History of The Honeywell Corporation

Maurice J. Monti

Allied Chemical & Dye Corporation

Formed in December 1920 as a means of ending foreign domination of the chemical industry. Consisted of the following:

- **The Barrett Company** - producer of Coal-tar chemicals and roofing.
- **General Chemical** - Industrial acids.
- **National Aniline & Chemical Company** - a leading dye concern.
- **Semet-Solvay Company** - manufacturing coke and its by-products.
- **Solvay-Process Company** - Producer of alkalis and nitrogen materials.

Subsequently these five subsidiary companies became operating divisions.

- Barrett and National Aniline Divisions in 1941.
- General Chemical, Semet-Solvay, and Solvay Process Divisions in 1947.
- Corporate Research Laboratory completed in 1948 at Morris Township, New Jersey.

Allied Chemical Corporation

In 1958 the name was shortened. From time to time its divisional structure had been realigned to meet the needs of growing, more complex operations. Manufacturing was carried on by eight Divisions. Agricultural, Fabricated Products, Fibers, Industrial Chemicals, Plastics, Semet-Solvay, Specialty Chemicals and Union Texas Petroleum. Allied Chemical Canada, Ltd., managed all Canadian business. Allied Chemical International directed export sales and manufacturing interests outside of the U.S. Canada.

Origins of Divisions

The Agricultural Division was formerly known as the Nitrogen Division -- renamed in 1967 to reflect the Company's broadened scope of farm products, which were consolidated in a single operating unit. The Division was initiated in 1952, to take over from the former Solvay Process and Barrett Division the production and sale of ammonia and other nitrogenous materials.

At Syracuse, New York, in 1921, Allied Chemical had been the first in the United States to develop commercially the synthetic ammonia process for the fixation of atmospheric nitrogen. This operation was moved to Hopewell, Virginia, where a sizable plant was completed in 1928, making America for the first time independent of imported nitrate deposits. Additional facilities for ammonia and nitrogen fertilizers were later established at South Point, OHIO, and Omaha, Nebraska. The Company's chemical/fertilizer complex at Geismar, Louisiana, provided a large new production center for the Agricultural Division's plant foods.

As the leading domestic producer of ammonia, urea, and a broad line of solid and liquid nitrogen fertilizes, the Agricultural Division to the farm economy. Other major products were phosphatic fertilizers, pesticides and liquid protein supplements for animal nutrition. The Division also marketed potassic fertilizers and micronutrients. At locations in the East and Mid-west, the Agricultural Division produced paving materials for highway construction, parking areas and other paving requirements.

Fabricated Products Division -- Established in 1967. Manufactured and marketed products strongly oriented to end-users. The division operated five separate businesses. Three departments were:

- Plastic Film - Caprolan (nylon), Aclar (Fluorocarbon), and PVC (poly-vinyl chloride) -- made Pottsvile, Pa.
- Plastic Dinnerware -- Melamine dinnerware was manufactured in Port Gibson, Miss.
- Unicast Products -- Unicast nylon fuel tanks and other hollow vessels for specific customer needs were made at the Whippany, New Jersey plant.
- Nodaway Valley Foods of Corning, Iowa produced convenience foods such as puddings, pie fillings sour cream, dressings, and cheese sauces. Nodaway's septic canning process gave products extended shelf life.
- The Jim Robbins Seat belt Company of Troy, Michigan was a leading maker of seat belts and harnesses for the auto industry. Principal plants were at Knoxville, Tenn., and Mt. Clemens, Michigan.

The Fibers Division -- Formed in 1963. Specialized in production and marketing of the Company's Caprolan Nylon, which had been initiated by the former National Division after almost a decade of corporate research and pilot plant study. The best known of Allied's Chemical consumer oriented products, Caprolan is, in chemical terms, a nylon-6 polyamide fiber from caprolactam monomer. Allied was the first to produce captolactam and nylon-6 in America, in 1955, building its monomer plant at Hopewell, Va., and spinning facility nearby in Chesterfield County. The caprolactam plant operated by the Plastics Division, supplied the Fibers Division with raw materials for its heavy- and medium-denier yarn made at the Chesterfield plant near Columbia, South Carolina, which began production in 1962. The heavy deniers went into tire cord, carpeting, upholstery, seat belts, cordage, conveyor belts and similar hard-wearing industrial products where unusual strengths were required. Fine-denier yarns went into hosiery, lingerie, colorful gowns, and many types of apparel including outer wear. In 1968 a new fiber combining the desirable qualities of polyamide and polyester polymers was introduced under the trademark "Source". Its principle use was carpeting.

The Industrial Chemical division -- Was established in 1966, consolidating the former National Aniline, Solvay Process, and General Chemical Division -- Three of the Company's original components. Their predecessor firms were prominent in the early days of American manufacture. The oldest and largest of National Aniline's predecessor was the Schoellkopf Aniline and Chemical Company, pioneer dye manufacturer, which was started in 1879 at Buffalo, NY. National Aniline itself was formed in1917 by the merger of Schoellkopf with two other dye firms.

The Solvay Process Company, responsible for the first commercial soda ash plant in the United States, was founded in 1881 on the outskirts of Syracuse, NY, near the regional abundance of salt and limestone. The General Chemical Company organized in 1899 through the merger of a dozen basic chemical firms, was the first in America to develop the "contact" process for large production of sulfuric acid. As a major supplier of basic chemicals and leader in supplying sulfuric acid essential in the production of other chemicals as nitric and hydrofluoric acid and aluminum sulfate. Soda ash the leading alkali, together with caustic soda and chlorine form the nucleus of another principal product group required by the industry. Chemicals related to this group are calcium chloride, bicarbonate of soda and hydrogen peroxide.

Mutual Chemical Company of America was acquired in 1954. Mutual began mining chromite ore near Baltimore, Maryland in 1827, becoming the largest producer of chromium chemicals. Industrial chemicals' principal plants were located in Baton Rouge, Louisiana; Brunswick, Georgia; Chicago, Illinois; Claymont, Delaware; East St. Louis, Illinois; El Segundo, California; Green River, Wyoming; Moundsville, West Virginia; Port Chicago, California; and Syracuse, New York.

The Plastics Division - Once part of the former Barrett Divisions' operations, was made a separate unit in 1958 for the

purpose of intensifying research, customer service and market development in the plastics field. The divisions' initial title - Plastics and Coal Chemicals, was shortened to Plastics in 1960.

- Barrett Division, one of the original member- firms. The Barrett Company started in Chicago, in 1854, with the first coal-tar still in America and the production of roofing for early western settlers. As a unit of Allied Chemical, Barrett was prominent in building and paving materials -- as well as the coal-tar chemicals and plastics was assigned to the Plastics Division.]

In 1967, Allied sold its building materials business; and the paving materials operation, which originated in with Barrett's "Tarvia" at the turn of the century, was transferred to the Agricultural Division In 1953 Allied Chemical acquired the Libbey-Owens-Ford Glass Company's Plaskon Division of Toledo, Ohio. In 1964 Allied acquired the Mesa Plastics Company of Los Angeles, California.

A comprehensive group of specialty products were produced ranging from nylon molding compounds to flourine-based resins. The production of phthalic anhydride and phenols and other tonnage materials for the plastics industry were manufactured at its Philadelphia complex. In Hopewell, Virginia, the division manufactured caprolactum, which was used for its nylon molding compounds. Other principal plant locations were Baton Rouge, Louisiana; Chicago, Illinois; Painesville, Ohio; and Whippany, New Jersey.

The Semet Solvay Division -One of the five concerns to form Allied Chemical in 1920 originated in 1895. Louis Semet, a relative of Ernest and Alfred Solvay of Brussels, Belgium, had developed with Solvay a coke oven designed to recover valuable materials formerly wasted in the coking process. At Syracuse, New York, in 1892 the Solvay Process Company was the first to construct the new by-product ovens in America, and three years later formed the Semet-Solvay Company to build and operate them. The coke plants were located in Ashland, Kentucky; Buffalo, New York; Detroit, Michigan; and Ironton, Ohio. Semet-Solvay operated its own mines in West Virginia for a substantial portion of its coal supply.

Wilputte Coke Oven Division, a part of Semet-Solvay, evolved from the Wilputte Coke Ovens Corporation, which was acquired by Allied in 1940. Wilputte designed and constructed coke ovens and chemical facilities for the company and for customers in the United States and overseas.

The Special Chemicals Division - Created in 1968 to provide a better opportunity to develop the diverse marketing techniques required by certain product groups from the Industrial Chemicals Division. Prominent in the manufacture of dyes, dye intermediates, food colors, and detergents. The new Division manufactured these and other organic chemicals at its plant in Buffalo, New York. Its organic pigments were made in Haledon, New Jersey, at the Harmon Colors plant acquired from the B.F. Goodrich Company in 1959. Isocyanates - the principal ingredients of urethane plastics, as well aniline, chloromethanes and acidulants were produced at Moundsville, West Virginia. A part of Specialty Chemicals operations included fluorine and fluorine based compounds. One of the major products in this area was uranium hexafluoride (UF6), a vital nuclear material for the enriched uranium fuel elements used in power generation.

The Division doubled the capacity of its UF6 plant in Metropolis, Illinois, to serve the growing nuclear power industry. Genetron aerosol propellants, refrigerants and solvents, manufactured at several locations, are major fluoride-based products, as well as specialty resins and fluorinated acetones and keytones. Laboratory reagents, fine chemical and electronic chemicals formed another specialized products group, made at Marcus Hook, Pennsylvania and marketed under the B&A label. This

trademark originated with the Baker & Adamson Company, acquired by the General Chemical Company.

The Union Texas Petroleum Division - Was established in 1962, upon the merger of Union Texas Natural Gas Corp. into Allied Chemical. The Union Texas organization dates back to 1891, when the well-known industrialist, Herman Frasch, formed the Union Sulphur Company in southern Louisiana, and developed his own mining process that was to revolutionize the sulphur industry. Union Sulphur subsequently became the Union Oil and Gas Corporation of Louisiana, which was merged, in 1960, with the Texas Natural Gasoline Corporation to form the Union Texas Natural Gas Corporation.

Of significant long-range benefit to Allied Chemical, the Union Texas Petroleum Division provided a readily supply of hydrocarbon starting materials for many of the Company products. Engaged in exploration and production of natural gas and crude oil, extraction of natural gas liquids, refining of condensate, and manufacture of olefins, Union Texas Petroleum operated a network of oil and gas wells, plants and pipelines. It distributed and marketed Texgas liquefied petroleum gases (LPG's), natural gas, motor gasoline, propylene and ethelene.

This Division pioneered the agricultural use of propane for weed control, tractor and irrigation fuel, and residential heating. Its ethane and propane are valuable petrochemical feedstocks for the Company. The Division carried on its operation at a score of localities-principally in Louisiana and Texas.

The Corporation's Geismar Complex - In 1965 a new chemical and fertilizer production center was to be constructed on a 3,300-acre site bordering the Mississippi River at Geismar, Louisiana, about 20 miles south of Baton Rouge. The first group of plants to be completed included large scale facilities for ammonia and urea, sulfuric and phosphoric acids, ammonium nitrate, diammonium phosphate, and a variety of the Agricultural Division's Arcadian fertilizer solutions. Barge and railway directly to the Company's distribution points transported the plant-foods products. From Union Texas Petroleum Division's reserves, Company owned pipelines to the complex-thus integrating oil and gas operations with chemical and fertilizer production carried natural gas fuel and hydrocarbon feedstocks. Facilities had also been completed at the site for ethylene, an important plastics intermediate, as well as for aluminum fluoride, used in the manufacture of aluminum, and for hydrofluoric acid, which is essential in making aluminum fluoride and other chemicals.

Allied Chemical International - Headquartered at 40 Rector Street, was formed in 1967 to consolidate two units: the International Division and the corporate international Development Department. The International Division had been organized in 1954 to centralize and coordinate the exports of various divisions, which over the years had found markets in many foreign lands. In fact, upon the Company's formation in 1920, a few products of the member firms were already being exported-notably National Analine's dyestuffs, which had worldwide markets. The former International Development Department was created in 1966 to manage several foreign manufacturing enterprises that had been initiated by the operating divisions, and to develop other projects overseas.

A large Iranian fertilizer complex, jointly owned with the government of Iran, introduced Allied Chemical as a major manufacturer in the Middle East.

Allied Chemical Canada, Ltd. - Originated in 1958 with the consolidation of five wholly owned Canadian subsidiaries: The Barrett Company Ltd.; Brunner Mond Canada Ltd; National Analine & Chemical Company Ltd; The Nichols Chemical Company Ltd; and Semet-Solvay Ltd. With the exception of Semet-Solvay Ltd, formed in 1947, all these firms had been subsidiaries of Allied Chemical's predecessor companies from the early days of Canadian chemical manufacture. With

headquarters in Montreal, Allied Chemical Canada's plants served the principal industrial areas of that country. Products included soda ash, calcium chloride, sulfuric acid, Genetron aerosols and refrigerants, fine chemicals, CP acids and other products. From an outline given to me, this concludes a period from 1920 to 1968. Since then I have received additional information.

Barrett - The First 100 Years

1833 - Samuel E. Barrett was born in Keene, New Hampshire.
1853 - Samuel arrived in Chicago, Illinois. Worked in a sugar factory. Accepted a job as a salesman with Benjamin F. Barrett (an older brother ?) who conducted a roofing business.
1850 - B. F. Barrett hires M.W. Powell as a roofing mechanic. Powell eventually becomes superintendent and later general manager. B. F. Barrett built the first plant.
1854 - Samuel E. Barrett launched his own business, founded the organization that became Barrett Division.
1855 - April, B.F. Barrett turned his business over to Samuel E. Barrett. Samuel took Wilson C. Dow in as his partner. The new company's name is now Barrett, Dow & Company.
1857 - William C. Dow leaves the firm. Samuel E. Barrett takes another partner, a roofer named Thomas Arnold. The company name is now Barrett & Arnold.

Primitive Methods

In the beginning small sheets of roofing paper, just long enough and wide enough to be dropped into a saturating tank. The excess tar scraped off with a hand scraper. Than a hand wringer, which had done duty in a laundry, was added. The wringer later suggested the use of a continuous saturation of rolls of felt. Samuel Barrett made arrangements with a small paper mill to supply felt 26 inches wide in rolls weighing 25 to 30 pounds each. This was, then, considered a miracle in mass production as the plant was able to produce 3000 pounds of saturated felt. This was doubled when a second saturator was added. Distilling was a simple process. There was just one separation - the light oil from the heavy oil. The light oil used for the saturation and the heavy oil for cementing the felt to the roof deck. The tar required was pumped out by hand.

The Civil War Interlude

Samuel Barrett desired to join the Union Forces. Arranged a consolidation of his firm with that of Powell & Mansfield. The new company was called Barrett, Powell & Company. Barrett served 4 years, taking part in the Battle of Fredericksburg.
Promoted to Captain. 1864 - Promoted to Major.
Samuel Barrett returned to Chicago, at which time Mansfield left the firm. The company name changed to Barrett, Arnold & Powell.
Firm became Barrett & Arnold.
Barrett acquired another partner Edward A. Kimball. The firm became Barrett, Arnold & Kimball.
Kimball retired and for the first time the company became Samuel E. Barrett Company.

