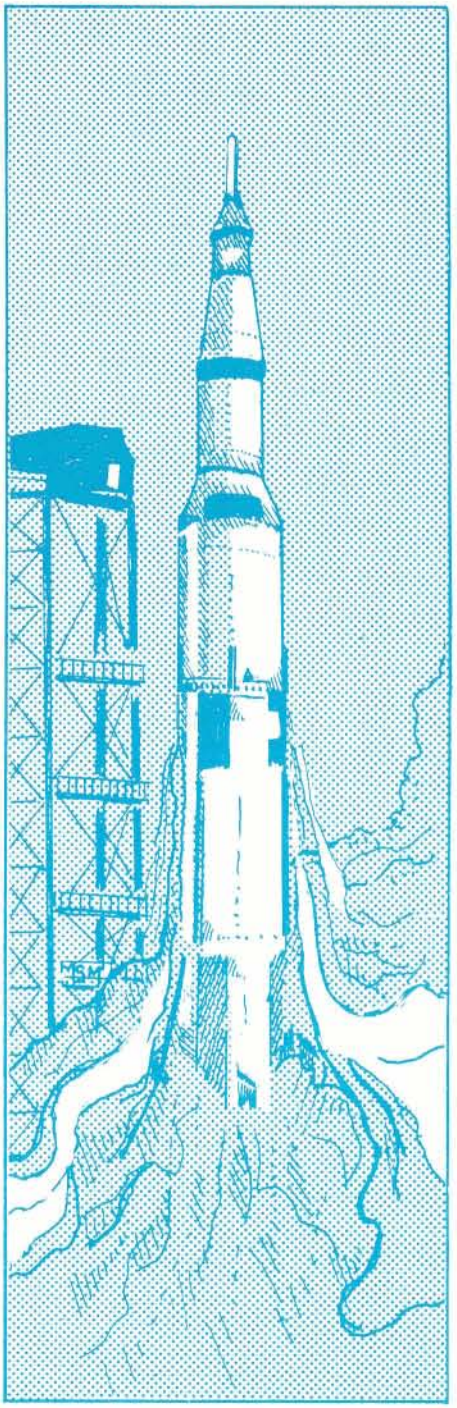
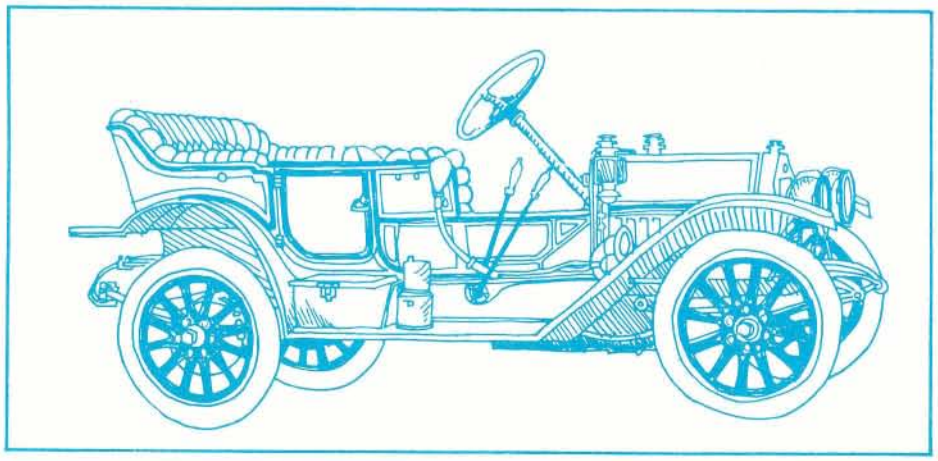
Bendix . . . Yesterday, Today, and Tomorrow

nbc photo





Bendix Field Engineering Corporation

As you read through these pages which describe our past as well as our present activities, it is appropriate to glance towards the future as depicted by Mr. A. P. Fontaine at the shareholders meeting on February 29, 1968:

"Surely the pace of change and the character of the variables that confront us demand of management a high order of judgement. But more than that, they demand a systematic approach to building for growth that is grounded in a clear statement of goals and buttressed by realistic plans for achievement. I feel confident that our objectives are clearly spelled out and understood at each level of management. It remains for us to apply our energies to the fulfillment of the plans we have set for ourselves."

On page 12 of this brochure you will find the Bendix Corporate Objectives. They set our course. The challenge for the future is ours to fulfill.

R. W. Schaeffer
Vice President of Operations
Bendix Field Engineering Corporation

This history has been abstracted from the text of a speech given by Mr. A. P. Fontaine, Chairman of the Board and Chief Executive Officer, The Bendix Corporation, to the Newcomen Society of North America on December 8, 1966. This Newcomen address was delivered at the "1966 Michigan Dinner" of the society held at Detroit, Michigan when Mr. Fontaine was the guest of honor.

Portions of Mr. Fontaine's talk relative to the Baltimore Divisions and Bendix Field Engineering were amplified locally to provide more historical detail concerning those organizations.

In many ways, The Bendix Corporation today is typical of what might be called a "new breed" of companies. There is a modest but growing number of firms like ours whose operations seem to defy classification into one or another of the rigid industrial categories. Typical of this new breed, Bendix is large, highly diversified, scientifically and technically oriented, and - fortunately - growing. You might say, to paraphrase Gilbert and Sullivan, "we are the very model of a modern major company." But more about that later.

The history of our company follows the patterns typical of many modern corporations. The early years are largely the story of a single man - in our case, Vincent Bendix - who took a bright idea and, with a combination of innate business aptitude, hard work, and good luck, forged that idea into the beginning of our company.

However, the events surrounding the birth of The Bendix Corporation were not particularly auspicious. Politicians are fond of citing humble beginnings; if there is special merit in having grown from low degree to international stature, that merit for The Bendix Corporation can certainly be claimed. While there is no log cabin in our background, there certainly is no silver spoon either.

The story of The Bendix Corporation begins in a Chicago hotel room in 1914 with the signing of an agreement between a 33-year-old inventor and officials of a struggling bicycle brake manufacturing firm. Under the agreement, Vincent Bendix gave an exclusive license to the Eclipse Machine Company in Elmira, New York, to manufacture his invention, which he described as "a transmission device for the starting of explosive motors." This device was marketed under the slogan "the mechanical hand that cranks your car" and is known to automotive history as the Bendix starter drive. This agreement proved to be the first big breakthrough for Vincent Bendix in the young but growing automotive industry. Up to this point, his career had not been notably rewarding.

At the age of 16, chafing under the strict discipline of his father, who was a Methodist minister, Vincent Bendix ran away from his home in Moline, Illinois. A mechanically minded youngster, he headed for New York City, where he worked as an elevator operator, a messenger in a lawyer's office, and a handyman in garages. Ultimately, he gravitated to the automobile field and, before he was 25, he associated himself with Glenn Curtiss in the manufacture and sale of motorcycles.

It was a few years later that he formed an automobile company and assembled and sold a few vehicles under the name of Bendix. Although his idea was good, his timing was unfortunate. That was 1907, a year that saw the introduction of 94 new automobile makes, including cars with such imaginative names as the Black Crow, Bugmobile, Single Center, and the Steel Swallow. In the face of such competition, young Mr. Bendix' car didn't have a chance.

