube • Waterloads—Airtron, Electron Tube • Waveguide components—Airtron • Waveguides,

flexible and rigid—Airtron • Windows—Electron Tube **SHIPS AND OTHER MARINE VESSELS** Aluminum barges—Ingalls • Barges, steel and aluminum—Ingalls • Boats—Ingalls • Conventional powered submarines—Ingalls • Marine equipment—Ingalls • Nuclear powered submarines—Ingalls • Rigs, offshore drilling—Ingalls • Ship conversion—Ingalls • Ship jumboizing—Ingalls • Ship modernization—Ingalls • Ships—Ingalls • Special facilities—Ingalls • Steel barges—Ingalls • Steel fabrication, marine—Ingalls • Steel structures, industrial—Ingalls • Submarine, conventional & nuclear—Ingalls • Submersible systems—Applied Science • Systems, submersible—Applied Science **INSTRUMENTATION AND CONTROLS** Accelerometers—Guidance and Control, Litton Systems (Canada) • Accelerators, induction plasma—Space Sciences Lab. • Accessories, X-ray—Automatic Seriograph • Adaptive flight Control Systems—Guidance and Control • Aerial photographs—Aero Service • Aerial photo surveys—Aero Service • Air navigation equipment (Altimeters)—Emertron • Alpha/numeric readouts—Guidance and Control • Altimeters—Emertron • Angle counters, miniature—Clifton • Assembly of Inertial Guidance Systems—Litton-Italia • Automatic evaluation equipment—Data Systems • Avionics systems—Guidance and Control • Balloons and balloon flight services—Applied Science • Binoculars—C. Plath • Blood cell counters (photoelectric)—Hellige • Blood coagulation meters—Hellige • Brushblocks—Poly-Scientific • Capsule, rotary—Poly-Scientific • Chronometers—C. Plath • Circuits, molecular interconnect—Advanced Circuitry • Circuits, multi-layer—Advanced Circuitry • Circuitry, weldable—Advanced Circuitry • Clocks, nautical—C. Plath • Collective protection devices—Applied Science • Colorimeters—Hellige • Communications, medical—Automatic Seriograph • Compasses, gyro & magnetic—C. Plath • Components—Components Group • Components, deflection—Utrad • Components, electronic, and systems—Clifton • Components, electropneumatic servo—Clifton • Computers, analog—Guidance and Control, Litton Systems (Canada) • Computers, digital—Duluth, Guidance and Control, Monroe • Computers, digital differential—Guidance and Control • Computers, navigational—Duluth, Guidance and Control, Litton Systems (Canada) • Computing resolvers, precision—Clifton • Cooking and heating tubes—Electron Tube • Counters, blood cell, photoelectric—Hellige • Cuvettes, precision spectrophotometry—Hellige • Defibrillators—Hellige • Densitometers—Westrex • Devices, medical electronic—Hellige • Electrocardiographs—Hellige • Electrocardioscopes—Hellige • Electroencephalographs—Hellige • Electromanometers—Hellige • Electromechanical systems—Applied Science • Electronic components and systems—Clifton • Electronic hardware—USECO • Electronics, medical—Automatic Seriograph • Electron spin resonance studies—Applied Science • Electropneumatic servo components—Clifton • Environmental control systems—Applied Science • Equipment, ground support—Data Systems • External-store airborne weapon systems—Applied Science • Failure analysis—Paratron • Flight control synchronizers—Clifton • Food heating and processing equipment, microwave—Atherton • Generators, motor—Clifton • Geophysical instruments—Aero Service • Geophysical research—Western Geophysical • Geophysical surveys—Aero Service • Gravimetric work—Western Geophysical • Ground support equipment—Westrex, Data Systems, Guidance and Control, Litton Systems (Canada) • Gyro compasses—C. 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Plath • Nuclear magnetic resonance studies—Applied Science • Oceanographic equipment—McKiernan-Terry • Oxymeters—Hellige • Papers, medical electronic recording—Fitchburg • Photoelectric blood cell counters—Hellige • Photogrammetric instruments—Aero Service • Positioners, angular—Clifton • Potentiometers, precision—Potentiometer • Potentiometer test equipment—Potentiometer • Precision computing resolvers—Clifton • Precision cuvette for spectro-photometry—Hellige • Propulsion, space—Space Sciences Lab. • Pulse transformers—Triad, Utrad • Quality control studies—Paratron • Quick disconnect, heavy duty connectors—Winchester • Reactor transformers—Triad • Readers, bar code, optical—Sweda • Recorder, industrial—Hellige • Re-entry simulators—Space Sciences Lab. • Regulators, automatic voltage, commercial and industrial—Triad de Mexico • Reliability analysis—Paratron • Relief maps—Aero Service • Research, geophysical—Western Geophysical • Resolvers—Clifton • Resources development services—Aero Service • Rotary capsules—Poly-Scientific • Rotary, switches—Poly-Scientific • Rotary, transformers—Poly-Scientific • Seismic exploration services—Western Geophysical • Seriograph—Automatic Seriograph • Servo-motors, sub-miniature, AC and DC—Clifton • Servo-packages, rotary components—Clifton • Sextants, marine—C. 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*Resigned effective Sept. 14, 1964

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