Disaster Hits Chicago

The fire that started in Patrick O'Leary's cow barn on DeKoven Street, October 8, 1871 destroyed 17,400 Chicago buildings among which was the Barrett Plant. A new plant was soon constructed and kept at peak capacity to satisfy the tremendous demand for roofing materials created by the post-fire rebuilding program.

After the Chicago fire a mysterious disease killed all the horses. All of Barrett's horses were killed. Barrett had the contract with Peoples Gas Company to haul 50 barrels of coal tar daily from the gas plant three miles away. Barrett hired two express wagons, much lighter than the roofing wagons, and harnessed a dozen men to each. The men made the round trip daily for three weeks until three yokes

of oxen were procured. The epidemic lasted six weeks and normal business resumed when horses were brought into the city.

1876 - Business was poor. The demand for tar almost disappeared. A plague of grasshoppers was ravaging the crops in four states - Iowa, Kansas, Minnesota and Missouri. Barrett visited the governors of those states with a proposal that sheet iron be placed in the path of the grasshopper invasion, the sheets to be covered with coat-tar. The grasshoppers swarmed onto the tar, which was set afire. The crops were saved. Barrett made a tidy profit from the sale of 7000 barrels of tar.

Major Barrett organized the S.E. Barrett Manufacturing Company and brought into his firm a group of five other roofing manufacturers. These included the Forest City Chemical Company, the St. Louis Coal Tar Co., and the Ehert-Warren Manufacturing Co., Chas. H. Conner & Co. of Louisville, Ky., Slocum, Lloyd & Orr of Pittsburgh, the Beloit Paper Mill of Beloit, Wis.

1896 - Major Barrett expanded into East, South and Middle West. Brought together five more companies- M. Ehert, Jr. & Co., Warren-Ehert Co., the I.D. Fletcher Company, the New York Coal Tar Chemical Co., and H.W. Jayne Chemical Company. The Jayne Chemical Co. eventually became Barrett's Frankfort Chemical Plant.

1896 - 1905

A number of companies were added to the Barrett organization, including the Mica Roofing Company, the National Coal Tar Co., New York, the Warren Chemical & Manufacturing Co., the Eastern Granite Roofing Co., and the W.H. Rankin Co. The last mentioned concern was the Barrett Elizabeth plant, which was the oldest continuously operated plant in Elizabeth, New Jersey.

Barrett's Canadian Companies

To facilitate the distribution of Barrett products in Canada, in 1906, two foremost roofing manufacturers in Canada were purchased. The Paterson Manufacturing Co. of Toronto and Montreal, and the Carrite-Peterson Manufacturing Co. of St. John, New Brunswick. In 1917 these two companies became the Barrett Company Ltd. As Canada grew and expanded so did Barrett. In 1909 a plant was built in Winnipeg followed by another in Vancouver. Barrett's Canadian felt mill in Joliette was an acquisition from Alex. McArthur & Co. In 1953, acquired the plant of the Louiseville Pulp and Wallboard Mfg. Ltd., produced insulating board products.

The Early Days of the 20th Century

A felt mill was built in Peoria, establishment of a Research Laboratory in Edgewater, NJ., the building of a modern roofing plant in Chicago and tar distillation plants in Birmingham, Toledo, Youngstown and Detroit.

"Tarvia" - Good Roads at Low Cost

The automobile became a popular item but was limited as to where it could go. Barrett's "Tarvia" road tar came on the scene. Barrett's advertising campaigns on "Tarvia" was meant for the public to the needs and benefits of paved roads and highways. The sale of road-tar for highway paving began in 1903. The trademark "Tarvia" was adopted in 1906.

The Barrett “Specification” Roof

In 1906 Barrett commissioned Alfred W. Erickson, the founder of the advertising firm of McCann-Erickson, to make a survey of the roofing materials field to determine if the new science of advertising could discover a remedy for an unhealthy condition in the built up roofing application business, which was endangering the reputation of the industry. Using less material than essential for a good job and varying applications, somewhat questionable, were affecting derogatorily the prestige of the larger group of reputable roofers. Mr. Erickson developed a “specific” method for the application of roofing materials, thereby standardizing procedures which proved themselves to be sound. These specifications prescribed the number of plies of felt, amount and type of pitch to be used, and the spacing of the layers of felt. Thus was born the famous Barrett “Specification” Roof.

Barrett building materials expanded with the building of a shingle plant in Birmingham, Alabama. In 1953 Barrett purchased the plant of the Maizewood Insulating Co. at Dubuque, Iowa to produce fibre board for insulation and roofing purposes. Barrett Division became probably the largest producer of coal-tar creosote.

Barrett’s entry in to the chemical field really began with the purchase of the Jayne Chemical Co. at Frankford.

In the mid-1960's Barrett Division built a plastic pipe plant on Green Pond Road in Rockaway, New Jersey. PVC pipe was extruded, which at the time was used mainly for irrigating farmlands, golf courses etc. The planted lasted 4 years. In 1967 Barrett sold its building materials business to Jim Walters of Tampa, Florida and the PVC pipe plant was included. The paving materials operations, which originated with Barrett’s “Tarvia” at the turn of the century, were transferred to the Agricultural Division.

" Pleasantdale Farms "

Dr. Charles W. Nichols, whose father, William H. Nichols, was one of the founders of Allied and its first chairmen, acquired the property consisting of 85 acres in West Orange, New Jersey. At the time Dr. Nichols was Vice-President and General Manager of the General Chemical Company - later Allied's General Chemical Division. For the first decade after Dr. Nichols purchased the property, it was used mainly as a family summer and weekend retreat. Only a few of the existing buildings were then in existence and the family occupied a small bungalow, which was situated to the rear of the house.

Actual construction at the farm extended over a period of about 2 ½ years. Pleasantdale Farms was operated as a gentleman's farm. Horses, cows, sheep, and chickens were raised and there were extensive gardens, pastures barns and outbuildings. A special area was set aside for pheasant breeding. Dr. and Mrs. Nichols frequent trips abroad, where a particular architectural detail or object of art would interest them. The architect was asked to blend these styles.

The estate was acquired by Allied in 1963 to be used as a conference and training center. The East Wing was primarily a recreational area. There was a heated indoor swimming pool and game room. This wing offered excellent space for meetings and seminars in modern conference rooms with complete audio-visual equipment. From the East Wing, one would walk through the Orangery (or Conservatory) to the West Wing. The Main Entrance Hall, Fountain Room, Music Room, Trophy Room and Library. Housed in this Wing were most of the art collection, which included Late Renaissance paintings tapestries sculptures and furniture as well as fine examples of other periods.

The spacious 54-foot Music Room with its wood-beamed cathedral ceiling featured a concert organ and grand piano, a balcony that was used for theatricals and an immense fireplace. The music room and Library connected to the Dining Room by an enclosed breezeway. Pleasantdale's twenty-two bedrooms could accommodate 34 guests. Pleasantdale Farms was in constant use year round, with seminars, meetings and other functions being held every day of the working week.

"Morristown - Corporate Center"

In the early 1900's, the property on which Honeywell International Headquarters now resides, was the summer estate of the late Otto Kahn, a prominent New York Financier and patron of the arts. "Cedar Court", his twin Monarch style mansions, connected by a 35 foot portico and surrounded by elaborately landscaped formal gardens, were a showcase of gracious living.

After Mr. Kahn's death in 1920, his heirs leased his estate to Dr. Frederick Allen. Dr. Allen, who helped introduce insulin for the treatment of diabetes, converted the property into a medical treatment center. The project was not successful; however, several years later the Kahn family decided to raze "Cedar Court" to save taxes.

The property lay idle for more than a decade, until Allied Chemical & Dye Corporation, a New York based predecessor of Allied Signal, purchased the estate in 1942 for $32,500, having previously selected it as an ideal location for a research laboratory it intended to build when WWII ended.

By 1948 the new field stone laboratory built on the hilltop where "Cedar Court" had stood, was ready for its staff of 150 scientists. The Company soon made plans for other buildings at the site and to accommodate them, bought 17 adjoining acres from the Sisters of Charity, a religious order for $7,000.00.

1954 constructed two more laboratories and six years later ground was broken for an office building to house some of the divisional personnel in the Companies New York offices. This three-story structure, occupied by the corporate staff was completed in 1962, along with expanded lab facilities and offices.

The Allied Years

Ammonia - The Solvay Process
The following is taken from two publications of Solvay Life; one issue was printed Sept. 1920 and the other was Dec. 1920. Thanks to Jack Zayak for sending them to AREA.

Brunner, Mond Canada, Ltd.
The scarcity of soda ash during WWI led to the development of the organization of the company known as Brunner, Mond Canada, Ltd. This plant was located just across the river from the Detroit plant of the Solvay Process Company. The plant was designed and built by the Engineering Dept. of the Solvay Process Company. The Amherstburg plant furnished an independent source of supply, produced within the boundaries of the Dominion, from natural resources hitherto undeveloped.
Work on the new plant started March 1917. The village of Amherstburg was a very old town, which grew up because of the river traffic, and especially the old crossing of the river by the Canadian Southern R. R. When this crossing was abandoned, the business of the river declined very rapidly. The contamination of the water supply by the large cities above it produced epidemics of typhoid fever. As a large number of workmen must live in the village of Amherstburg, it was decided to build a complete water purification plant to supply, not only for the works, but the entire community. A modern filtering and purification plant was built. During the year of construction there were more than 50

deaths of the inhabitants out of a population of 2500, since the purification plant was built there were no deaths from this cause.

One great advantage to the plant was its proximity to the quarries. A good bed of salt was located, a pumping station was constructed and an eight-inch pipeline was laid to the works, three miles to the south.

The works were put in run October 1919. As the property was of considerable size, it was necessary to carry on some farming operations and a large barn housed the crops used in the feeding of the horses. A garden and truck patch supplied the cafeteria with vegetables. The Company maintained a hospital with a works physician and nurse in charge, and conducted a number of conveniences for the benefit of the employees. A lodge for the accommodation of unmarried men employees and in the village, a building had been fitted up as a club with bowling alleys and recreation rooms.

Future plans for the plant included the manufacture of Bicarbonate Soda, Crystals, and possibly Caustic Soda. From these developments, Canada would have a supply of these products from her own natural resources. The only raw material, which it is necessary to bring from the outside, is coal. As the demands increased, the company decided to build its own coke ovens to insure a reliable and adequate supply of ammonia and the coke necessary for the operation of its lime kilns.

Thomas Morris, an engineer, was engaged and sent to Europe to study the Semet-Solvay ovens and its operation and to bring home the plans for the construction of a plant in this country. Mr. Morris returned from Europe and work was started on the first block of Semet-Solvay ovens in America. Twelve ovens were built at the Syracuse works of the Semet-Solvay Process Company and put into operation in 1892.

These first ovens were small having a capacity of but four and one-half tons. Following the Belgian practice, the coking time was thirty two hours, so each oven had a capacity for coking six-tenths tons of coal per day, as compared with the modern oven which has a capacity of from twenty to twenty two tons per day.

The construction of this plant had many trying problems. There were no standards to follow to adapt the ovens to American materials and conditions. No where in the United States was the proper material or capable brick makers to be found to produce the materials needed to line the ovens. It was necessary to import all the lining bricks; "Belgian Tile" made from special clay, practically free from shrinkage or expansion. The first coal used contained about 20% volatile. The coke manufactured was used mostly at the kilns. The surplus gas was first used for illuminating purposes. The block was enlarged from 12 to 25 ovens as the demands increased, and coking time was lowered from thirty to twenty-four hours.

When the ovens were enlarged a richer coal was used. The quantity of surplus gas increased to such a volume that it was found sufficient to supply the necessary fuel for three pots in the caustic soda department, which had previously operated by hand and fired by coal.

In 1895 the first contract to build a plant of ovens for use of others than the Solvay Process Company, was made with the Dunbar Furnace Company of Dunbar, Pennsylvania. It was agreed to construct for them a block of Semet-Solvay ovens to supply their furnaces. The Semet-Solvay Company was formed in that year with a capitalization of $75,000. Rowland G. Hazard was made president and continued in that capacity until 1915.

In 1896 the company constructed a block of 25 ovens at Sharon, Pa., for the Buhl Steel Company and in 1897 and 1898 120 ovens were built at Ensley. Alabama, to furnish coke for the furnaces of the Tennessee Coal and Iron Company. The building of this plant confirmed the use of by-product coke for blast furnace purposes. In 1902 the plant was enlarged to 240 ovens. It was operated by the Semet-Solvay Company.

Judge Nathan L. Miller

Judge Miller served as general counsel of the Solvay Companies was elected to the office of Chief Executive of the State of New York. 1920.

BUNKER RAMOS
A Division of Allied in 1982 or 1983

The division was founded in 1928 as The Teleregister Corporation. The name was changed in the 1960's due to mergers with other elements of the present Bunker Ramos Corporation. The original product was the Teleregister on-line stock quotation board system, created to serve brokerage offices in New York City. It was a network of electrically posted black boards, activated by a central transmitting station via telegraph lines. The first major advance in market information since the Edison ticker. The boards became operational in 1929, and the system eventually reached over 700 brokerage offices from coast to coast, serving the securities industry.

Notable Milestones

1945 - First automated system for airlines reservations. Used by American Airlines.
1952 - First computerized on-line real time data processing system ever used commercially.
1957 - First on-line teller terminal system for the banking industry.
1963 - First automated voice response system ever used commercially.
1964 - First production model cathode ray tube data terminal.
1969 - First electronic stock market. Bunker Ramo began work on the 25 million NASDAQ system that showed the financial community, for the first time, which market offered the best price on a given security. NASDAQ became fully operational in earl 1971.
1972 - First bank teller terminal with a CRT display.
1974 - First instantaneous news retrieval system. Market Decision System 7, a news retrieval service enabling subscribers to tap a database containing all significant business and financial news of the past 90 days. Called DJ NEWS? RECALL ®, it was developed through a joint venture with Dow Jones & Company Inc.
1975 - America's largest on-line bank teller terminal system. Bunker Ramo began installation of 9,000 terminals in over 1,100 branches of Bank of America throughout California. In 1986 Allied sold Bunker Ramo to ADP.

Did you know… The present Morristown site was known as Cedar Court and was the estate of Otto Kahn which contained its own golf course, 40 acre deer path, tennis courts and wood floored roller skating rink. The property was purchased by Allied Chemical Corporation in 1942.

When the AB cafeteria opened in 1962, it was catered by Schraft. Coffee carts circulated once in the morning and afternoon.

The Bendix Story

1881 - August 12 - Vincent Hugo Bendix was born. The son of the Reverend Jann Bengston and his wife, Anna. Both were natives of Sweden. He had two younger siblings, Ernest Oliver and Esther. The family name was changed to Bendix. The family moved to Chicago, then called the Swedish Capital of the U.S.

1897 - At the age of 16, Vincent went to New York and got a job as an elevator operator in a hospital. A string of odd jobs followed. Vincent picked up various skills in electricity, stenography, and accounting. Those skills coupled with his hobby of motorcycle racing lured him toward mechanical engineering. While working for a N.Y.C. law firm he attended night school studying engineering. He wanted to specialize in automobile and automobile engine design.