Vincent Bendix' venture into the auto industry wasn't a complete flop, however. This exposure to the automobile business did interest the young man in the problem of starting automobile engines. He was convinced that only the perfection of mechanical starting would ensure complete public acceptance of the motor car by eliminating the hazards and inconvenience of handcranking.

Develops Starter Drive

It is true that the first electric starting motor had been introduced on the 1911 Cadillac, but a dependable mechanical link between the starting motor and the car's engine was still lacking. Bendix had developed a transmission device that would provide such a link, but he found that a vital part, a triple thread screw, was almost impossible to produce except by hand in a machine shop. Inspired by his visions of the tremendous market potential of the starter drive, Bendix begain searching for a manufacturer capable of producing a triple thread screw economically and in large volume.

The search led him, in 1913, to a bicycle show in Chicago, where he encountered John Ferguson, general manager of the Eclipse Machine Company. The bicycle coaster brake, which

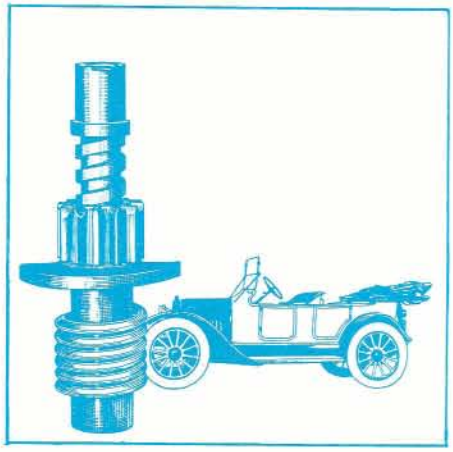
was Eclipse Machine's principal product, used a triple thread screw of the kind Mr. Bendix needed. Little time was wasted in negotiations, and the license agreement to produce starter drives was signed with Eclipse Machine the following year. The first Bendix starter drive was installed on Chevrolet's "Baby Grand" touring car in 1914, and 5,500 drives were produced that year. By 1919, production had soared to 1.5 million, and soon nearly every vehicle produced in the United States was equipped with the Bendix Drive. Vincent Bendix had been launched into the auto industry.

Hoping to duplicate his success with the starter drive, Bendix spent the next few years searching for other potential products, but success was slight. Then, in 1923, he became acquainted with Henri Perrot, an outstanding French engineer noted for his design of a taxicab with a short wheelbase and a tight turning radius, which made it ideal for use on narrow European streets.

At the time he and Bendix met, Perrot was investigating two areas of automotive brake equipment which badly needed improvement. With very few exceptions, the cars and trucks of the day were equipped with simple, but somewhat less than adequate, band brakes, and those only on the rear wheels. Perrot had designed a linkage system which would permit front wheel brakes. This invention he had licensed to the General Motors Corporation for manufacture under his patents. His second development was an internal expanding shoe brake which, in the long run, proved to be a much more important product than the linkage system.

Vincent Bendix was not only perceptive in recognizing engineering advancements, he was a persuasive salesman as well, and he used both talents in the negotiations with Perrot which followed. As a result, the Bendix Engineering Works was established with the exclusive license to the Perrot shoe brake patents. In addition, Perrot assigned to Bendix his interest in the brake linkage license granted to General Motors. With this, Bendix was prepared to offer the auto industry the first thoroughly reliable four-wheel brake system ever seen on American cars.

THE BENDIX STARTER DRIVE AND THE FIRST AUTOMOBILE TO USE IT—THE 1914 CHEVROLET "BABY GRAND"



This arrangement with Perrot was the first of many business associations Mr. Bendix had with individuals and companies in France. His contributions to French industry were recognized in 1963 when he was named to the exclusive Legion of Honor by the French Government. Interestingly enough, one of the first of these associations arose from the fact that a French firm was infringing on the Bendix starter drive patents. What started as a "cease and desist" order ended as a license agreement.

To finance the new brake business, The Bendix Corporation offered its stock for public sale for the first time in 1924. With the $800,000 raised by the sale of 40,000 shares, Bendix bought an old factory in South Bend, Indiana, and started manufacturing automobile brake systems for such early customers as Marmon, Locomobile, Packard, Hupp, and Durant. The next few years might have been drawn directly from a textbook example of the law of supply and demand. The auto industry needed better brakes, and the Bendix-Perrot system filled the bill. In the four years from 1924 to 1928, the Bendix brake plant grew from 20,000 square feet to more than a million square feet. Production climbed from 650,000 brakes in 1926 to 3,600,000 in 1928.

It was in 1928 that General Motors first became involved in the fortunes of The Bendix Corporation, a development that was to have far-reaching effects on the character of the company until 1948 when GM sold its last remaining interest in Bendix. By 1928, General Motors had become the largest customer for the Bendix starter drive and, when Vincent Bendix moved to acquire a majority interest in the Eclipse Machine Company, GM agreed to act as his agent in the transaction and accepted Bendix' notes for the $6.8 million needed for the purchase of the stock. As a result of these moves, General Motors was guaranteed a reliable source of supply for starter drives, and The Bendix Corporation added another facility to its growing industrial complex.

By 1928, the success of The Bendix Corporation in the booming auto industry seemed assured. In that year, it had about 25 percent of the available market for brakes, and profits at Eclipse Machine were $2.5 million, due principally to the sales of starter drives.

With his automotive operations in reasonably robust health, Vincent Bendix now turned his attention to the growing field of aviation. He had observed the fantastic growth in the production of engine starters, generators, and other electrical devices for aircraft at an Eclipse Machine subsidiary, and he was impressed. Even though he was personally uneasy about the prospects of flying-and probably never flew more than half a dozen times in his life - Vincent Bendix was convinced of the tremendous potential of the aircraft industry. He saw that Lindbergh's flight to Paris would capture the imagination of prospective investors as no other event in transporation history ever had. In an effort to borrow some of that glamor, he changed the name of his business to the Bendix Aviation Corporation in 1929 when eight percent of his company's sales were in aviation products.

Then, as if to justify the new name, Bendix embarked on a whirlwind acquisition program intended to increase the company's participation in the aviation industry. The companies Bendix acquired in 1929 and 1930 were among the first of the more than 100 companies, corporations, and partnerships which have gone into making up the modern Bendix Corporation. Among the major purchases of those early years was the Scintilla Magneto Company, which was engaged in the production of magnetos for reciprocating engines for aircraft. The Electrical Components Division still makes Scintilla magnetos and remains an expert in engine ignition systems, but today its electrical connectors form an important and expanding product line.

Pioneer Instrument Company was another of the many 1929 acquisitions. It was regarded in 1929 as the world's leading manufacturer of aircraft instruments, and its earth induction compass was used by Lindbergh during his Atlantic crossing. Today, the descendant of that company, the Navigation and Control Division in Teterboro, New Jersey, is one of our largest aviation and space-oriented operations.

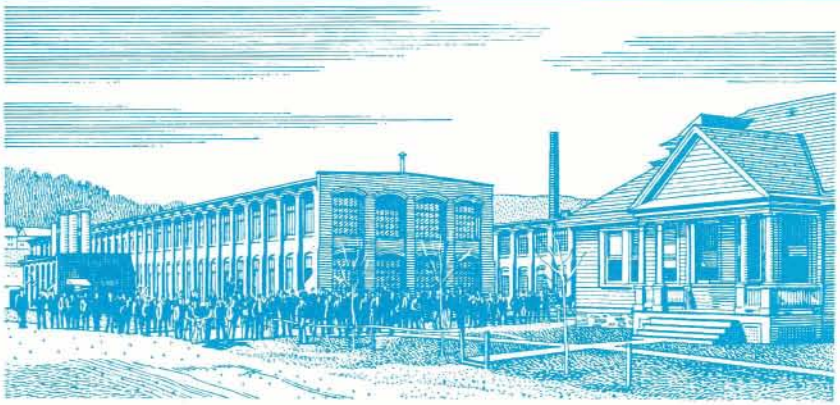
Another company acquired by Mr. Bendix in 1929 was the Stromberg Carburetor Company. It had become a status symbol in the 1920's to install a Stromberg carburetor on a new car unless it was so equipped by the manufacturer. Stromberg further strengthened the Bendix position in the automotive industry, and the prestige of the Stromberg name gave increased stature to the young company.

The acquisitions of 1929 gave the Bendix Aviation Corporation a broader line of products for the automobile industry and formed a substantial foothold in the aircraft components industry. The acquired companies brought with them the capable young men who since have made up the management of The Bendix Corporation. The immediate effect of the acquisitions was increased sales and profit and, by the end of the first full year of operation, net profits for the new Bendix Aviation Corporation totalled $1.2 million.

Things looked good for the Bendix Aviation Corporation. Business was good; the company was growing and stockholders were happy. They had reason to be happy: an investment of $26 in Bendix stock in 1924 was worth $420 by 1929, an increase of 1600 percent.

But of course this was 1929, and although Bendix was growing and for that period was already remarkably well diversified, it was far from immune to the Great Depression. In 1932, the Corporation operated at a loss, and dividends to stockholders were discontinued until 1935, when they were resumed. The stock which had sold for $104.37 a share in 1929 was down to $4.37 by 1933 - a drop of exactly $100.

The depression years were rough ones for the Corporation, yet the 1930's still stand out as a decade of research and development at Bendix, marked by sparkling invention and the improvement of our aviation and automotive products. Bendix engineers during those years experimented with power brakes and power steering for cars and trucks, fields in which Bendix leads today. At



ECLIPSE MACHINE COMPANY, ELMIRA, NEW YORK, IN 1915—
THE HOME OF THE BENDIX STARTER DRIVE

the Radio Division, revoluntionary developments, such as the aviation radio compass, came off the drawing boards, and experiments went forward with a newfangled instrument called radar, in which Bendix pioneered.

One of the most important of the new inventions to come out of Bendix during the 1930's was the pressure carburetor for aircraft engines. By 1938, this device had been developed to the stage of successful performance, and in the war years just ahead, the Bendix-designed carburetor was used on the engines of virtually every aircraft in the Allied arsenal.

The interest Vincent Bendix had in aviation led him to establish the Bendix Transcontinental Air Race in 1931. It was a time of daring and glamor in aviation; for a generation the Bendix Air Race symbolized these qualities while it encouraged aircraft designers and pilots to build better, faster planes. The 1931 race was won by Major James Doolittle at an average speed of 223 miles per hour. By contrast, the winner of the of the Bendix race in 1962, Captain Robert G. Sowers, flew his B-58 coast-to-coast at an average speed of 1,215 miles per hour.

At this point, it seems appropriate to clear up the question, "What about the washing machine?" It seems that every representative of The Bendix Corporation sooner or later finds himself explaining that his company has nothing to do with the Bendix automatic washer and, in fact, never did have except in a rather remote way. It is a source of frustration to many of our people that, while our company designs and builds missiles and space systems, sophisticated aviation instruments, and literally thousands of highly engineered products, many people - perhaps most people -- who recognize the Bendix name connect it with an automatic washer we never marketed. This is probably due to the

THE COVETED BENDIX TROPHY

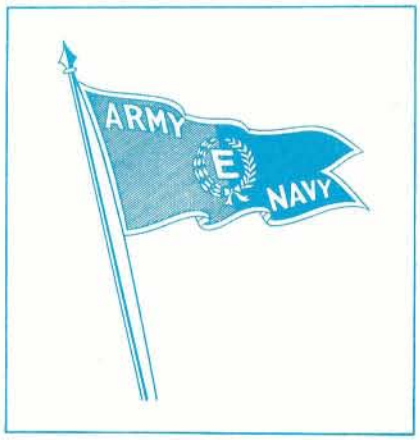
fact that the Bendix washer was a consumer product and received the advertising and public attention that consumer items do while our products, well-known in the business community, are seldom seen by the general public.

At any rate, in the mid-1930's, officials of the Hydraulic Brake Company, a Bendix subsidiary, allowed two young inventors to use Bendix facilities to refine a drastically new and unique automatic washing machine the two men had conceived. As the work progressed, the Hydraulic Brake Company officials persuaded Vincent Bendix to permit the use of the Bendix name on the machine. In return, Bendix Aviation was to receive 25 percent of the stock in Bendix Home Appliances, Inc., founded in 1936. Bendix was assigned the task of producing certain components for the machine, but that is about as close as we came to the washer.

The Bendix washer had tremendous appeal when it appeared on the market and at one time had 52 percent of the market for automatic washers. However, as war approached, shortages of material developed, losses mounted, and Bendix became too heavily involved in military production to continue the affiliation with Home Applicances. The Corporation finally disposed of its stock in Bendix Home Applicances in 1940.

By 1935, the Bendix Aviation Corporation was recovering from the depression, but profits remained low because of the costs of expanding established product lines and the consolidation of new ones. In 1937, general unsatisfactory conditions led General Motors, the owner of 25 percent of Bendix stock, to install two members on the Bendix board of directors. One of these men was Ernest R. Breech, a GM vice president, who was to have a major role in Bendix history a few years later. This was the beginning of a move to improve the position of the Corporation without drastically changing its character. A campaign began to streamline Bendix, tying up loose ends, cutting costs, consolidating and centralizing operations. Within a year, the Corporation changed from a kind of holding company to an operating organization through the transformation of the wholly owned subsidiaries into divisions. Profits remained low in 1938, but in 1939, the Corporation enjoyed the best peacetime year since its formation, with sales of $40 million.

There might be some doubt that 1939 can be considered a peacetime year, of course. By that time production orders began coming in from the British and French for military material. From 1939 to 1941, there was a hugh expansion of Bendix facilities to meet the needs of the preparedness program of the United States Government.



Emerson wrote that "Every great institution is the lengthened shadow of a single man." If this is true, the late 1930's marks the point that the shadow of Vincent Bendix began to diminish in importance in the affairs of the corporation he had founded. Mr. Bendix, whose personal worth in 1929 was conservatively estimated at $50 million, underwent bankruptcy proceedings in 1939 as the result of real estate speculation during the early 1930's. By the spring of 1942, Vincent Bendix had resigned as president and chairman of the board of the Bendix Aviation Corporation, and he remained apart from the Corporation until his death in 1945.

When Vincent Bendix resigned, Mr. Breech was elected the Corporation's president. Mr. Breech was well acquainted with the Corporations's plans and programs, and General Motors agreed to permit him to be a candidate for the presidency. Under his leadership, Bendix made numerous significant contributions to the war effort and earned 20 Army-Navy "E's" for efficiency in the process. Bendix developed the four-wheel drive for Jeeps, the Navy ground-controlled approach radar, the air position indicator, the automatic pilot for aircraft, automatic oxygen systems, a fuel injection system for aircraft, and the famous "Gibson Girl" emergency radio transmitter that led rescuers to countless fliers downed at sea.