1905 - Vincent first venture into this field was with Glenn Curtis, working on his Torpedo motorcycle. At an auto buggy show, he decided that this was the future for transportation. Vincent became the general sales manager for Holsman of Chicago, one of the leaders in the auto buggy field. He was instrumental in the successful marketing of the new and interesting Holsman High Wheel automobile. He designed the Bendix Motor Buggy and organized an automobile firm. The building of the vehicle was subcontracted to the Triumph Motor Co. of Cragin, Illinois. A sales and service location was established in Chicago and Logansport, Indiana. Some 7,000 of these buggies were built and sold before the company went bankrupt two years later.

1910 - Vincent had an idea to start an automobile without having to crank the engine. He sent away for patents on a drive for an electric starter. He produced a little gadget, put it in his car and started out to sell it. Not one engineer who looked at the device believed the starter would work or that Vincent could successfully manufacture the pat. Vincent recalled a story about one manufacturer to whom he tried to peddle the idea. The engineer who had turned it down walked outside with him. Both were about to drive from the plant in their cars. Vincent got into his small car and pushed a button that started the engine and drove away. The engineer was left lustily cranking his car, oblivious of the riches driving away from him.

For three years Vincent went on improving the starter and trying to sell it. He knew he could manufacture the device, but he needed a special triple threaded screw that was produced by hand at a high cost. And low volume. The Eclipse Manufacturing Co. of Elmra, New York was mass producing a triple thread screw to make coaster brakes. Bendix licensed Eclipse, which later became part of the Bendix Aviation Corp., to develop and produce and sell his electric starter drive in exchange for royalties during the life of the original starter drive patent.

1914 - The Chevrolet "Baby Grand" was the first car to have the Bendix starter and over 5,500 drive units were produced that year. It didn't take long before the device became standard on all cars.

1919 - As the money rolled in, he began to look for a place to manufacture his starter and to experiment with other ideas. He decided on South Bend, Indiana because it was on a rail line midway between Detroit and Chicago, which were competing to become the auto capital of the United States. He the Winkler-Grimm Wagon Co. plant at the western end of the Washington Avenue streetcar line in South Bend. The company specialized in making fire engines for the city of South Bend. The American-La France bid against Vincent and won.

Vincent's personal life took a turn at this point. Divorced by his wife of 18 years, he moved from Chicago into a lavish apartment he had built for himself on the second floor of the South Bend factory. His social circle remained in Chicago and was a member of several men's clubs.

1922 - He took Elizabeth Channon of Chicago as his second wife. Elizabeth stayed in Chicago and occasionally traveled to South Bend. A tragedy in the Vincent's family prompted him to develop his next invention. While standing on a street corner in Chicago, his father standing on a corner was killed by a car equipped with ineffective brakes. The accident caused Vincent to focus on the inadequacy of automobile brakes, and he vowed to devise better braking system.

Later that year, on a trip to France, Vincent met Henri Perrot at an auto show. The French engineer had invented an internally expanding brake shoe that could be used on all four wheels. Vincent bought the American Patent Right to the Perrot braking system, and brought Perrot back to the United States to improve it. One year and $350,000 later, Vincent introduced his Bendix four-wheel brakes into the auto market. Soon one out of every four new American cars was equipped with Bendix brakes.

1923 - Vincent broke ground on the first small building of what would soon become a huge manufacturing complex in November. The Bendix-Perrot Brake Co. stood on the old site of the Winkler-Grimm factory.

1924 - A year later the company name was changed to The Bendix Corporation. For the first time Vincent sold stock in corporation. Over 40,000 shares were sold and $800,000 was raised to finance operations. The corporation grew quickly. Production of brakes rose from 650,000 to 3,600,000 in 1928.

1932 - A writer for American Magazine interviewed Vincent who showed him a collection, no other company, at the time, could match: a set of 14 volumes that contained the records of the 5,500 patents held by Vincent and his company. With the money flooding in, the car parts dynamo went on a buying spree. He purchased an interest in the Stromberg Carburetor and Bragg-Kliesroth Corp.; which made vacuum boosters and several other companies in the field. His small factory in South Bend expanded into an immense complex as he moved the companies he purchased into South Bend and brought them under the Bendix Corporation name. During the depression of 1929, many companies failed. Vincent decided to continue to forge ahead and speed up. Hardly a month went by that Bendix put out new products. In 1931, 20 new products were put out on the market. Vincent not wanting to become a car manufacturer kept his business in car parts.

Vincent got into the aviation industry when he bought the Pioneer Instrument Company, which made aircraft instruments and several other companies that made airplane parts. As flight fever hit the country, Vincent himself got caught up with it too; he changed the name to Bendix Aviation. In 1930 Vincent had met Clifford Henderson, the originator and promoter of the National Air Races. Bendix

agreed to sponsor the Bendix Trophy Race. Jimmy Doolittle won the first race in his plane the Solution, at an average speed of 223 mph from Los Angeles to Cleveland in 2 hours and 1 minute.

Vincent bought more than businesses. In less than 2 years he purchased 2 landmark mansions an ocean front estate in Palm Beach and a posh apartment in New York City. In 1928 bought the mansion at 1710 S. Jefferson Blvd., built for Clement Studebaker Jr. in 1910. The estate was elaborately remodeled. The remodeling included a spacious brick clubhouse. The three-hole pitch and putt golf course was enlarged to nine. After further refinements, Vincent surrounded the property with a high spiked fence that was hand made in France, reportedly costing more than $30,000. The estate was renamed Chateau Bendix, Vincent began collecting antique furniture, tapestries, sculptures and paintings to decorate his mansion and apartment in NY.

The company was putting out an unbelievable list of products. There were the Bendix outboard motors, electric fans. But perhaps Bendix did not make the most well known product that bore the Bendix name at all. Many people across the country remember their mothers loading laundry into the first automatic washing machine - The Bendix automatic washing machine. Yet the washing machine was remotely connected to Vincent and his corporation. He had allowed two young inventors from one of subsidiary companies to use Bendix facilities to refine the new and unique washer the men had conceived. They convinced Vincent to allow them to use the Bendix name when they began to market, and in return, Bendix Aviation would get was to receive 25 percent of the stock in Bendix Home Appliances Inc., founded in 1936. The washer had tremendous appeal to the public, and at one time had 52 percent of the market for automatic washing machines. The Bendix Corporation was frequently connected to the in the public mind. In fact, so much confusion arose when consumers contacted the corporation about the washers that Bendix finally ran advertisements disclaiming any connection with the washers. As World War II approached, the company faced shortages of material, which resulted in losses, and The Bendix Corp. disposed of its stock in Bendix Home Appliances, Inc.

1929 – Vincent Bendix agreed to finance the purchase of two Eastern temples. One for the Chicago World's Fair and the other for Stockholm Sweden. A replica of a Chinese temple was built in china and shipped to Chicago. The temple was the showpiece of the Century of Progress Exposition in Chicago from 1932 – 1934. Later the temple was moved to New York for the New York World's Fair. The entire operation was funded solely by Bendix.

Vincent bought a 410-acre tract of land north west of the city, just 1½ miles from the Bendix plant. After building the airport he set out to induce the city to take it over. Eventually the city signed a three-year lease at an average rental of $6,000.00, with an option to buy the property for $210,000.00. The field was christened "Bendix Municipal Airport". Since then the name has changed several times, lastly, "Michigan Regional Airport".

Vincent was a large contributor to the building of Notre Dame Stadium. He liked various sports. The Bendix Corp. had a softball team called the Bendix Brakes. The Bendix Brakes won the World Championship in 1941. Records show that Vincent in conjunction with three other individuals was awarded the franchise for a football team in Boston. The team was named the "Braves" after the baseball team. The next year they changed the name to the "Boston Redskins" and moved the team to Washington D.C.

Vincent wanted a whole Bendix car. Not wanting to compete with other car manufacturers, who were buying his parts, he created the Phantom Steel Wheel Corp. to build a single car as his show- piece. He sent a team of 11 engineers and mechanics to a remote garage in St. Joseph, Michigan where they were designing, working and building a car. They could not communicate with anyone about it,

not even with Bendix employees. The Steel Wheel Corp. car was finished in 1934 and was a show case of advanced automotive features, such as an aerodynamic body design, airscoop hubcaps for brake cooling and a built in ventilation system, some of which are standard equipment on today's cars. Several design sacrifices were made to speed up construction. The car was not used much and ended up in storage in a warehouse. Today the hand built one of a kind sedan, known to car buffs around the world, is on loan to the Studebaker National Museum in downtown South Bend's Century Center.

In 1932 the corporation Vincent had founded was one of the foremost manufacturers of automotive and aviation equipment in the world, with 15 plants in this country and abroad. In 1931 he was elected the 26th President of the Society of Automotive Engineers. He was made a Knight of the French Legion of Honor in recognition of his interest in the social and economic welfare of his Paris plant of Bendix aviation. He received the title of the "Knight of the Order of the North Star" from King Gustav V of Sweden. 1937 – After the Bendix Corp. moved its headquarters to Teeterbory, New Jersey the town in the fall election voted to change its name to Bendix, N.J. In 1938 Vincent held no power at The Bendix Corp. For years he had been selling off his shares in the company, primarily to General Motors, until he owned no shares at all. G.M discovered in mid-1937 that Bendix was losing money at the rate of 1 million dollars a month and Vincent seemed incapable to stop the losses. G.M. sent Earnest Breech and A.C. Anderson to study the situation and make recommendations. Most of the losses were at the South Bend plant. Management was blamed. Malcolm Ferguson was named to replace Bendix, who remained as President, a figurehead. In 1942 Vincent was named chairman of the board, but only remained for a few months before cut all official ties with the corporation. In 1939 he filed for personal bankruptcy listing 14 million dollars as liability and 1 million dollars as assets. Vincent tried to fend off creditors in federal court in South Bend, but all was lost. It was the complete demise of one of South Bend's greatest tycoons.

He went to New York and tried to start over in a related industry. In 1942 he formed The Bendix Helicopter, Inc., to develop a four-passenger helicopter sedan, and announced that it would be ready for production after the war. The company reportedly made him more than 1 million dollars before death claimed him.

Vincent died March 27, 1945 of a coronary thrombosis at his home in New York City. He was cremated and buried in Grace Memorial Cemetery in Chicago. The legendary inventor and his contributions to the city and to technology have not been forgotten in South Bend. The Bendix Corp. became part of AlliedSignal, which in turn became Honeywell Corp. School children learn English and Geometry in his Chateau Bendix, now Trinity School at Greenlawn.

Under the presidency of Earnest Breech (1942), Bendix made many contributions to the war effort and earned 20 Army-Navy "E's" for efficiency.

1942 - Earnest Breech was elected President. Bendix made many contributions to the war effort. Bendix developed the constant-velocity universal joint for military four-wheeled drive vehicles, the navy ground controlled approach radar, the air position indicator, the automatic pilot, automatic oxygen system, an aircraft fuel injection system, and the famous "Gibson Girl" emergency radio transmitter that led to the rescue of many fliers downed at sea.

Sales of the corporation soared to $900 million in 1944. Bendix had more than $100 million worth of government facilities in use and a peak employment of 70,000. Production of aircraft pressure carburetors leaped to 674,000 between 1941 and 1945. In 1945 when the war ended, production, employment and facilities were all at the highest level in the company's history. Within months of the

wars end the government cancelled 21,000 contracts with Bendix worth well over $1 billion. Earnest Breech resigned to become executive vice-president of Ford Motor Company.

Malcolm P. Ferguson was elected to succeed Breech as president. Ferguson was faced with the task of returning the company to peacetime production as quickly as possible. Deactivating many divisions and settling with the cancelled government contracts, withdrawing from the $100 million worth of production facilities, reducing and realigning personnel in 1947.

The demand for Bendix brakes was overwhelming; also Bendix continued to be important suppliers of carburetors, direct fuel injection systems, landing gear, wheels and brakes for the aircraft industry. About this time the corporation launched its automobile radio and electrical connector product lines and began a concerted development program for commercial aircraft items, including automatic pilots, flight path controls, oxygen regulators and turbine starters.

1948 - General Motors decided to eliminate all minority interests in other companies as a matter of policy. As a result General Motors disposed of some 400,000 shares of Bendix stock.

1951 - The first half of the Korean War, Bendix was hard pressed to keep up with the demands being made upon it. Bendix met those demands with a different management approach than it had for WWII. Instead of expanding existing divisions, Korean War activities were spun away from the parent divisions, leaving space for the manufacture of existing products. These spin-offs did not wilt when the war ended. Many are still in operation today as full-fledged divisions. 1950's -- Bendix introduced several new and important products for commercial aviation application, including the Polar Path Compass, which made Arctic Circle flights possible and airborne weather radar, which permitted pilots to avoid storms in flight. Bendix also developed Cermetalix aircraft brake linings to solve the problem of stopping the heavier and faster commercial planes that came off the drawing boards. In 1951 Bendix introduced a power brake system that evolved into the Master Vac Brake system still used in many American cars. Bendix pioneered the development of power steering, which came into widespread use in cars and trucks.

1956 - A Systems Division was established to integrate the efforts of multiple divisions involved in large-scale aerospace development programs and major systems projects. In 1957 came the appointment of a top-level officer to supervise the company's international operations. A special subsidiary, Bendix Field Engineering Corporation, programs to sell technical support management was intensified.

1960 - The name Bendix Aviation Corporation was changed to The Bendix Corporation. The change was not meant to de-emphasize aviation's roll in the Corporations operation because it still represents 51% of the sales that year. But the word "Aviation" down played major involvements in the automotive, space, missile and automation fields. The Corporation entered the 1960's with 32 operating units and 50,000 employees. The military and commercial activities were separated in 1961 with the establishment of two divisions - -Automotive and Aerospace. In 1965 after 20 years at the head of the company, Malcom Ferguson retired as chairman and president. A. P. Fontaine was elected President and Chief Operating Officer and George E. Stroll was elected president and chief operating officer.

A. P. Fontaine first joined Bendix in 1944. He left the company in 1946 to establish the Aerospace Research Center at the University of Michigan, and returned to Bendix in 1952. After being named CEO, he remapped the corporate concepts and thoroughly revamped the company from the top of its management to the bottom of its product mix. The company that emerged was very different.

A major new corporate identification program was launched in 1966. It had a dramatic effect on everything from facility signs to product packaging to new methods of product identification. The name of virtually every division was changed to more closely identify each operation with its main product. A contemporary and dynamic corporate mark replaced the old "Flying B" as the company's logo.

One of Fontaine's primary goals was to reduce the company's dependence on government business. New commercial markets were needed. Diversification efforts were speeded by a number of acquisitions in a manner somewhat reminiscent of the whirlwind acquisitions of 1929. Respected companies such as Besly-Wills, Scully-Jones and Buhr became part of the Bendix family. One of the largest acquisitions was the Fram Corporation in 1967. Adding the Providence Rhode Island based producer of oil; air and fuel filters to the corporation's operations gave Bendix a new product line. This was a major move that expanded the company's role in the automotive after market business.

The FTC challenge the acquisitions and required Bendix to maintain Fram as a separate subsidiary and induct its merchandising, purchasing, pricing and manufacturing policies independent from Bendix. When the final ruling came in 1975, certain operations of Bendix and Fran, were ordered to be transferred to Facet Enterprises Inc., a wholly new subsidiary, which Bendix would divest within two years.

In 1967 Bendix reached a milestone when the 200th million automotive brakes come off the line in South Bend. Bendix was recognized as the producer of more brakes for more kinds of vehicles than any other producer in the world was.