Sales of the Corporation went from $40 million in 1939 to over $900 million in 1944. By 1944, Bendix had more than $100 million of government facilities in use, and employment had reached a peak of 70,000. To give an idea of how production soared, average monthly sales at Eclipse Pioneer Division alone went from $625,000 in 1939 to $30 million in 1945. Production of the pressure carburetors mentioned earlier leaped from 1,700 in 1939 to 674,000 in 1945. The sales volume at Radio Division went from only $2 million in 1939 to $193 million in 1945. So in mid-1945 when the war ended, our production, employment, and facilities were all at the highest point of the company's history.

However, within months of the war's end, the government cancelled some 21,000 contracts with Bendix for well over a billion dollars. To add to that, the Corporation at the same time lost its chief executive. It was 1946 when Mr. Breech resigned to become executive vice president of Ford Motor Company.

Following Mr. Breech's resignation, Mr. Malcolm P. Ferguson was elected to succeed him as president. Mr. Ferguson, by the way, was one of the men who joined The Bendix Corporation during the acquisition campaign of 1929. He came to Bendix as a junior executive at Eclipse Machine Company. While Mr. Breech's accomplishments were outstanding in the building up of facilities and performance during the war years, Mr. Ferguson was faced with the necessity of returning the company to peacetime production levels as quickly as possible. This responsibility included such grim tasks as deactivating many

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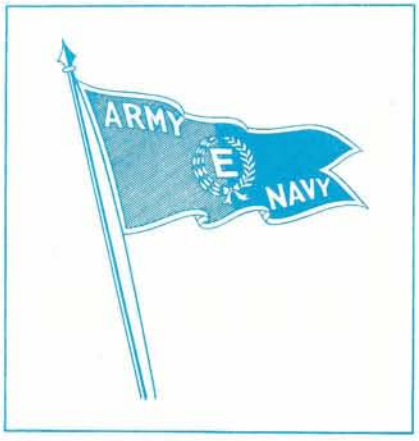

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THE FAMOUS "GIBSON GIRL" RADIO TRANSMITTER FOR FLIERS DOWNED IN WORLD WAR II

divisions, negotiating settlement of the $1 billion in cancelled government contracts, disposition of some $100 million in excess plants and facilities provided by the government, and the reduction and realignment of personnel. It was a difficult period, and Mr. Ferguson's success in directing the company through it is reflected in the fact that the postwar recovery at Bendix proceeded remarkably well. There was an operating loss of $12 million in 1946, but by 1947, the Corporation was once again in the black.

One bright spot in our postwar recovery was the experience of the Bendix Products Division, which found that demands for automotive brakes, vacuum power brakes, and universal joints were overwhelming. In addition, the same division continued to be an important supplier of aircraft carburetors, direct fuel injection systems, landing gears, struts, wheels, and brakes for the aircraft industry. About this time also, the company initiated automobile radio and electronic connector product lines.

In 1946 and 1947, the Eclipse Pioneer Division faced some of the toughest problems in the Corporation. It had the most major subcontractors to terminate and more government-owned facilities to deactivate than any other division. In addition, its future production activity was complicated by the fact that it had been operating at 30 separate locations for military security reasons. Finally, its backlog of orders was practically nonexistent. After some very difficult months, the division proceeded to convert to peacetime-use products which had been developed during the war years. It also began a concentrated development program for commercial aircraft items including automatic pilots, flight path controls oxygen regulators, and turbine starters.

The Corporation received a substantial start in a new area of operations in 1949 when the Atomic Energy Commission selected Bendix to undertake management of a classified project; the Kansas City Division was organized to accommodate it. Since then, this operation has grown to encompass almost 2 million square feet of plant and some 6,000 employees.

The Berlin airlift of 1948 and 1949 helped to boost our recovering aircraft business, and by the late 1940's, Bendix had regained its strength.

At this point, it should be noted that, in 1948, General Motors decided to dispose of all minority interests as a matter of policy. As a result, GM disposed of its remaining 400,000 shares of Bendix stock in that year.

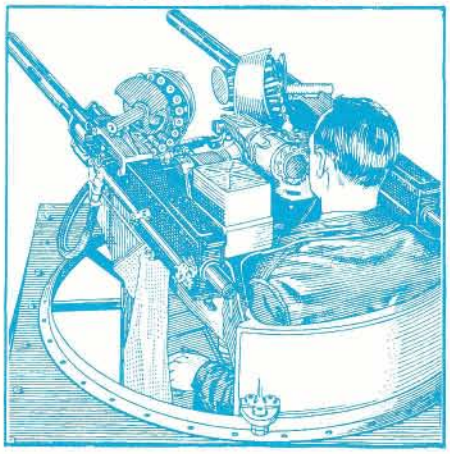
By the first half of 1951, the full impact of the Korean War was being felt, and Bendix Aviation was hard put to keep abreast of the demands made upon it. Its 1951 sales had increased to $340 million, up 50 percent from 1950, and its backlog of orders had skyrocketed. Bendix met the demands of the Korean War, however, with a different management approach than it had used in World War II. Instead of expanding existing divisions, as it had in the 1940's, Korean War activities were spun away from the parent divisions, leaving space for the production of the products which the established divisions retained. Spin-offs from the Eclipse Pioneer Division, for example, led to new divisions called Pioneer Central, Utica, and Red Bank. These new divisions did not die when the war ended as so many did in 1946: they are still operating profitably today.

The early 1950's saw Bendix introduce several new and important products for commercial - as contrasted to military - applications. They include the Polar Path Compass which made Arctic Circle flights possible, airborne weather radar permitting pilots to avoid storm conditions ahead of their planes, automotive power steering and ultrasonic cleaning systems. All of these continue to be important product areas for us.

Under Mr. Ferguson's leadership, a number of organizational changes were made to increase the efficiency and capabilities of the Corporation. Late in 1956, a Systems Division was established to integrate the efforts of two or more divisions on large-scale development programs and major systems projects. The increasing importance of our international activities was recognized in 1957 with the appointment of a top level officer to supervise our International Operations. Through the establishment of the Bendix Field Engineering and Bendix Commercial Service Corporations, we intensified our programs to sell our abilities in technical support and management roles.