Bendix firsts in the automotive brake field includes the Duo-Serve brake, a type which has been the standard in the industry for more than 35 years, and a self-adjusting feature for it; the first caliper disc brakes used on a production American built cars; the split hydraulic system, which is standard equipment on all passenger cars; and Hydrovac power brakes, which have been used on more trucks than any other type of power brake.

NASA called upon Bendix technological leadership for almost every type of space activity from the early days of Mercury and Gemini to the Apollo missions of the late '60s and '70s. The corporation's role included launch support and space tracking in addition to production of components and system for the launch rockets and space vehicles.

Bendix Field Engineering Corporation, which operates space tracking stations to monitor manned missions, unmanned scientific satellites, and deep space probes, started serving NASA with project Vanguard, the nations first satellite program. For Project Mercury, the corporation supplied sensitive radars that tracked U.S. astronauts in their earth orbits and also was responsible for ground to space communications. Bendix personnel operated six of the stations in the worldwide tracking network for the Mercury, Gemini and Apollo missions.

The Bendix Launch Support Division at the Kennedy Space Center in Florida had responsibility for launching the Apollo Space flights and provided support services in operations, maintenance, and site management of launch Complex 39 facilities. And ground support equipment. Bendix air pumps used on returning space capsules were critical were critical to the success of several Apollo missions. They were designed to quickly inflate airbags and right the capsule in an upside down landing in the ocean. And that was exactly happened on the very first Apollo recovery. July 1969 Apollo 11 astronauts Neil Armstrong and Edwin Aldrin jr. became the first men to walk on the moon, they carried scientific Instrument packages designed and built by Bendix. Included among the instruments were devices to transmit information about the moon's structure back to Earth and a laser reflector to provide better

measurements of the distance between the Earth and the moon and the rotational wobble of the two bodies.

Jumbo Jet - Bendix Aerospace was well represented with an extensive array of important products on the Boeing 747 and McDonnell DC-10. Bendix products included brakes, wheels, landing gear, flight guidance equipment and electronic generating systems. The corporation supplied more standard equipment on the 747 than it had for any other commercial aircraft previously did.

45th Anniversary in 1969 - Over the years, Bendix Headquarters moved from Chicago, to South Bend, and then to Detroit. The Fisher Building in Detroit had served as its home since 1942, but now a new Bendix world Headquarters was ready for occupancy in suburban Southfield, Michigan, adjacent to the Bendix Research Laboratories. The move to the Bendix Center was completed in May 1969.

A restructuring of the organization also took place that year. Division and subsidiaries with similar technologies and markets were grouped together. Bendix Aerospace- Electronics Company, Bendix Automotive & Automation Company, and Bendix International were established as separate companies, each with its own president and chief operating officer.

By the end of the 1960's, Bendix had spanned the globe with a strong foothold in international business. The Corporation had increased export sales and licensing agreements, expanded local manufacturing by overseas affiliates and increased the capacity of plants in Western Europe. Exploratory business ventures in the 70's brought the Corporation into new fields - not all of which would remain in Bendix business makeup.

Bendix opened the decade entering the forest products industry. Wood was far removed from the hundreds of products manufactured, but because the markets for and lumber products was promising. Bendix acquired American Forest Products Corporation in 1970. AFPC was later named Bendix Forest Products Corporation. Acquisitions of related businesses later in the decade expanded BFPC's product line and distribution network across the country. Its products included lumber, plywood, moldings, aluminum siding, windows, patio doors and specialty building materials.

Fontaine retired in 1972 after 7 years at the corporate helm. W. Michael Blumenthal as chairman, President and Chief Executive Officer succeeded him. Blumenthal had been named vice-chairman of the corporation in June 1970 and 6 months later became President and Chief Operating Officer.

President Carter named Blumenthal Secretary of the Treasury in 1976. William M. Agee succeeded him in as chairman, president and chief executive officer. Agee, at the age of 39, became one of the youngest heads of a major U.S. corporation. After completing his MBA at Harvard, he took his position in the forest products industry with Boise Cascade. Agee's responsibilities were in finance during his nine years in senior positions; Boise Cascade grew from $100 million in sales to $1.4 billion. Agee had joined Bendix in 1972 as executive vice-president, chief financial officer and member of the board. He was elected president and chief operating officer in 1976. Shortly after Agee became CEO, William F. Panney, a former executive vice-president of Rockwell International, joined Bendix as vice-chairman and chief operating officer. Panney, who was named president in 1979, was responsible for all operating units of the corporation until his resignation in 1980.

Agee in 1978 guided the largest single investment in Bendix history - the purchase of $128 million in stock in ASARCO Incorporated, one of the world's leading producers of non-ferrous metals and minerals. Bendix sold the stock in 1980 and 1981 for a gain of more than $75 million.

The mobile home/recreational acquisition of 1973 did not turn out to be a well-timed venture. The oil embargo of 1974 caused gasoline shortages and higher prices, the housing market suffered from spiraling inflation and rising interest rates. Bendix divested the business in 1976.

Bendix commercial aviation received a boost in 1979 when the corporation won a series of contracts to supply wheels, brakes, actuators, and electrical load control units for Boeing's new generation jetliners - the 767 and 757 planned for 1982 and 1983 introductions. For the future, Bendix engineers were working on a new landing system for airport, integrated cockpits, digital flight controls, and carbon brakes.

1980 - Agee consummated the largest acquisition in the company's history, a step that would significantly increase the size and scope of Bendix industrial business. The Warner & Swasey Company, a 100-year-old highly respected manufacturer of machine tools and construction and tex6tile equipment head quartered in Cleveland, Ohio, was purchased for $300 million. This made Bendix the second largest toolmaker in the United States.

Divestiture of the forest products business began in 1980 and by all 1981 all of the operations and timberlands had been sold in transactions involving approximately $425 million. These funds and those provided by the divestment of other operations were earmarked for investment and future operations in other technical and manufacturing areas. By the end of the fiscal year 1980, the Corporation had grown to nearly 100 units with 80,000 employees in three major lines of business. Aerospace electronics, Automotive, and Industrial with revenues approaching $4 billion. Agee announced an important change that would allow the presidents of the three groups to use more entrepreneurial initiative in running their businesses. There would be more decentralization and decision making authority at the group level.

In 1978, Agee bolstered the Corporation's top management ranks with the appointment of Alonzo L. McDonald jr. as president with responsibility for directing all corporate and staff functions, developing Bendix policies for the future and implementing the corporate strategic direction. Previously assistant to the President of the U.S. and staff director at the White House. McDonald had also served as the U.S. Ambassador who concluded the Tokyo Round of Multilateral Trade Negotiations in Geneva and earlier as managing director (ceo) of the management-consulting firm of McKinsey & Company, Inc. with offices in most industrial nations.

Agee made several moves to strengthen the company's technological capabilities and confirm a corporate rededication to technologies. Short and long term research and development activities were separated, with short-term tactical engineering and support activities assigned to the group and division level. A new Advanced Technology Center was established to become the central long-term research facility for the corporation.

Dedicated in September 1981, The Advanced Technology Center in Columbus, Maryland was commissioned to develop innovative ideas and technological concepts for Bendix aerospace electronics, automotive and industrial businesses, as well for new ventures in fields such as the biosciences. Scientists and engineers there work with a visionary charter to explore potential products for the market place of the future. The Centers initial "thrust areas" include chemical sensors, microwave integrated circuits, signal processing devices and techniques, particulate-fluid separation, polymer composite technology, friction materials and mechanisms and powder forming technology.

The fledging company that Vincent Bendix launched in 1924 has grown into a diversified worldwide manufacturer with an excellent financial strength, a solid work force, and a broad based management alert to new and changing opportunities.

This ends what I have been able to recall from the memorabilia that you all have sent to me. I believe there is more out there, so if it is possible to send me more I will be glad to incorporate it in our newsletter and historical files. These could also be personnel recollections of places where you worked and what involvement you had in the development of products, projects and sites. I will now continue with the next phase.

Our Honeywell Connection

In 1920 Washington Post publisher Eugene Meyer and scientist William Nichols formed the Allied Chemical & Dye Corporation as an amalgamation of five American chemical companies established in the 1800's. In 1928 Allied opened a synthetic ammonia plant near Hopewell, Virginia, becoming the world's leading producer of ammonia. After World War II, Allied began manufacturing other new products, including nylon 6 (for making everything from tires clothes) and to refrigerants. In 1958, it became Allied Chemical Corp. and moved its Headquarters to Morristown, NJ. In 1962, Allied bought Union Texas Natural Gas, which owned oil and gas properties throughout the Americas. Allied regarded it mainly as a supplier of raw materials for its chemical products. In the early 1970's CEO John O'Connor sold many of Allied's unprofitable businesses and invested in oil and gas exploration. By 1979, when Edward Hennessy Jr. became CEO, Union Texas produced 80% of Allied's income. Under its new name, Allied Corp (1981), the company went on to purchase the Bendix Corp., an aerospace and automotive company, in 1983. By 1984 Bendix generated 50% of Allied's income, while oil and gas generated 38%. In 1985, Allied merged with the Signal Companies, adding critical mass to its aerospace, automotive and engineering material businesses. Founded by Sam Mosher in 1922 as the Signal Gasoline Company. In 1928 the company changed its name to Signal Oil & Gas. Signal merged with the Garrett Corporation, a Los Angeles-based aerospace company and in 1968 adopted the Signal Companies as its corporate name. The addition of Signal's Garrett Division to Bendix made aerospace Allied-Signal's largest business sector. In 1991, CEO, Larry Bossidy, began bold actions to position the company as a global competitive force. The name was changed to Allied Signal. 1999 was the year Allied Signal merged with Honeywell.

Honeywell

Man's first encounter with fire must have occurred with volcanic lava. He learned he had control by using wood to keep the fire going and could carry the fire to where he needed to. He could kindle fire by using wood or charcoal for fuel. In the 17th coal was used as a fuel and centuries later oil became the common fuel.

The earliest forms of fire controls were the primitive tools they produced. The fire drill consisted of a bowstring used to turn a dowel in a wooden socket. Friction and perseverance brought a smoldering flame. The flint and steel method was an equally consuming and tricky affair, involving the rain of sparks onto small extremely dry tinder. Once the fire was started, it had to be kept burning as long as possible.

By the Industrial Revolution, making a fire had become a common notion. The earliest forms of matches were usually awkward affairs, consisting of components that were often dangerous. One example was a splint topped with potassium chlorite. The splint was dipped in a vial of sulfuric acid. A

vial of sulfuric was carried around in a gentleman's vest pocket, needless to say was dangerous and poisonous. These early matches were positively hazardous.

The first friction match was developed in 1827 and given the name "Jones Lucifer". This was a wooden splint topped with antimony sulfide. It was drawn through a piece of abrasive paper, causing friction, which ignited the match.

The advantage of heat and light obtained by fire were counter-balanced by the obnoxious presence of smoke. The simplest solution was to make a hole in the roof and create a funnel, into which the smoke would enter and billow out.

The Romans used a portable brazier to heat their homes and public places, a sort of tray mounted on legs in which charcoal was burned. They also used aromatic or performed wood.

The chimney came into use in the 15th century, and was the first device to effectively separate heat and smoke. The draft created by the fire served the dual purpose of introducing more oxygen to the fire, causing it to burn faster and hotter while drawing the smoke away from the lungs of the inhabitants. With the invention of the chimney came the fireplace and the hearth, which replaced the fire ring. The chimney was a great advancement but far from a perfect solution to home heating.

Unfortunately, the draft of the chimney caused about 80% of the fire's heat to be lost with the smoke. The quality of the heat was poor because it was unidirectional. If you sat directly in front of the fire you were very warm and as you moved away you got cold. The fireplace was the best technology until the casting of iron. The complexity of fir control and home heating changed completely.

Iron proved to be an ideal material to contain fire for a number of reasons. It transferred heat extremely effectively, while remaining most unscathed by fire. The stove existed in various forms before the casting of iron. The Chinese had a brick oven they used for heating and cooking, the fuel being reduced to embers in the course of a day. By night, the oven cooled enough to sleep on. Europeans had used various types of ovens for baking and cooking. For centuries a variety of kilns, oats (a kiln to dry herbs and leaves). Other fireboxes were used for special purposes, such as pottery and brick firing.

The use of iron became common in the construction of the early stoves. A cast-iron floor or base was elevated on four legs, like the Roman brazier, and enclosed by ceramic tiles, forming a kind of ceramic closet in which the fire burned. These early types of 'stoves' stood over 12 feet tall. The first stove in North America was the Ben Franklin stove, which was more of a cast-iron fireplace than anything else was. It provided better heat transfer than the ceramic tiles, bricks, or stones and more or less inserted into a fireplace. In this way it extended in to the room from which the hearth, while still channeling the smoke up the existing chimney. Before long the stove was fitted with 4 legs and a door, to better control the flow of air to the fire.

The manufacturers of stoves realized they could maximize the transfer of heat by increasing the surface area of their cast-iron wares in artistic ways. The surface castings were decorated with flowers, fruits, and garlands of leaves and vines, pure baroque.

The original cast-iron stoves were designed to be used with wood and charcoals as fuels. But shortages of these fuels increased the use of coal. Coal was not the only fuel. Since coal was not mined in the west until later, stoves were developed which burned hay, corncobs, and even 'buffalo' chips. In the northwest, stoves often burned sawdust.

Coal remained the standard fuel well into the 20th century. Most homes built in cold weather latitudes had a cellar or basement. Stove and furnace salesmen urged the homeowners to install central heating.

Central heating requires a heating plant and a means of distributing the heat to the rest of the house. The terminology of the times changed, the 'stove' being in the kitchen for cooking and the 'furnace' was in the cellar for heating the home. The first central heating system using a coal furnace, was probably the 'Cockle stove'. This was a system used to heat a cotton factory in England in 1792. It was the first gravity hot air furnace. While the first central heating systems was a great improvement over the past heating systems, the homeowner soon realized it became a chore, having to go down to the cellar to feed the coal and stoke the fire. With the husbands away at work, the housewives wound up with job of feeding and stoking the furnace to keep up the heat. This was the precise time for when a clever gadget was invented which would usher in an age of automatic control, which would be associated with the birth of Honeywell.

Albert Butz

By 1885 the most common heating systems consisted of a coal-burning furnace in the cellar, which provided heat for a steam or a gravity air system. The typical homeowner needed to journey to the basement several times a day to stoke the fire. Any adjustments in the system in terms of flues and vents, dampers and intakes had to be made at the furnace itself. Albert Butz's invention nicknamed "the damper-flapper" which describes exactly what the system accomplished.

Albert M. Butz was born in Switzerland in 1849 and at the age of 8 he immigrated to America. At the age of 16, he enlisted in the Union Army during the Civil War; he served in Wisconsin's 47th Infantry for the last 6 months of the war. By 1884, Butz had become involved with the invention of fire related devices. He and a partner, RJ Mendenhall, formed a company with the name The Butz and Mendenhall Hand Grenade Fire Extinguishing Company. The partners developed a fire-extinguishing system that consisted of glass spheres filled with water, which were hung from the ceiling in wicker baskets. If the room was set ablaze, the baskets would burn up and the glass spheres would fall to the floor, break and extinguish the fire.