In 1960, the Bendix Aviation Corporation changed its name to The Bendix Corporation. The Corporation had long since evolved into a creative engineering and manufacturing organization engaged in a great many products and fields, and it was believed that the old name was inaccurate and limiting. Aviation products still constitute a sub-

BUILDING GUN TURRETS FOR WORLD WAR II BOMBERS

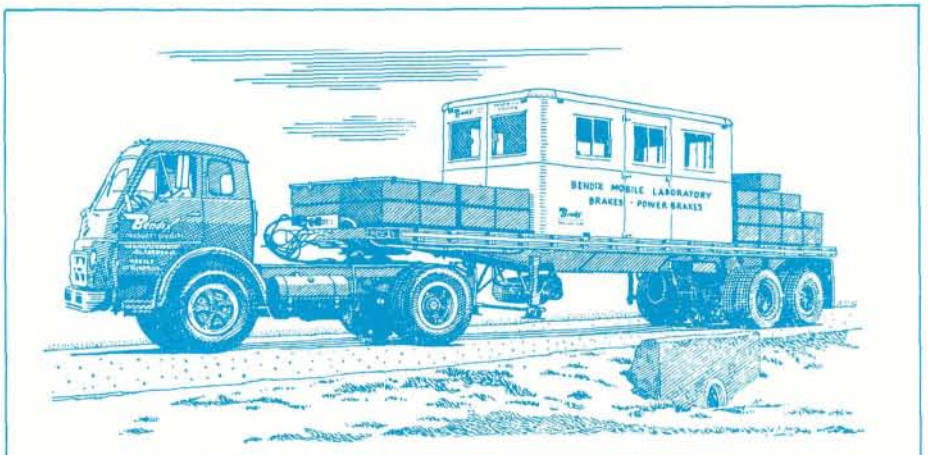


stantial segment of our business, of course, about 35 percent of our corporate sales in 1965. However, we felt that the word "Aviation" in our corporate name distracted from our major involvement in the automotive, space, missile, automation, and oceanic fields.

In 1965, Mr. Ferguson resigned as chairman of the board and president after almost 20 years at the head of our company. He continued to serve as a corporate director and as chairman of the Corporate Finance Committee until the following year. Mr. A. P. Fontaine was elected chairman of the board and chief executive officer in 1965 with Mr. George E. Stoll elected president and chief operating officer.

Bendix Field Engineering Corporation's place within the corporate structure can best be understood by returning to the 1936 creation of the Bendix Radio Division, from which Field Engineering subsequently emerged. Many developments or "firsts" which stand out as hallmarks of achievement in American business are attributed to the Bendix Radio Division. Bendix Radio evolved from four electronic manufacturers which were then operating independently. The formation and evolution of these divisions is shown on the next page.

"HALLMARKS of ACHIEVEMENT are Attributed To Bendix Radio ..."



TESTING IN THE INTEREST OF HIGHWAY SAFETY

Combines Four Companies

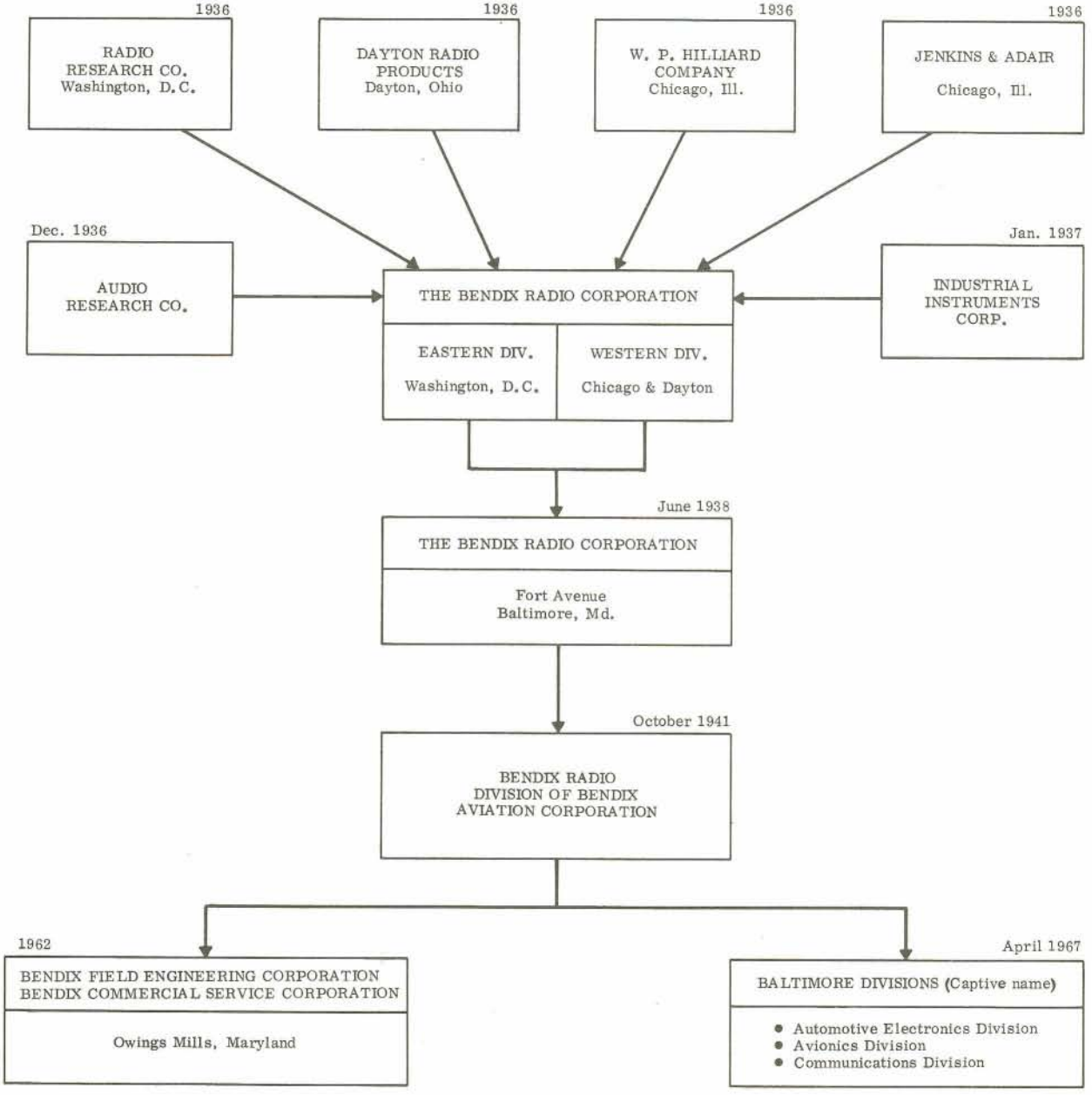
One of the four companies, Radio Research Company, had been started by three engineers from the Naval Research Laboratory in Washington, D. C. for the purpose of building military radios. Bendix bought one-half of Radio Research and then expanded by acquiring Dayton Radio Products, which produced test equipment in Dayton, Ohio; W. P.Hilliard, a Chicago firm which was involved in commercial aviation; and Jenkins & Adair of Chicago, which manufactured audio products. Bendix combined the four to form a single company known as the Bendix Radio Corporation, with a western division in Chicago and an eastern division in Washington, D. C. By December 1936 and January 1937, Audio Research Company and Industrial Instruments Corporation had joined the organization.

Among the early products manufactured was the first successful automatic directional finder (radio compass). The first single order ever placed by the U. S. Government for over $1,000,000 worth of electronic equipment was received for these units. Similarly, Bendix Radio was the first company to successfully produce crystal frequency indicators, many thousands of which were built.

By June 1938, the entire Bendix Radio Corporation organization had moved to Fort Avenue in Baltimore, Maryland. After a little more than three years of operation in the Baltimore area, the wholly owned subsidiary of the Bendix Aviation Corporation was annexed with full divisional status on October 1, 1941.

Production effort for World War II had reached large-scale proportions by this time, and great expansion took place. The Towson, Maryland, plant came into being, and additional space was obtained in buildings leased at Charles and 24th Streets, East Monument Street, and West Belvedere Avenue.