In the early 1800's, Butz also experimented with a system that would become the corner stone of Honeywell the thermostat heat regulator. Thermostats had been in existence >for Over a century. The term "thermostat" was used as early as 1831 by a Scottish chemist. It described any instrument constructed to exploit the principle of the variable expansion of metals. If a strip of copper and silver are attached to each other, they will bend in one direction or the other as heat is applied or removed. By the middle of the 19th century, a Frenchman developed what he called a "thermo scope", most likely an ancestor to the modern thermostat.

In 1879, Julian Bradford was issued a patent for "Electric Heat and Vapor Governors for Spinning and Weaving Rooms." Bradford's invention was probably the first application of a thermostat to the automatic control of heat. His device provided for a DC circuit running through the thermostat, which acted as a switch to a gear train that performed work. Bradford's thermostat acted as part of an automation system.

Alfred Butz, after forming a company to manufacture his device, purchased Bradford's patent. In 1885, Butz applied for his first patent on a device that automatically controlled the dampers on a coal-fired stove, the patent was granted in 1886. Honeywell commonly cites 1885 as the date of its

establishment and by 1895, its advertising claimed that the company had been in business for 10 years.

The damper-flapper was a system composed of three basic parts. The thermostat acted as a Bl-metal trigger, placed in a living space of a home. Adjustments could be made to two points on either side of the bi-metal strip to conform to the desired temperature. The thermostat would complete an electric circuit that began with a battery pack and terminated with a solenoid in a wind-up motor. The solenoid engaged and disengaged the clockwork mechanism of the wind up motor, serving as a lynch pin. The whole mechanism worked on half terms. For example, if the thermostat were set at 70°, the circuit would close when the temperature would fall to 69°.

The solenoid would disengage the flywheel, and the windup the motor would make a one-half turn with its bell lever. The lever would pull a chain running through a series of pulleys to the hinged dapper of the furnace, opening it and introducing more oxygen. The fire would burn hotter and faster, causing an increase in the temperature of the living space. When the room had warmed to 71°, the thermostat the thermostat would again close the circuit and this time the motor would turn 180° closing the damper and cooling the fire. This was Butz system and it constituted one of the first automatic controls based purely on reliable feedback.

Even with this automation someone still had to feed the coal into the furnace. To many, having to still shovel the coal into the furnace made the automation of the damper in the living room and than travel to the basement for the furnace seem unnecessary. Yet the advantages of the automatic controls quickly became obvious, once the made to operate smoothly. The Butz heat regulator was a precise method of controlling the heating plant because it could measure small changes of temperature. This precision saved coal by over-stoking and over-ventilation of the heating system, usually caused by members of the household over-compensating for their slow-reacting senses.

Albert Butz probably conceived his damper-flapper in 1884 or 1885, and it is generally believed R.J. Mendenhall urged Butz to patent, manufacture and sell it. Mendenhall also most likely introduced Butz to a group of investors known as Hay & Company, Investors and Business Brokers. They, in turn, provided Butz with funds he needed to incorporate the Butz Thermoelectric Regulator Company on April 23, 1886. Two weeks later, on May 4, 1886, Butz patent was granted. The world was about to buy an Electric Heat Regulator, but first someone had to sell it.

Albert Butz was the first president of the Butz Thermo-Electric Company. Between 1886 and 1889, Butz filed several additional patent improvements and assigned them to his company. As early 1887, the legal firm Paul, Sanford and Merwin secured Julian Bradford 1879 heat governor patent, lending much greater authority to the Butz' invention.

In 1888, Butz attorneys had renamed the business The Consolidated Temperature Controlling Company and had secured even more patents relating to heat regulation. The oldest known artifact from Honeywell's earliest days is a thermostat from around 1888, engraved with the trademark of Consolidated Temperature Controlling Co. By 1889 Consolidated purchased The Guion Automatic Heating Regulating Company of Elmira, NY, which had been producing a heat regulator of its own. Among the holdings of the Guion motor was the key to success of heat regulators. Before 1916 and the wiring of American homes to line voltage, any motor providing sufficient torque needed to be hand wound or weight activated, the same way a grand-father clock is powered.

Manufacture and sale of the Consolidated Heat Regulator began in earnest, and by the end of 1891 the company's factory had moved into larger quarters and employed 5 men. During this period the directors continued to seek investors by encouraging friends and family to buy Consolidated stock.

This was the state of the company that would become Honeywell, when a young man by the name W. R. Sweatt arrived in Minneapolis. Sweatt was the son of Charles Sweatt, a Vermont banker and hardware merchant who had sought greater opportunities in the west. Charles and his family moved from New to Iowa where W.R. was born in 1867. At 24 W.R. had graduated from military school and moved to Minneapolis. Sweatt purchased a manufacturing company, which became the Sweatt Manufacturing Company. The Consolidated Temperature Company full time management, in 1892, the name was changed to The Electric Thermostat Company. On August 16, the stockholders agreed to sell an "extensive list of patents" to W.R. Sweatt for the diminutive sum of$ 1.00.

On Oct. 5 the directors changed the name to the Electric Heat Regulator Company and recapitalized it and elected Sweatt Secretary and Treasurer. The stockholders agreed to accept the assets of the Electric Thermostat Company and to assume the liabilities of Sweatt as a trustee.

By 1895, the company showed a profit for the first time. In 1896, W.R. Sweatt was given a salary of $1200.00 for the year and a retroactive salary of $1200.00 for the year 1895. The Company struggled to sell a product slightly ahead of its time. A watershed was finally reached at a stockholder meeting February 23, 1898, as W.R. Sweatt purchased the entire company from the other stockholders. By 1900, Sweatt held all 400 shares of stock, and by 1902 he had paid off the company's outstanding debts. The young businessman sold his woodenware company in 1901, which may have enabled him to complete the transactions. From the time he began managing Electric Heat Regulator Co. in 1893, it never suffered a losing financial year.

In 1891, the old Consolidated Company had rented factory space in Southeast Minneapolis. In 1892, fire destroyed the Sweat Manufacturing facilities in Robinsdale, unseat moved the woodenware business in with the regulator business. Once Sweatt Manufacturing was sold, he searched for a new location for Electric Heat Regulator. Sweatt rented an office in down town Minneapolis and a make shift factory was established in a barn behind the house of Wellington DeVoe, the company foreman, and the first known-rank-and-file employee. A small 2-story barn still stands behind 3027 Columbus Avenue in Southeast Minneapolis, only 6 blocks from Honeywell World Headquarters. Company artists since about 1937 have erroneously represented this structure as Albert Butz's home and workshop, where he invented the damper-flapper.

By 1903, Electric Heat Regulator had moved to a new factory a block north on Lake Street, and 3 years later, to an odd little building which has variously described as a roller rink and bowling alley. This long narrow structure is the location at which the oldest surviving photographs were taken of factory operations. It consisted of one large room heated by two stoves. The building was so poorly designed that it actually swayed with the wind and one account purports that in a strong wind the walls had to be braced to keep the production pulleys and belts in alignment. Erick Westrand, who worked for Honeywell and its predecessor companies, recalled that even if the wind wasn't a problem there times when the power cut in the building. We had a funny way of making do. My motorcycle was used to run machinery, when the power went off, by running my motorcycle on a treadmill.

By 1910, Electric Heating Regulator Company employed 12 men in the "bowling alley" factory, where two types of motors were assembled: the original spring wound motor, which required periodical winding, and a newer gravity type motor, which used an iron weight for power. In addition to the

motors, the company assembled thermostats from parts purchased from the Standard Thermostat Company of Boston.

Around 1908, W.R. Sweatt and factory supervisor Joel Hersleter began experiments on a new product to further refine the automatic damper-flapper control. The idea was simple. Modify am alarm clock, adapting the alarming mechanism in such a way that, instead of ringing a bell, it mechanically changed the setting on the thermostat. Through a clever arrangement of levers and catches, the clock would be mounted on directly on the thermostat. The "alarm" could be set to go off, say at 7 o'clock, and when 7 o'clock arrived, the device would turn the thermostat up automatically. The clock thermostat idea was around for some time, so it was natural for Sweatt and Kersteter to develop the new product.

'The Lawsuit and Mark Honeywell'

By late 1908, Electric Heating Regulator Company was advertising its Minneapolis Heat Regulator, with or without time attachment, and in1911, the company landed in court in opposition to another company over a patent relating to the clock thermostat. The Jewell Manufacturing Company of Elmira, New York brought suit against Electric Heat Regulator for manufacturing a clock thermostat, similar in design to a patent purchased from inventor Schyler Post in early 1908.

Jewell had strong circumstantial evidence of infringement. First, there was a hand written letter from Joel Kersteteter to Jewell dated January 7, 1908 saying, "Gentlemen, I recently purchased a house in which there is one of the controllers but it is all disconnected and does not work. Please send me directions for connecting it up and making it work. The letter gave Kersteter's home address. Wirt Wilson, W.R.'s brother-in-law, and Electric Heat Regulator board member, dated September 20, 1907, executed on Wilson's insurance firm letterhead, sent another letter. It reads," Please send me full particulars regarding your heat regulator. The cost of it and whether a novice can install it. W.R. claimed that a prototype clock thermostat had been in his home since 1906. His only proof, though, was his wife who claimed that she recalled a conversation between W.R. and a friend from Fargo regarding the clock thermostat, and that she had recorded the date in her diary as September 16, 1906. The matter was settled out of court, however as Sweatt agreed to pay Jewell $3,000.00 for a license to manufacture thermostats of the Jewell design, along with a royalty of $10.00 for each thermostat manufactured prior to the settlement. Several years later Jewell was acquired by Honeywell Heating Specialties of Wabash, Indiana, and in 1927. Jewell became part of Sweatt's company when the Minneapolis and Wabash concerns merged.

In 1906, Mark Honeywell, a young inventor from Wabash, Indiana, was setting up shop as a plumber and heating mechanic. Honeywell was born in Florida and had become involved in the citrus industries at am early age, however he was more interested in the invention of mechanical devices. He invented a very special device, which launched his career and led to the incorporation of the Honeywell Heating Specialty Company. The Honeywell Heat generator, also called a mercury seal generator, created a revolution in the home heating industry.

Water and steam systems had been in use for more than a half-century before Honeywell's invention. Most were gravity-circulation systems, which directed heated water throughout a building, the circulation resulting from the difference in weight between hot and cold water. This type of system was notorious for both circulation and unsatisfactory heat transfer. The system also incorporated and expansion tank to accommodate the overflow of the heated water, but the tank often spelled. Honeywell's invention revolutionized the water system by allowing it to operate closed and pressurized. The heat generator featured a column of mercury, which would not permit heated water

to overflow until the system exceeded 10 psi. Pressurized systems had greatly improved circulation, required smaller pipes and allowed for the superheating of the water to about 212° Fahrenheit. Mark Honeywell's invention established him as an important player in home heating field.

From around 1905 all advertising had introduced the country to the heat regulator called "The Minneapolis". Early thermostats were stamped "Electric Heat Regulator Co.". In a semi-circular around the top of the unit Minneapolis, Minnesota stamped in the center. By 1910 the thermostats were actually stamped "The Minneapolis" in bold face across the cover. The cover itself had been developed by 1892 and protected by the bi-metal strip and electric switches.

In 1912 the company was renamed "The Minneapolis Heat Regulator ". In the same year the name was changed, the company completed the impressive new factory and office complex on the corner of 4th avenue and 28th street in south Minneapolis. Though the complex has since gone many expansions and now occupies nearly a square city block, the original buildings still forms the corner stone Honeywell World Headquarters.

In 1913, W.R. Sweatt named his 22 year-old son, Harold, vice-president of his promising heat regulator company. H. W. had been born in 1891. From a very young age, he had been put to work on weekends and vacations, pushing a broom or boxing shipments. In 1913, H. W. was most likely the graduate of the University of Minneapolis who had already been named a vice-president. The company now had grown to 50 employees and had sales of about $200,000 per year.

Minneapolis Regulator Company was busy developing the technologies, as well the markets to sell the developing products. W.R. Sweatt wanted consumers, as well as the manufacturers of stoves and furnaces, to know there was a spectacular new device promising to revolutionize home heating. The major problem was that the old stoves and furnaces were equipped with a damper that would not accommodate the Butz system. Soon, the advertising directed at the homeowner began to work. As customers began to request home heating controls, manufacturers quickly changed their minds about their potential profitability. Sweatt made the decision not to manufacture furnaces, instead to concentrate on the controls. A 1937 -company profile in Fortune magazine pointed out this important fact about Sweatt and his firm.

In 1926 W.R. commissioned a well-known artist, Phillip Lyford, to create several large oil paintings incorporating the Minneapolis thermostat in domestic settings. Four years later the company sponsored a national broadcast show featuring the Minneapolis Symphony Orchestra. This was the first time an American company sponsored a symphony orchestra for a radio program.

In 1920, W.R. announced that his second son, Charles "C.B." Sweatt would be the advertising manager and treasurer of the Minneapolis Heat Regulator Co. When C.B. Sweatt, there were 250 employees in the home office and factory with 100 more in sales and distribution throughout the country. By 1926, there were branch offices in 9 cities, complemented by 15 authorized distributors. The control system ranged in cost from $60 to $180, which might include a clock thermostat, a limit control (which provided a safety valve to prevent accidental overheating) and a damper motor.

The Company's products were starting to cross international borders: such as the diamond mines of South Africa and the Chinese National Museum. In 1938, a letter from London reported news of royal significance "...the King of England sleeps in comfort at his Balmoral Castle, his Scottish residence.

For 35 years, W.R. Sweatt and his company developed and sold his damper-flapper for hand fired coal furnaces. But by the twenties, oil and gas became viable options as technology made their use

more practical. In 1927, Minneapolis Heat Regulator and Honeywell merged. Fewer than 10% of homes had been converted to automatic heat. 1942, when World War II slowed business, had converted 4.5 million, most of them to oil business, the rest to gas and stokers. A. stoker was a device, which automatically fed coal into a furnace through a system of hoppers and conveyers. Because methods of burning these fuels in a controlled manner had not been devised, these fuels were previously considered worthless for home heating.

OIL -There is evidence that oil was used as a fuel some 6,000 years ago. However, until the present century it was used primarily to caulk and waterproof watercraft. Most oils have properties that lend themselves to ignition. The wide spread use of oil occurred in part because of the shortage of whale oil in 1860. When whaling nearly rendered the animal extinct, a method of distilling kerosene from petroleum oil was developed. The first oil burners in Europe were fashioned and probably adapted from oil lamps.

The first oil well in the United States was drilled in 1859 by Edwin Drake in Titusville, Pa. Of course, from time, to time oil had surfaced on its own, sometimes in salt mines. About the only use was in patent medicines and some specious products sold from the back of "snake oil" wagons.

In the 1850's, a report by Dr. Benjamin Stillman of Yale described the easy distillation of oil into a profitable product. This report caught the eye of a group of investors in Titusville, Pa. Nearby was a large natural oil reserve and these investors retained Edwin Drake to drill it.

The Chicago Worlds Fair of 1893 introduced oil burners as an important new technology, capable of being used in space heating. The exposition buildings were themselves heated by 54 oil-burning furnaces. By the 1933 Chicago World's Fair, more than 100,000 Chicago homes burning oil for heat and more than 300 retailers were selling oil burners for heating.