During the war years, Bendix Radio achieved renown in the manufacture of the King Geroge transmitter-receiver, which was redesigned from British to American standards in an amazingly short time after Coventry, England, was bombed. The Queen Elizabeth radio was also produced at this time and became the first fighter plane direction system. The "Queen" was a major



Formation and Evolution of Bendix Radio Division and Bendix Field Engineering Corporation

factor in ending the blitz on England and contributed heavily in routing the Axis forces in Africa.

As a result of the efforts during those years, Bendix Radio was the first plant in the electronics industry to receive the Army-Navy "E" citation for quantity and quality production. Subsequently, additional stars for this citation were awarded for meritorious performance.

Development of the Bendix Radio Division into the successful element of the Corporation was greatly influenced by the guidance of the late Mr. E.K. Foster, vice president and group manager of The Bendix Corporation.

After World War II, Bendix Radio, along with many other similar plants, suffered severe cutbacks in production. Although there had been postwar planning, the transition to a nonwar production level could not be made immediately, the overall work force being reduced approximately one-third of its wartime peak.

However, a new period of discovery and development commenced. The first few years of restless peace brought jet flight, advanced uses of atomic energy, guided missiles, improved radar, and other innovations.

One of the most notable names during this time is R. J. Davis. Davis, chief radar design engineer, managed the development of the AN/FPS-3 heavy ground radar for Bendix Radio. It was not until 1951 though that an FPS-3 radar was installed on the Eniwetok atoll and operated during the first H-bomb tests, tracking airplanes as far as 150 miles away.

A few months earlier, in October 1950, Bendix Radio Division had taken one of its most important steps as far as Field Engineering is concerned. This step was the selection of eight people to provide installation engineering assistance to the U. S. Air Force Air Materiel Command for the FPS-3. It was these eight men who formed the nucleus of what now has become the Bendix Field Engineering Corporation and the Bendix Commercial Service Corporation. The engineers were

" Eight Men Formed The Nucleus Of Bendix

part of the engineering department responsible for design and development of the radar which was just starting to come off the production line in quantity. This equipment was needed to implement an early-warning radar network to protect the United States and its allies against air attack. Although radar production was speeded up, the training of competent military personnel needed to operate the system rapidly fell behind the production.

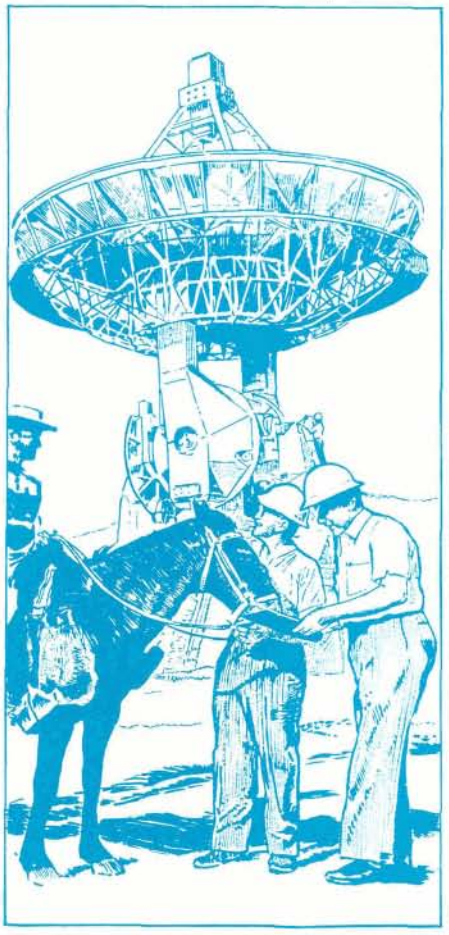
The problem was clear. The Air Force needed experienced men immediately. They had to ensure that the early-warning radar sets were installed quickly and properly. Air Force planners had to see that men were available to operate the equipment and to train others to operate and maintain the system.

The answer to the problem was the development of the Contractor Support Program. Bendix Radio was asked to furnish field engineers to supervise the installation and maintenance of Bendix-built early-warning radars at the field sites. On-the-job training by the field engineers was supplemented by instruction of military personnel at the Bendix factory. Depots were established to provide technical assistance in emergencies and replacement parts directly from the factory. Mobile laboratories were outfitted for periodic major maintenance of the radar systems by crews of Bendix specialists.

Within a few years, a worldwide organization had been established. Operations were no longer restricted to the U. S. air defense system, although the Field Engineering Department continued to participate in all phases of the enhancement of this system as newer, improved Bendix radar systems and ancillary equipments were emplaced into the system.

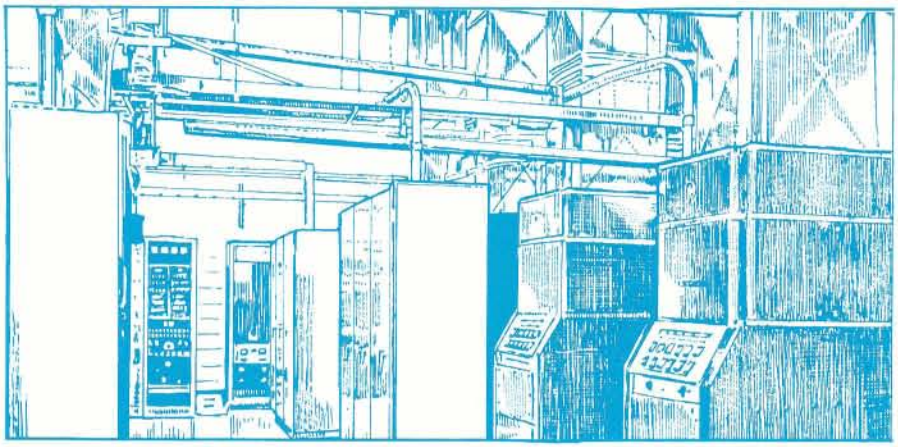
While field engineering activites were expanding in overseas areas under Air Force cognizance, Bendix airport surveillance and precision approach radars were being installed, modified, and maintained for the Air Force, the Navy, and the FAA.

Bendix Field Engineering continued to diversify. Its capabilities expanded in the field and in the depot to encompass services and training on a wide variety of electronic, communications, and associated equipment -- not all of Bendix origin. As the company' s scope of work broadened to include service contracts with all the Armed Services, with NASA, and with other governmental agencies and commercial firms, Field Engineering was reorganized as a corporation. In 1962, BFEC, along with the Bendix Commercial Service Corporation, the sister corporation formed at the same time, became a wholly owned subsidiaries of The Bendix Corporation.



Field Engineering "

Today, BFEC offers engineering support services ranging from depot overhaul of communications equipment at the Owings Mills, Md., facility to operation and maintenance of NASA's three major networks -- Manned Space Flight, Deep Space, and Space Tracking and Data Acquisition. Bendix Field Engineering has managed, and is currently managing, some of the most nationally prominent and important programs in existance.



Work for the Air Force, supporting Bendix-built radar, continued for nearly ten years. As air defense requirements multiplied with the complexities of world politics, more complex radar systems were demanded. Bendix Field Engineering became involved with the Air Force in providing installation and checkout of gap-filler radar into the SAGE network. Currently, BFEC is providing field support for the Bendix Communications Division of the large, 13-story, building-type space detection radar, SPADAT, at Eglin Air Force Base, Florida. We also provide engineering and installation services for the Air Force throughout the Pacific and Southeast Asia, supporting the current deployment of U. S. forces in Korea, Japan, Okinawa, Philippines, Australia, Thailand, and Vietnam.

BENDIX TECHNICIANS MAN THE JOHN F. KENNEDY SPACE CENTER

Bendix Field Engineering has been supporting the scientific satellite network known as STADAN -- Space Tracking and Data Acquisition Network -- since 1958, when it was organized by the Naval Research Laboratory as part of Project Vanguard.

In 1967, BFEC was selected to operate portions of the STADAN at stations in the United States, South America and the Republic of Malagasy. Extensive support also is provided for NASCOM communications, magnetic tape rehabilitation, STADAN training activities and Goddard optical range and electromagnetic interference activities.

In 1959, Bendix Field Engineering was selected to assist in implementing Project Mercury by participating in the installation of 18 ground tracking stations around the world. This association with the Manned Space Flight Program has continued to this day. Bendix Field Engineering operates and maintains 11 of the updated Apollo tracking stations; it also furnishes over 500 people for engineering support to and training at Goddard Space Flight Center in Greenbelt, Md. BFEC also operates the aircraft fleet that is used for calibration and simulation at the NASA tracking stations. Additionally, BFEC provides technical publications, depot level module repair and test equipment calibration services to the MSFN. Another related NASA project is the Apollo Range Instrumented Aircraft (A/RIA), where BFEC engineers assisted Douglas Aircraft in the systems design, installation and test of equipment for the A/RIA used as inflight telemetry and communications stations.

Recently the logistics support of the STADAN and MSFN has been combined under a new program which will involve the eventual automation of all logistics functions.

BFEC operations at Cape Kennedy began in 1964 with the implementation of a launch support contract from NASA. The result of BFEC Support Activities has been the establishment of the Launch Support Division, a separate division of The Bendix Corporation.

Deep space exploration in which Bendix has been involved since 1960 includes the Deep Space Network, managed for NASA by the Jet Propulsion Laboratory of the California Institute of Technology. Bendix Field Engineering

Corporation has been under contracts to JPL in operating the Deep Space Instrumentation Facility at Goldstone, California; Madrid, Spain; Cape Kennedy, Florida; and Ascension Island since the inception of this network. With a team of over 350 personnel, BFEC also operates and supports the Space Flight Operations Facility at Pasadena, California. Calibration repair and logistics facilities at Goldstone provide support for the entire Deep Space Network. It is this participation that has made BFEC a part of such successful space probes as the Ranger, Surveyor, Lunar Orbiter, and the Mars and Venus fly-bys of the Mariner.

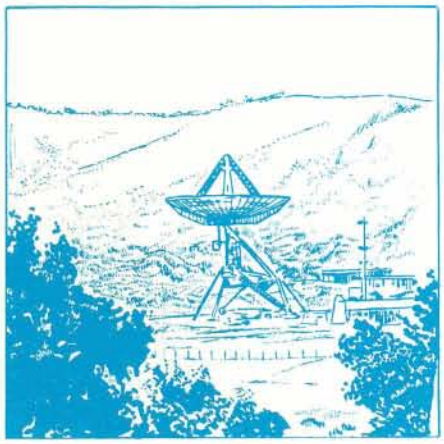
Programs conducted by BFEC for the U.S. Army have included installation, operation, and maintenance of three communications satellite programs, engineering and installation of microwave communications at Fort Meade, Md., and in Puerto Rico. Since 1960, BFEC has been involved in the engineering and installation of Project Criticom, a worldwide, cryptographic-secure communications system coordinated by the Department of Defense J6 committee.

For the U. S. Navy, BFEC has provided rehabilitation of ground controlled-approach radar, electronics engineers to the Naval Air Engineering Center, and operation and maintenance services to the Naval Space Surveillance System to detect "silent" satellites and "space junk." Also, BFEC operates experimental stations in support of the Naval Research Laboratory. Since 1963, the Corporation has furnished technical support to the U. S. Marine Corps for engineering studies, equipment modifications, and equipment design and fabrication. The success of these activities enabled BFEC to expand its USMC business with the award of a contract for depot overhaul of three-dimensional, state-of-the-art radars. To fulfill depot expansion requirements of both the Marine Corps and the Army, Bendix leased in 1967 a new facility with 20,000 square feet of floor space at 2905 Whittington Avenue in Baltimore, Md., which has been completely outfitted for depot overhaul activities.

Commercial Service Corporation COMSCO for short, is, like BFEC, a wholly owned subsidiary of The Bendix Corporation. COMSCO was formed in 1962 to take advantage of support service opportunities to commercial industry abroad. Initial activities of the Corporation involved small contracts with West German, Spanish, and Israeli Governments. In 1966, however, COMSCO embarked on a multimillion dollar contract with the Greek Government for the implementation of the NATO Missile Firing Instrumentation (NAMFI) facility on the island of Crete. Generally speaking, the officers and management of COMSCO are identical to those of BFEC.

It was stated earlier that the modern Bendix Corporation, of which Bendix Field Engineering and Commercial Service Corporations are an integral part, is highly diversified and technically oriented. It is appropriate now to amplify those two aspects of the corporate character.

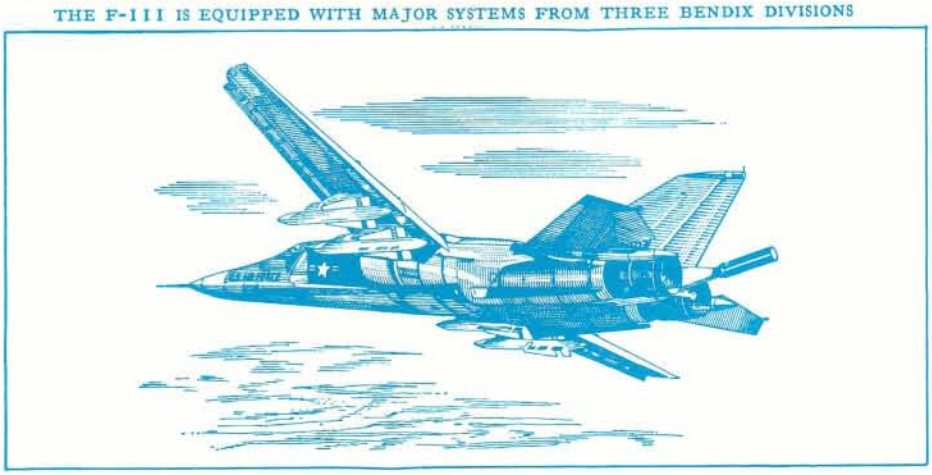
People who attempt to classify The Bendix Corporation into one industrial category or another usually end up shaking their heads and giving up in frustration. We have the same experience ourselves when we try to describe our operations in certain terms. For example, we normally list our activities as falling into the five broad market areas of aerospace, automotive, electronics, oceanics, and automation. However, even while we are listing these market areas, we realize that the list is a compromise. It is true that some 90 percent of our sales during the last year can be fitted under one of these markets or