In times of a national crisis, coal was reserved for production and defense. During WW I, the War Priorities Board declared "coal-less Mondays". But there were no restrictions on the use of petroleum oil, since it wasn't widely used. Although oil burners had been developed, they were in a prototype stage. One had been developed for the Dobie Steam Automobile, on the verge of production. Before the war began, the War Priorities Board's restrictions on most metals prevented the Dobie Steam Automobile from going into production. In light of the coal restrictions, someone envisioned the potential of an oil burner for the home heating front. Thus was born the first mass-marketed oil burner, appropriately named the Nokol. It was a burner of a kind that remained in use throughout the 1920's. Oil burned in a pot and installed directly into the old furnace, so the furnace required only a simple conversion. In 1923, a bitter coal strike took place in the dead of winter. As a result many Americans were forced to consider alternate ways of heating their homes.

Among the biggest challenges faced by manufacturers of burners and controls was the requirement for an efficient and safe method of automatic oil ignition. The first oil burners required various controls to provide for the introduction and ignition of oil and safety measures to prevent fire and explosion. Consequently the company was asked to adapt its damper-flapper system to heating oil. The first solution was to simply adapt the damper motor to open and close the main oil valve. This system, however, did not provide for ignition or repressing of fire. If the pilot or burner flames went out, there was the real possibility that oil would flood the furnace and even the cellar. A mechanical device was quickly devised to act as a safety shut-off valve, a bucket fed by a spill tube in the combustion chamber. If a flame was not present, the oil filled the combustion chamber and then flowed through the spill tube into a bucket. The bucket was connected to the main shut-off valve, so that if it filled, the

valve would shut-off. Unfortunately obstructions could interfere with the spill tube, or a pet or careless worker could bump the bucket. And when the fire failed, the basement would flood with oil.

There were many problems in the early days with fuel oil. Early burners were “tricky, capricious and temperamental”. Furnaces, unfortunately, had a habit of back firing, causing smoke and/or soot to fill the house. By the mid-1920’s sophisticated controls began to remedy these problems. Minneapolis-Honeywell developed a number of products to eliminate the early problems of oil-fired furnaces. The Pyrostat, for example, was developed as a proximity switch in the furnace. Employing a small b-metal strip, similar to that in a thermostat, it maintained a closed electric circuit as long as the flame was present. If the flame accidentally extinguished the switch responded by opening the circuit, shutting down the electric motor, which pumped oil into the burner. Another control that made fuel oil safer was the Protectostat, mounted in the chimney. This switch measured the temperature of the furnace exhaust, if the temperature did not increase after the furnace was to have fired the burner was shut down. In 1923 Ben Cyr and H.W. Sweatt, developed the Series 10, it was a low-voltage control circuit, which put everything “back in dead center” if anything failed. Later, Honeywell, developed the Protectorelay, the first control suited to the hundreds of models of oil burners then manufactured. The standardization of controls was a significant boon for the oil industry.

Gas

Gas is one of the most common fuels in home heating today. But it was relatively scarce in the early days of automated home heating. The technologies were yet developed to pipe it great distances or to process it from coal. Until 1920 gas was available only in certain areas. The Chinese used natural gas 2,000 years ago, piping it in bamboo to their sacred temples to provide light and heat.

The term “gas” is actually a derivative of the Dutch word for ghost (geist), which evolved following the 1609 experiments of a Dutch scientist who discovered “wild spirits” in coal. Gas was discovered in America in 1776, on land George Washington wanted to use for a public park. This natural vent had caught fire and was called a “burning spring”.

In 1863, in Rochester, New York, workmen drilling for oil struck a pocket of gas instead. Further drilling didn’t produce the well was abandoned. The escaping gas fire, the owners saw a way to turn disappointment into a profit. They turned the fire into an attraction, calling it “The Old Burning Well”. In 1870 the well was bought by a company organized for the purpose of piping the gas 25 miles to Rochester, using a pipeline made from 12 inch hollowed pine boughs laid end to end. By the end of the decade, iron pipe made high-pressure transmission possible.

In 1912 there were 547 companies in the U.S. supplying natural gas, mostly on a regional basis and limited to the coasts, where gas occurred naturally. With the expansion of gas transmission lines into the interior of the continent, the numbers increased dramatically. This expansion with the completion of a gas line more than 2,000 miles long, extended from West Texas to New York.

In 1792, William Murdock, “the father of The Gas Industry” had pioneered a method of generating natural gas by processing coal. It was manufactured gas that gave the gas industry its start. Manufactured gas made the fuel available to major urban centers not serviced by pipeline. Seattle, for example, was too remote to be reached by gas line. Instead a huge processing plant was constructed there. It still stands, preserved as a public park called “the Gas Works”.

In the early nineteen twenties gas had been used primarily for lighting. There are many communities where gas lampposts are used to light walkways and street corners. One of the earliest modern gas

usages was to generate heat with the Bunsen Burners, developed in 1855 for use in the laboratories. About the same time gas came into use in room and space heaters. A common sight in Boston was the portable room heater a small gas burner with no exhaust. The heater was linked by a hose to a gas cock in the room and could be moved anywhere there was a gas cock in the room. But for obvious safety reasons, it was limited.

Coal was the primary fuel for home heating and remained so until fully automatic central heating with oil was pioneered in the twenties. By 1933, gas companies began a new marketing campaign for home heating. The public interest in gas enticed furnace makers to make models specifically designed gas burners for the home.

About 1915 Honeywell received its first order for gas controls and asked to adapt the Butz system to the new fuel. Initially, the company arranged the system so that a damper motor simply opened and closed the main gas supply to the burner. A large pilot light was kept burning at all times, so large that in mild weather it could heat the house by itself: There were two areas of concern: 1 The house could fill with a poisonous gas which might explode with a single spark. 2 Gas manufactured from coal was expensive. Troy, New York was the first city to pass laws in the 1880's requiring that an odorant be added to the gas, to indicate its presence.

It became evident that the old damper-flapper system was not an adequate control for the gas-fired furnace. One problem was that the system depended on power from batteries or line power. If there were an interruption or loss of current, the system would remain open or closed.

Sweatt's company began experimentation on an automatic pilot protection that would stop the flow of glass if there were a failure. A breakthrough came with a special kind of circuit, a thermocouple that translated heat directly into electricity. The company's thermocouples made it possible to have a completely closed, self-sufficient system.

In the 1930's as oil and gas became the new universal fuels, manufacturers of automatic controls sold their wares directly to the furnace manufacturers, dealers and installers. Honeywell found itself in the enviable position of having an indispensable product. In the earl days, door-to-door sales and direct advertising were responsible for the bulk of control sales. Ever since the stove had been moved to the basement and the dapper-flapper rigged up, the homeowner depended on the sales people to help out with the technical aspects of installation, repair and instruction. These complexities only multiplied with automatic central heating and in a sense the sales people of the early 1900's became the service staff of late years.

The engineering department began in 1925 with two or three engineers. Production developed grew rapidly from 1900 to 1937. During this period, the company evolved from manufacturing one thermostat and one motor to producing more than 3,000 control device and its engineers received more than 1,000 patents. The diversity of the company's controls was often exaggerated by the fanciful and sometimes tongue-twisting names for them. Some of the products had names such as Chronotherm and Acratherm; the Protectorelay and Protectoglo; the Acquastat, Weatherstat, Modustat and Airstat to name a few.

The damper-flapper motor itself went through several generations of improvements before it was ultimately made obsolete by automatic fuels. The first motor had been a hand-wound spring motor, and before the turn of the century, Sweatt's company had developed a gravity motor as an alternative, utilizing an iron weight on a chain for power. In 1915, a third motor was added, powered by direct

current (DC) electricity from batteries. The following year the company anticipated the break through by bringing out an alternative current (AC) motor could run directly off the “lighting circuits”.

The thermostat, perhaps the visible component of the home heating system and therefore something of an icon, was in constant metamorphous. The clock attachment, developed by W.R. Sweatt and Joel Kersteter around 1908 evolved into a line of clock thermostats. In 1912, the model 47 was introduced as the standard clock thermostat, with a one-day clock that required winding once a day. This could be set to raise the temperature at an hour determined by the homeowner. It was usually set to open dampers and fire up the coal furnace early in the morning. In 1917 the company introduced a substantial improvement with the model 55. Called a “Duplex Thermostat”, it both raised and lowered the temperature settings at a predetermined times. It used a clock that required winding only once every eight days. The Model 55 represented state-of-the-art automation. At the same time, the company had begun building thermostats from scratch, all under one roof. (Until then it had secured some parts from other companies).

The increasing popularity of the clock thermostats also made it important as a timepiece. The “Deluxe Model 55” was introduced in 1920, after the company received complaints that the regular 55 clocks, purchased from the Salem Clock Company, was plagued with inaccuracy and durability. A new clock was secured from the Boston Clock Company, and was jeweled for accuracy and reliability.

As automatic fuels grew in popularity throughout the ‘twenties” subsequent demands for clock thermostats resulted in a critical shortage of reliable jeweled 8-day clocks. In 1922, the Minneapolis Heat Regulator Company made the stunning decision to manufacture its own clocks. Since the Boston Clock Company unit had been successful, the company decided to base its own design upon it, and proceed to establish a complete clock making shop.

Mark Honeywell had built his company into a small but serious competitor, mostly through his heat generator, which used a column of mercury to create a closed hot-water system that could operate under pressure. World War I had seriously limited the quantities of mercury to private companies. In 1916, Honeywell Heating Specialty Company changed its name to Honeywell Heating Specialties. This reflected a commitment to enter the field of home heating in direct competition with W.R. Sweatt.

The rivalry between the two companies supposedly extended to the two men. Whatever the situation, the merger between the two companies seemed a natural. The new organization was to be a public company, with its stock first offered on the Chicago Stock Exchange and later on the New York Stock Exchange. Headquarters was to be in Minneapolis, W.R. Sweatt serving as chairman of the Board. Mark Honeywell was named president and his office to remain in Wabash, Indiana, which became “the oil burner headquarters of Minneapolis-Honeywell. H.W. Sweatt was the vice-president and general manager, while his brother C.B. was vice-president in charge of sales. Willard Huff became treasurer, and Ben Boalt who had married W.R.’s daughter was named secretary. The merger insured Minneapolis-Honewell’s position as the undisputed leader in home heating controls. The next 10 years were a period of spectacular growth and diversification. As a result of the merger the company could provide the controls for any heating system. In 1931, the Time-O-Stat Controls Company was acquired. In buying the company, Minneapolis-Honeywell gained access to a number of important patents, designs and products.

With this new effort, the Minneapolis Heat Regulator Company crossed the line into the domain of time management. Thus was born the “the Minneapolis 77” which came to be called “ the best 8 day, 7 jewel clock ever made for heating equipment”. In actuality, however, it may have been one of the best clocks ever built of any kind. Up until the 77, the thermostats had been given the names

reflecting their prices when purchased with damper motors. The 77 were a light-heated departure from this practice: 77 were the number of “Red” Grange, the university of Illinois legendary halfback. A new motor for the 77 was known officially as model 24, but in practice as the football motor. In 1927, when Minneapolis Heat Regulator Company and Honeywell Heating Specialties merged, the company was producing 40,000 clocks annually. Production of the model 77 continued until 1931when the Chronotherm was introduced as the first electric clock thermostat. Acratherms were also introduced, some of which had digital clock mechanisms designed to automatically adjust temperatures at pre- selected times. Some were equipped with a time control that could be set directly on the hour. In some neighborhoods, every household would call for more gas at precisely the same moment in the morning creating a tremendous drop in the gas lines. In cold weather the gas company would be besieged with calls to come and relight pilots.

Early in the century, Minneapolis Heat Regulator had expanded into the field of valves for natural gas and street steam. Gas and steam valves were needed for bake ovens, vulcanizers and forges among the industrial applications.

In 1927, Minneapolis Heat Regulator Company, 40 some years old, merged with 20-year-old Honeywell Heating Specialties of Wabash, Indiana and both companies were officially dissolved. They officially became a new company twice the size and no longer privately held.

One of the most significant acquisition occurred in 1934,with the purchase of the Brown Instrument Company. This was Minneapolis-Honeywell first entry into the field of industrial process control, and extended its product line and engineering well beyond the realm of home heating. Brown Instruments name came from Edward Brown, an engineer born in 1834 in Earith, England. Brown immigrated to Philadelphia around 1860, and there studied ways to measure high temperatures of the type found in kilns and foundries. In 1869, Brown invented the first pyrometer, an instrument based on the expansion principle, just like the thermostats Albert and Butz used 15 years earlier. The Pyrometer operated by measuring the difference in expansion of iron and graphite rods, which registered on a calibrated dial. Brown died in 1905 and his son Richard took over and the business underwent a rapid expansion. The company pioneered numerous thermo-electric instruments, and by World War I, as the demand for ceramics and metal alloys exploded, it took over an entire city block. When Brown was acquired by Minneapolis-Honeywell some 30 years after Edward’s death, company had 500 employees who produced $2 million worth of instruments annually. Richard Brown met Willard Huff on a train from Washington D.C. to New York. They soon became intrigued by the complementary nature of the businesses they represented. They wasted no time in proposing the purchase to their respected companies.

The spectacular growth of the company before World War II could also be gauged by expansions of the plant in Minneapolis. In 1916, 10,000 square feet were added and three years later another 25,000. In 1926, W.R. Sweatt oversaw the construction of an eight-story tower, 70,000 annexed to the north end of the structure. The tower featured a limestone façade engraved with the immediately outdated “ Minneapolis Heat Regulator Company.”

Minneapolis-Honeywell’s expansion during and after the Depression was not limited to the United States. The first international office had actually been acquired with the 1930 purchase of Time-O-Stat Controls Corporation. Time-O-Stat had established a distribution office in Toronto; manned by a young entrepreneur named Tom McDonald. When Honeywell purchased the firm, it retained McDonald to run it. By 1934, distributorships included Calgary and Montreal. Factories were eventually built in Canada enabling the subsidiaries to market products made in Canada.

Prior to 1934 most of the overseas sales were handled by the New York office. That year however, Minneapolis-Honeywell established its first European subsidiary in the Netherlands. N.V. Nederlandshe Minneapolis-Honeywell was an ideal locale for the export distribution because of Amsterdam's free port facilities, where goods could be stored in warehouses and shipped abroad without incurring a duty fee. Other subsidiaries followed in quick succession. One was created in London in 1936 and one in Stockholm in 1936.

In May 1939, the company acquired a plant and warehouse in London and began factory operations there while augmenting the staff of its Swedish subsidiary. Minneapolis-Honeywell prospered during the first years of the Depression. Reality caught up in 1932 when sales dropped from $5.5 million to $3.5 million. The Sweatt's reacted by cutting employment from 1150 to 647. When similar economics conditions had plagued the company in the early twenties, W.R. had sought temporary contracts for piecework, to try to keep production workers with less seniority on the floor.

In 1932, Sweatt resorted to similar measures by contracting with the Pillsbury Company to produce flour sifters that Pillsbury used as a premium to promote sales. Minneapolis-Honeywell produced some 2 million sifters at a cost of 7.5 cents each and this temporary arrangement kept a few toolmakers on the line. The company also produced gear trains for water meters for the city of Minneapolis. This vigorous pursuit of outside Contracts proved essential to the company's survival during those lean years.

As early as 1940, The Minneapolis-Honeywell News Circulator wrote, "The equipment and facilities of the Minneapolis-Honeywell plants are being placed squarely behind the expanding defense plans of the U.S. Government. By 1941 it was clear that Honeywell was going to be a mass-production facility for military instruments and equipment. In the fall of 1941, construction was begun to complete the north end of the plant, adding 65,000 square feet. Minneapolis-Honeywell engaged in the making of fire control devices for tanks, trench mortars, aircraft and anti-aircraft guns and telescopes and inclinometers for airplanes, but also in the standard controls that go into army camps, navy yards, ship yards and defense housing.

H.W. Sweatt anticipated the pit falls of super-accelerated production and took steps to insure the company's prosperity no matter what happened in the context of international politics. It was important to H.W. that a fevered rush to war production didn't cause the company to lose sight of its long goals in the business of domestic heating controls. In fact, demand for thermostats, limit controls and damper motors continued to outpace defense contracts even through 1941. Passage of the Universal Military and Training Act in 1940 meant that thousands of young men were to be called to military duty and this meant dozens of military camps and thousands of barracks, hospitals, laundries, officer quarters, mess halls and all other assorted structures that make up a military establishment, opened a tremendous market controls. Honeywell sought out a share of that market and got it.

The success Minneapolis-Honeywell had in the production of the accurate 7-jewell, 8-day clock in a mass- production facility, resulted in the mass production of many highly complex military instruments. Among the first contracts were orders for optical devices, such as gun sights and tank periscopes devices that required very small tolerances, and seemed to require productions methods at odds with the assembly line.

" One of the first jobs was frames for tank periscopes," Nessell wrote. "The sample submitted was a carefully machined, costly affair weighing 100-150 pounds, M-H engineered looked it over, quickly decided sheet metal and a little spot welding would do the job cheaper and faster. It did. Since then

M-H has carried the bulk of the tank periscope program – and tanks have 12 periscopes, some models even more.

Another problem brought to Minneapolis-Honeywell was in the etching of cross hairs on optical devices like periscopes and telescopes. Such an operation was usually very exacting and expensive, with a high rate of rejection of the end product. Before Honeywell took on the problem, a machine called the pantograph was used to etch “reticles”. The machine cost $15,000 and produced only 10 etchings at a time, with a 50% rejection rate. Honeywell engineers developed a simple device costing only $600.00, achieving a higher rate and producing rejections only about a quarter of the time.

By mid-1941, work on defense contracts had grown to the point where the company the company thought it prudent to increase security and offices. Honeywell employed guards 24 hours a day at company entrances and exits and began checking identification badges of workers and visitors. Employees considered the identification badge a privilege. One asserted, ‘ this badge we proudly wear because it identifies us as people who are doing our part to help America prepare.

Ten months after Pearl Harbor, the company received the coveted Army-Navy “E” Award. Only 3 percent of the nation’s war plants received an “E” Award during WWII, but by VJ-Day in 1945, Minneapolis-Honeywell received 15 more.

During the thirties, the company began to research possible applications of Honeywell temperature controls in cars, trains, ships and airplanes. Heating and cooling moving vehicles presents a much different problem than heating a home or office building. Heating airplanes were particular tricky since they experienced violent changes in temperature as they climbed or dropped thousands of feet in a few moments. In the late 1940’s, Minneapolis-Honeywell engineers developed a servo-amplifier system for controlling ambient temperature in aircraft cabins. This was based on the Modutrol system they had designed in the 1930’s for accurate control in residential and commercial buildings.

The basic idea of Modutrol was to control environmental conditions through a system of multiple, proportional settings and constant output, constantly regulated. A proportioning system, on the other hand would always be running, simply by mixing varying amounts of heated and unheated air to attain the desired temperature.

With airplanes, this type of control would be of particular advantages. In the summer and fall of 1939, Willis Gille, chief test engineer and John Sigford, test engineer, began working with Thomas Harrison of Brown Division in Philadelphia to perfect the Modutrol System in an effort to market the results to the airline industry. The three men worked with a two-phase motor, developed by Lewis Cunningham. They attempted to control the torque and direction of the motor by using an amplifier so that the motor would respond instantaneously to signal changes. The challenge was to develop an amplifier to perform the job. By mid-June, the men developed the G-58 amplifier, and two months later, an application- ready improvement, imaginatively named the G-59. The group built a demonstrator model and in January 1941 made the trip to Dayton, Ohio to demonstrate the amplifier, to a group of AAF technicians and scientist.

The Photographic Division at Wright Field wondered if the company could adapt its proportioning motor to a problem with their Fairchild reconnaissance camera.

Fairchild cameras used in reconnaissance flights to photograph large areas, horizon to horizon, were plagued by inaccuracies. Serial photographs of vast areas of the earth’s surfaces were needed, but if the camera was not perfectly parallel to the earth’s surface, the photographs could not be assembled.

Because planes in flight experience turbulence, it was difficult to keep the cameras level. Within a few weeks Honeywell engineers had a functioning prototype. Not only had they solved the leveling problem, they had also achieved remote control of the camera, so that it could be mounted in the tail if the plane.

The Norden Bomb Sight

In the early 1930's a man named Carl Norden invented a revolutionary new bombsight and founded a company in New York for the sole purpose of developing and manufacturing it. At the time it was said that it could aim and drop a bomb from 4 miles up inside a circle 100 ft. wide. The US Navy showed an early interest in the bombsight, but it was more suited for stationary targets, which put it in the domain of the USAAF. The Norden bombsight became the standard equipment for the Army and the Navy. The Norden Company alone built 25,000 bombsights and they cost $10,000 each. Thousands more were manufactured by other contractors. Although the public was aware of the bombsight, each one was removed from the planes by armed guards and secreted away in canvas bags.

The Norden Company and the Navy had developed a stabilizing system to be used in conjunction with their bombsight, called Stabilizing Bombing Approach Equipment (SBAE). The people at Wright Field were not quite satisfied with the SBAE and began working on an extensive modification to it; they wanted a system for the automatic control of flight. It was renamed the Automatic Flight Control Equipment (AFCE). The engineers at Honeywell were asked to develop the AFCE further. The Honeywell system automatically controlled the pitch axis of the test plane so effectively, that Wright Field wasted no time in ordering a complete set of controls for all three axes of the AFCE. A month later the Army Air Force loaned Minneapolis-Honeywell a B-17, so the company could install and test equipment at Wold-Chamberlain Field in Minneapolis.

The first installation of what became called the C-1 automatic pilot took place at Boeing in a brand new B-17, on New Years Day, 1942. The system was approved by the military for all bombing missions and became standardized in May 1943. The performance of the automatic pilot was usually measured by the degree precision the Norden bombsight was able to achieve, and the reports from the theaters of combat indicated the C-1 and the Norden bombsight were performing above, even the highest expectations.

At first, pilots were reluctant to use the auto-pilot. By the spring of 1943, the pilots became more familiar with the auto pilot and used them on all flights. The auto-pilot increased the efficiency of the bomb runs and in bad weather helped the pilots to maintain control of the planes, also in long distance flights it gave the flight crews a chance to rest. The auto-pilot revolutionized flight and during the war saved many lives.

Honeywell's important role in wartime production was manifest in the christening of a B-29 super fortress. The "Honeywell Honey Frances Carl" was named for the winner of a beauty contest back at Minneapolis-Honeywell's Mercury Switch department. The bomber made 42 bombing sorties, downed two enemy planes, dropped supplies to POW's in Japan and made six trips "over the hump" from India to China.

Minneapolis-Honeywell developed a turbo super-charger which diverted some of the engines exhaust to provide the motive force for the compressed air, effectively governing the air intake of the huge engines in all conditions. The system would automatically adjust for altitude changes or it could be manually operated by the pilot when he required greater power.

The formation stick – the advantage was that a less force was required from the pilot to keep his plane in formation.

For many years, prior to WW1, oil and fuel gauges were somewhat dangerous, because they required that raw flammables be piped through the cockpit to the indicators. Engineers at M-H designed a pressure transmitter allowing flight crews to keep tabs on the machinery and fluid levels without this additional risk.

Another challenge was keeping track of fuel a plane carried in the wing tanks. Fuel tendency to “boil” or “foam” at high altitude creating froth on its surface which could corrupt accurate measurement. Fuel also contracts at frigid temperatures encountered at high altitudes. All these factors could cause as much as a 15% error in fuel indicator readings. M-H engineers developed an electronic capacitance gauge which solved the problem by measuring the weight of the fuel in the tanks rather than the volume.

Dedicated on September 24, 1943 was a giant hangar built at the World-Chamberlain Field in Minneapolis. The experimental facility was large enough to house five B-17 Flying Fortresses. The door measured 180x130 feet and was rumored to be the largest in the world. After the war the hangar was rented out Northwest Airlines. The new hangar was home to a B-17 known only as “two-one-zero”, for the last three digits of its tail number. Logging more than 1800 hours of test flight, “210” tested all the successful M-H controls: the formation stick, auto-pilot, superchargers and fuel gauges. After the war, the AAF declared the “210” surplus and M-H donated the bomber to the University of Minnesota’s Engineering Dept.

The development of technical equipment required the training of people to build and use for example, the C-1 autopilot. Honeywell offered a six-week educational course with the price of the modified AFCE. Eventually it established an Aeronautical School at World-Chamberlain Field, where technical representatives and enlisted men alike learned the intricacies of the new devices. By mid-1944, the Minneapolis-Honeywell Aeronautical School had turned out2500 graduates. Minneapolis went to Hollywood for assistance with the program, contracting with Walt Disney Productions to produce 10 instructional films for the school.

In the summer of 1945, two employees were invited to participate in an Army tour of German scientific facilities, Willis Gille and Hub Sparrow, who had helped develop the C-1 autopilot, conducted a survey of Nazi flight development. This study turned up some shocking information which included models and blueprints of German air secrets, had the Allies been held off for another six months might have won the war for the Nazis. Giles and Sparrow were surprised at one particularly extensive facility where they “learned of a roomful of Minneapolis-Honeywell autopilots and turbo regulators, gyros, amplifiers, motors and other gadgets” all apparently salvaged from fallen bombers and planes. The group found a JU-88 in which a complete C-1 autopilot had been installed.

Honeywell Women during the War

During the War, Minneapolis-Honeywell employed thousands of women in every position. M-H had hired women for the production lines as early as the 1920’s, because it seemed that their smaller hands and fingers provided them with a distinct advantage in delicate assembly line work. Women worked two daily shifts, from 8:30 a.m. to 5 p.m. and from 9 p.m. to 6:30 a.m. The women came from all walks of life, many had never had worked before.

The Honeywell Frances Carl

The company participated in a contest to name a B-29 bomber stationed in the Pacific. The Honey was named after Frances Carl, an employee in the Mercury Switch department, who had won a company beauty contest. The B-29 had made 42 combat sorties, downed two enemy planes and six trips “over the hump” from India to China and even made a mercy drop of supplies to American POW’s in Japan.

On May 11, 1945 at 8:04, Harry Truman made his epoch-making official declaration. On a signal, bells rang throughout all three plants for a period of thirty seconds. This was to announce the 24 hrs. shut down. V-J Day followed several months later. A total of 4,173,561 products for Army, Navy and Air Force, not one of which was commercially manufactured before the war, was produced by M-H in the 1,347 days between Pearl Harbor an V-J Day The 1945 annual report detailed the contribution to the war effort. Three million periscopes, 300,000 telescopes, 100,000 mortar sights,160,000 gunner’s quadrants, 110,000 autopilots and associated devices, 800,000 turbo regulators and more than 35,000 four-engine bombers were equipped with M-H C-1 automatic pilots and turbo-chargersuary 1946, Lt. General L.H. Campbell, Chief of Ordinance, at the War Department in Washington, D.C., wrote to commend Minneapolis-Honeywell for a Job well done. Minneapolis-Honeywell had converted from heating controls into a sizeable manufacturer of government requisitions. This transformation was the result of Minneapolis-Honeywell’s tremendous endowment of scientific and engineering talent.

The war had ended and the painful conversion to peace time production began. Thousands were laid off or “voluntary terminated “as government orders were slashed. Cutbacks were the worst when the Japanese surrendered, when most of the remaining contracts were cancelled. The remaining work force turned to the production of Honeywell’s controls for the post-war world. To quote H.W. Sweatt, “Within 30 days of the victory, M-H expects to have achieved regular production at a rate equivalent to its pre-war years”. The Second World War ended with the atomic bombings of Hiroshima and Nagasaki. Minneapolis-Honeywell was directly involved in the birth of the new atomic age, as the c-1 autopilot was in command of the two b-29s. The C-1 also piloted several unmanned planes that flew through the Bikini Island test in 1946.

Many of the automatic controls, recorders and other instruments produced by the company were used by the Manhattan Project. The company was involved in outfitting the facilities of the AEC’s testing sites and headquarters at Los Alamos, N.M. The AEC, s order was the largest order the commercial Division had ever received. The company was proud to supply the Nautilus (SSN-571), the first atomic submarine; the Honeywell equipment controlled the ship’s 10 different “Air conditioning zones”.

In October 5, 1942, H.W. Sweatt announced the opening of Aero Division. Tom MacDonald, former head of the Toronto office, to take the helm. Aero Division’s challenge was the unprecedented mass-production of higher sophisticated “electronic instruments”. In 1946, Aero profits were just $25,000, barely breaking even compared to other sections of the business. Fortunately, Aero was still swamped with government contracts that had not been cancelled. Orders placed since the first of the year (1946) exceeded $4,100,000. Aero shop facilities were planned on the basis of a shop for $3,000,000 annual sales. No more sales could be accepted for 1946 deliveries except in very limited quantities of items in production. Both Bendix and Sperry had already developed automatic flight controllers which were being installed on commercial planes. The E-6 autopilot was developed to serve the Air Forces next generation of bombers, the B-36 and the B50. Before the E-6, the engineers were already working on the E-11, the first automatic pilot for supersonic jets. The Aero Division’s best customer was the Army Air Force, and the division had to be content with government rather than the commercial contracts. The war years never subsided from the point of view of defense production, for as soon as WWII concluded the nation plunged right into the arms race of the cold war.

For forty years there would be no shortage of funds for research and development of technologies for American defense. The introduction of nuclear submarines, super-sonic jet planes, and guided systems, there would be bountiful work for Honeywell's Aeronautical Division.

Unfortunately tensions continued to escalate between the U.S. and the U.S.S.R. The continuing flow of government contracts helped fund development projects, which diversified Aero's line, and items like gyros and navigational systems were re-engineered and designed as stand-alone products, with applications in several markets Aero Division began to move away from components and into systems. The "Autopilot" became an automatic flight control system".

In 1951, the outbreak of the Korean War caused Honeywell to re-activate the Ordinance Division. The missile projects acquired increasing importance over the next five years. For defense needs, new plants, new equipment, and new personnel were added on a substantial basis.

In 1957, Honeywell reorganized its defense-related business into the "Military Products Group", a unit including Aero, Ordinance, and a new Boston Division in Gyro-related projects, headed by Steve Keating, who would become CEO in 1974. Military Products Group aggressively developed an expanding line and advanced technologies of power systems, lasers, and radiation and training simulators.