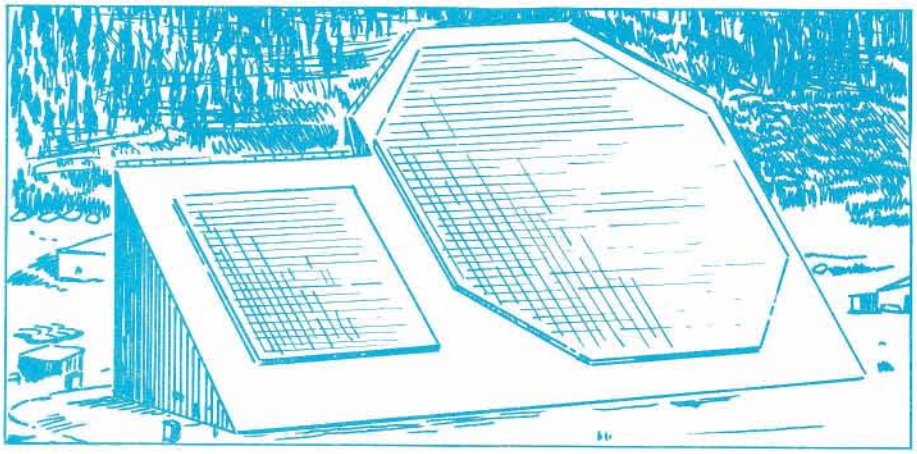


another, but the list includes neither our bicycle brake business, at one end of the technical spectrum, nor the nuclear components we build for the AEC at the other. Whole classes of products, such as those which go into farm equipment or the many varied products we manufacture for the electronics industry, are missing from our list. In terms of the products we build and the markets we serve, The Bendix Corporation literally defies classification.

In an effort to answer the frequently asked question, "What kind of a company is Bendix?", a reply recently used by our Chief Executive Officer, Mr. A. P. Fontaine, describes us rather succinctly and well. "Bendix is a scientific and

THE F-111 IS EQUIPPED WITH MAJOR SYSTEMS FROM THREE BENDIX DIVISIONS



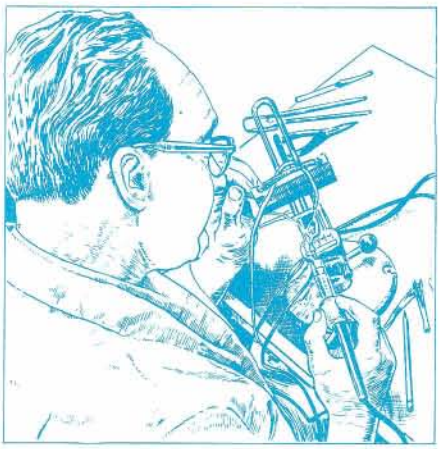


technological corporation dedicated to creating new ideas and developing them to maximum usefulness - whether we're serving as creative engineers, manufacturers, or professional problem solvers for industry and government."

If our products and markets are diverse, our point of view - our orientation - is not. Bendix is scientifically and technically oriented, and this characteristic runs through all of our operations, bringing unity from our diversity. This technical orientation is reflected in the background of our more than 85,000 employees in this country and abroad, 16,500 of whom are engaged in research and development. Every one of our 71 domestic and foreign divisions and subsidiary companies fits this pattern, contributing to the corporate character and borrowing their individual identities from it. Almost all of our products demonstrate this technical orientation, and all but a few of them have a high proportion of their cost devoted to engineering expenses. In very plain language, we are not especially good at making simple things, but in creating the products that require our particular scientific and technical skills, we consider ourselves very good indeed.

The company that Vincent Bendix founded some 42 years ago joined in 1966 that elite group of American companies with annual sales of over $1 billion. We are still working to attain a fifty-fifty split in our sales between government and commercial business. We have not attainted that goal yet, but the continuing acquisition program - notably in the automation and oceanics markets - will help bring commercial sales to the level of our expanding government business before long.

We at Bendix believe that each generation of products and technology should surpass its predecessors in excellence, ingenuity, and performance and that all of our products and services must reflect the integrity that is one of Bendix' most precious assets. The vision and energy of men like Vincent Bendix, Ernest Breech, and Malcolm Ferguson provided us with a secure foundation upon which we can continue to grow and to prosper.



STATEMENT OF GOALS AND OBJECTIVES THE BENDIX CORPORATION

VOLUME: Establish a program for attaining and maintaining a continuous growth rate of at least 12% per annum in domestic and foreign corporate sales and thereby achieve a 1.2 billion dollar sales volume in FY 1967 and 1.5 billion by FY 1969.

Accomplish this goal through development of products from within, and aggressive acquisition of businesses and products from without the Corporation.

Increase Corporation's industrial and commercial sales volume to the point of at least a corporate mix of 50% commercial and 50% government sales in FY 1967.

EARNINGS: Develop a program of improving the earning capabilities of the Corporation to achieve an overall corporate profit of $4.00 a share in FY 1967, and $5.00 a share by FY 1969.

RETURN ON INVESTMENT: Develop a program to increase the Corporation's return on invested capital commensurate with the increased size of the Corporation, achieving 8% return on investment after taxes in FY 1967, and 10% by FY 1969.

DIVERSIFICATION & ACQUISITION: Pursue a strong and active acquisition program which will account for approximately one-half of the Corporation's projected annual growth in volume.

RESEARCH & DEVELOPMENT: Conduct a vigorous program of research and development in the generation of new products and technology.

Develop and improve the Corporation's scientific and engineering capabilities in all its fields of endeavor.

MANUFACTURING: Conduct a continuous program of modernization of existing manufacturing facilities, equipment, processes and methods, consistent with adequate return on investment and depreciation practices, to improve productivity and quality, reduce costs, and improve competitiveness.

LOSS PRODUCTS: Eliminate or dispose of loss products and product lines when it has been established, after thorough and careful study, that their continuance cannot be made profitable, or adopt measures to correct conditions causing losses.

MANAGEMENT IMPROVEMENT: Establish conditions and create an atmosphere within the Corporation which will stimulate employee growth through challenges and fuller utilization of talents and capabilities.

Improve the Corporation's management techniques and management talent through more effective personnel selection and administration, more attention to methods of management, establishment of sound personnel research and successful management development programs, and more effective audit of available talent and management performance.

BENDIX IMAGE: Establish an effective communications program which will enhance Bendix' prestige in its scientific and technological endeavors; protect and further the reputation of its products, services and name; and develop a greater understanding of the Corporation, its policies, problems, and operations among management personnel, other employees, stockholders, customers, vendors, government agencies and the public.

NOVEMBER 12, 1966

Proposals And Presentations Section - Technical Publications And Graphic Arts Department

Bendix

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Tel (301) 363-1300

A Subsidiary of
The Bendix Corporation

Mr. David L. Christensen
Documentation Coordinator
Saturn History Program
University of Alabama
Huntsville, Alabama 35807

August 26, 1969

Dear Mr. Christensen:

This is in response to your recent request to our Corporate Headquarters in Southfield, Michigan concerning material for possible use in your history of the Saturn program. I have enclosed for your information and use, two booklets titled, "Bendix Yesterday, Today and Tomorrow" and "Bendix. . . . . Apollo 11 Mission Profile".

I hope these might be of some use to you in your project and if I can be of any further service, don't hesitate to let me know.

Sincerely yours,

Paul R. Leatherwood Jr.

Paul R. Leatherwood, Jr.
Director, Public Relations

jp
cc: J. B. Tierney
Enclosures