In 1958, Honeywell established a Research Center in a former county poorhouse in Hopkins. Minnesota. Once research had developed identifiable applications to a Honeywell business, it was turned over to the research section of the appropriate division. The new group was well-positioned for the immediate space program. The launch of sputnik caught America by surprise and began the space race. In the U.S., immediate attention was placed upon the military and space research and science education. The missile work in already in progress was intensified.

Honeywell continues to work intensively on gyroscopes, since these precision instruments were at the heart of many of the company's navigational guidance systems and automatic controls. In 1950, technicians experimented with a new device which has become known as the Electrically Suspended Gyro. The idea was to create a gyroscope at the highest level of accuracy and durability's, features important to preventing gyro "drift" or error overtime. The ESG consisted of a rotating ball suspended within a shell by means of electric fields. The absence of any wearing surfaces suggests extremely long and reliable, and the drift rate is so low that it makes testing difficult, because the gyros must be operated for extremely long periods of time before the drift is great enough to be detectable.

In 1960, Areo Researcher Joe Kilpatrick was working into bringing gyroscopes into yet another generation of development. Kilpatrick worked with beams of light in opposing directions. These lights were sensitive to movement, like the spinning iron spheres in a traditional or Electrically Suspended Gyro. His work resulted in the invention of the Ring Laser Gyro, which went into production in 1966 with a laser gyro navigation system presented to the Navy at China Lake, California. The Ring Laser Gyro continued to under go intensive development through the 1970's. By the late 1970's, the RLG was ready for the commercial market. In 1978, Boeing awarded Honeywell, a multi million dollar contract for RLG navigational equipment for its 757 and 767 aircraft and the Ring Laser Gyro became the center of the aircraft's flight management system.

The Defense Systems Division was established in 1977 in response to a general trend toward government investment in ordinance and aviation products. Electrically Suspended Gyros were increasingly in demand, and Honeywell was awarded a contract to retrofit the nation's aging B-52 bombers with contemporary navigational and flight controls. In the 1980's, Honeywell's Ring Laser

Gyro equipment became the standard on many business jets. An RLG navigational system helped make it possible to reduce the normal crew on a Boeing 757 by one, which reportedly caused a problem between airlines and unions.

For the Korean War, the Ordinance Division “basically” picked up from where its predecessor left off in 1945. In 1951, Honeywell acquired the Intervox Company on Seattle, a small manufacturer of ship-to-ship telemetry and ultra sonic underwater systems. Intervox eventually became Honeywell’s Marine Equipment Division (MED). In 1960, MED established a deep ocean research unit designed to study ocean mechanics, acoustics, magnetics, and thermodynamics.

By the mid-fifties, components for missiles, anti-aircraft gun controls, and under seas warfare equipment were added to production. Many highly sensitive government programs were available to the division. For example, the Wag tail project for the Navy and the Air Force involved a low-altitude bombing system, a predecessor to the technology of the cruise missile.

In 1956, the anti-submarine Rocket (ASROC) was a prime contract for the Navy, for the development and production of a rocket-assisted anti-submarine weapon with sonar foe detecting targets. The ASROC was fleet operational by 1961. This led to other important military contracts, such as the Polaris MK-11 submarine missile. Four years later, Honeywell won the prime contracts with the Navy for the light weight torpedo MK-46, one of the longest running programs in company history, continuing in production for more than 20 years.

By 1967, Marine Systems once again received full division status. An exciting new product was a ship positioning system that combined underwater technologies with a familiar field of navigation and inertial reference, using acoustics to help maintain positioning at sea. In 1967, the Military Products Group was renamed the Aerospace and Defense Group. At the same time the Aeronautical Division became the Aerospace Division. In 1969, Honeywell contacted with Douglas to provide for the first major commercial installation of digital avionics in the new DC10, and Boeing placed a substantial order for altitude alert indicators for its 727 & 737 aircraft.

In 1967, the Marine System Center was formed from the company’s Seattle and West Covina, California operations, and acoustics and sonar research continued. Honeywell had been developing simulators like the Space Cabin and along with many avionics-oriented trainers, and navigational training complexes were prepared and sold to the Navy. Sonar signal processor operations were the subject of another training simulator, giving the company entry into the air anti-submarine market. Maritime Systems Center experienced rapid growth in the late sixties and reached divisional status in 1973.

In the early seventies, the Systems & Reach Division became a center for inquiry. The center worked for most of the decade on laser navigation devices, as well as on a helmet-mounted sight, which allowed helicopter pilots to define a target while still keeping his hands on the controls. Developed for the Army’s Cheyenne Helicopter project, the helmet sight linked a pilot’s head movement with a camera outside the cockpit, allowing him to define a target simply by turning his head to it. This was, in effect, an early form of virtual reality; especially the cameras were upgraded to infra-red models allowing the pilot to “see” at night.

Space

Honeywell was a contractual participant in nearly every manned and unmanned U.S. space enterprise. The Soviet launching of “Sputnik” brought together the best scientists, engineers, technicians and

planners. NASA pointed out that the investments, in this area, brought clear payoffs down to earth as well, in the form of technological break through that would have profound impact in everyday life. Among these, the rechargeable pacemaker, telecare emergency medical system, oxygen-hydrogen fuel cells and computer enhancement.

Honeywell products helped guide spacecraft, missiles and satellites. John Dewane, president of Honeywell's Space and Aviation Control Business, stated, "He believed our products are on probably just about every vehicle you can name, certainly in the U.S. and a lot of them outside of the U.S." A lot of equipment was on the Apollo, on Gemini, on the Space Shuttles and the Space Stations. Between 1966 and 1967, Honeywell developed its Orbital Scanner program for Langley Research Center.In 1958, Honeywell participated in an experiment called "APRE", which consisted of "a very large high performance camera installed on a 3,000 lb. Gondola and carried to altitudes of 80,000 to 100,000 ft." The experiment was designed to "determine the effects of atmospheric turbulence on high altitude photography". The company also developed a space cabin simulator for the U.S. Air Force School of Aviation Medicine, which could house two people up to 30 days in a sealed environment.

In 1964, the newly formed System & Research Division won a contract to develop, design, and delivers a complete space vehicle. Called "Scanner", it was Honeywell's first prime contract for a space-related project. The Scanner project was a $2.8 million a "spin-stabilized suborbital vehicle". Honeywell was responsible for all of the space craft systems, structure, guidance and control, telemetry and power, which meant integrating all the system components of propulsion, payload instruments, booster, and launch complex. Scanner was to be designed to be launched at an 80° angle, 400 kilometers into the stratosphere and its payload of a star mapper and radiometer would scan the entire earth's atmosphere "to measure the natural radiation gradients which define earth's horizon. It was successfully launched twice in 1966 from Wallops Island off the coast of Virginia. Honeywell later developed a second Scanner, which cancelled before it could be completed.

After Scanner, the next contract Honeywell sought was "Earth Resources", intended to launch sophisticated sensing equipment into orbit. Because of the competition for this, Honeywell decided to forego prime contract, and instead concentrate on the sub-contracts work. This strategy only enhances its space technology reputation. Other Gemini and Apollo programs followed in short order, with contracts for flight and stabilization controls, cockpit displays, displays and training and ground support.

In 1969, "Jane's All the World's Aircraft" noted that Honeywell has contributed to more than 90% of the U.S space vehicles successfully orbited and is currently involved in nearly every major civilian and military space effort, both manned and unmanned. Honeywell teamed with McDonnell-Douglas to "provide attitude reference and control equipment" for Skylab. In fact, Honeywell has contributed to every manned space flight launched by the U.S. In 1977, Honeywell systems performed flawlessly in Space Shuttle trial flights, and in1981 saw the first successful flight of Columbia. Honeywell digital flight control systems allowed manual and automatic control of the Space Shuttle's flight and the Honeywell main engine controller allow full throttling control for the rocket engines during lift off.

Honeywell's reputation as a space age company had become such that management was approached by the filmmaker Stanley Kubrick in 1966. Kubrick was hoping to consult with company scientists and engineers on technical aspects for a new movie he was making entitled 2001: A Space Odyssey. Honeywell responded by assigning four engineers to the project, and they spent several months researching and drafting fictional technologies, like anti-gravity suits and radiation guns. Perhaps Honeywell's most important contribution, however, related to the detailing the characteristics of HAL, the computer which played a central role in the drama. When the engineering team completed its work, lead engineer David Stubbs flew to London with a one inch thick note book, which he turned

over to Kubick and screen play writer Arthur C. Clarke during a consultation on the set. The movie went on to be a screen classic. Honeywell computers were also featured in “Modesty Blaize”, a 1966 movie in which an H-200 selected clothes and accessories for a female spy. In 1967, the “billion Dollar Brain” an H-200 was portrayed as the heart of a vast computer complex.

In 1981, Aerospace and Defense Group revenues exceeded $ 1 billion dollars for the first time. In 1983, President Reagan pledged to increase military spending with a five year $1.8 trillion expansion. Defense accounted for 10 % of U.S. spending and 25 % of the countries scientist and engineers, and the Pentagon was the largest purchaser of goods and services in the nation.

Some analysts grew concerned that the U.S. economy was becoming too dependant on defense. As defense spending increased, protests from “concerned citizens” groups became more vocal. Honeywell, for the first time, was called upon to answer critics who charged that the company was profiting from warfare. In 1968, a group of protesters calling themselves the “Honeywell Project” regularly staged demonstrations at Honeywell World Headquarters in Minneapolis. The Honeywell Project consisted of several hundred anti-war activists from the Minneapolis-St. Paul area, who regularly sponsored protests at the company’s annual meetings, and on Honeywell property. Its purpose was to pressure Honeywell to stop research, development, and production of all weapons systems, though many observers believed the group wanted publicity.

Before the war ended, H.W. Sweatt started considering the company’s future. As soon as the hostilities ceased, many government contracts stopped. In June 1945, Sweatt appointed a “post-war planning committee” headed by his brother, C.B. and consisting of six top executives. This group was charged surveying the company’s major markets, past and present, as well as evaluating its product lines and engineering directions. It was asked to detail two specific objectives for the post war company: increasing the companies in fields already being served, and cultivating new markets. The goal was to install more and better home heating controls in homes from coast to coast.

The primary vehicle was to be the new Modular flow system, which had been as successful in its metamorphosis as the C-1 automatic pilot. By April 1945, the company had kicked off a nation wide ad campaign for Moduflow, generating more than 5,000 customer inquiries per week. Some engineers had been working on designs for post-war controls, and in 1947 they were ready to unveil a brand new Chronotherm. By 1953, The Honeywell Round would be ready to transform the post-war home. Sweatt envisioned Minneapolis-Honeywell expanding into new fields of automatic controls for heating and cooling of railroad refrigerator cars, passenger jets and even automobiles. The company had already participated in a number of high profile installations on luxury liners, as well as sales to passenger airlines in the midst of the war.

In 1953, H.W. Sweatt left the presidency and became board chairman. Paul Wishart became the first president who was not a Sweatt or a Honeywell. In the decade from 1945 to, total employment rose from 8,628 to 25,000. The company invested $48 million in plants and equipment and sales nearly tripled. In 1950, the company purchased the Macro Switch Company of Freeport, Illinois. The division manufactures switches, sensors, manual controls and fiber optic products. These products detect presence, position, motion, color, shape, level flow, pressure and temperature. In 1994, Micro Switch served more than 300,000 customers around the world with products found everywhere the home to the Space Shuttle. Many Micro Switch products are sold directly to manufacturers. It produces and ships about 165 million switches a year, about 10% of which are sold to other divisions.

The Round (T-86)

Carl Kronmiller was the man responsible for the development of the Honeywell T-86 “Round Thermostat”. Begun in 1943, the Round was shelved for the war effort. It was revived in 1953, when it went into production and met with spectacular success. The T-86 became synonymous with Honeywell, and can still be found in more household walls than any other thermostat world wide. Considered industrial art, the Honeywell round was scheduled to go on display in 1997 at the Cooper-Hewitt National Design Museum, Smithsonian Institution. Kronmiller also invented a safety device that made it easier to light pilots in automatic gas systems.

In 1965, the company instituted the H.W. Sweatt Award, to recognize its top scientists and engineers for outstanding contributions to technological advancement. “Honeywell was founded and shaped by inventive technical people. The H.W. Sweatt Awards for outstanding engineering and scientific achievement are designed to encourage this vital creativity.

Digital computation began in the 1940s; a global revolution began changing the way we work and play. Once Honeywell had e-established production for civilian heating and air conditioning controls for the market place following WWII, H.W. Sweatt and his management team examined the potential of the emerging computer market.

Early Computers

Computers, if defined as mechanical devices for counting, have been around for thousands of years. The abacus, still used in parts of Asia, has been around for 4,000 years. In the West, the first mechanical device for computation was developed by the French inventor and philosopher, Blaise Pascal, in the 17th century. Pascal designed and built a gear driven adding machine, which would add as many as eight columns. The German philosopher, Gottfried Liebnitz, improved on Pascal’s machine by designing one which could subtract, multiply, divide and even extract square roots.

In the 19th century, Englishman Charles Babbage made his own contribution to the science of computers. To correct what he considered shoddy math in the Royal Society’s astronomical and math tables, he designed a “Difference Engine: and an “Analytic Engine”. His “Analytic Engine”, had it been produced, would have added, subtracted, multiplied and divided. It would have been able to perform a series of operations in a predetermined sequence and as well retain results for subsequent calculations. Incredibly, Babbage’s mechanical computer had a memory of one thousand 50-digit numbers as well as a printer. But, like DaVinci’s flying machine, never made it off the sketch pad.

What has become to be called the modern method of computation really had its origins at MIT, where in 1925 Dr. Vannevar Bush developed the first electric analog computer. An analog computer directly measurer’s a variable such as speed or temperature and continues to record changes through a mechanical or electric analog, like a speedometer or a thermometer. Most analog computers are specific to a particular task. More general applications of computing machines required the development of techniques and machines dealing strictly in discrete numbers and values. In other words, digital technology would have to be developed before a general computer with variable applications could be invented.

In 1939, mathematics professor at Iowa State College, John Vincent Atanesoff graduate student, Clifford Berry, developed a working bench model of a digital computer. The ABC (Atanasoff Barry Computer) was designed and built simply to make life a little easier for Atanasoff students. Four years after ABC was born, John Mauchly, a (University of Pennsylvania scientist) with help of J. Presper

Eckhert, built the first fully operational electronic digital computer. The Electronic Numerical Integer and Computer (ENIAC) pit Claude Shannon's directly to work by using vacuum tubes that switched on and off translating a binary system into electronic impulses. Developed to help with the arduous calculations of the Armed Forces ballistic tables, it was partially funded by the government. The finished machine weighed 30 tons, contained 18,000 vacuums and cost $400,000. ENIAC could perform 5,000 additions and subtractions a minute. In one hour, it could equal to months of production by 100 mathematicians using desk calculators. After the success of the ENIAC, Mauchly and Eckhert formed a computer company of their own, which was eventually bought by Sperry Rand.

Most early computers were designed for scientific research, while later machines extended the applications to other uses. UNIVAC, built in 1951, by Sperry Rand, was sold to the U.S. Census Bureau. It gained national attention on network television when it predicted the outcome of the 1952 presidential election between Eisenhauer and Stevenson. The first fully operational system like ENIAC and UNIVAC used vacuum tube technology and required huge power supplies and extensive cooling systems, because of their high output of heat. But, amazingly, it would be only a matter of months before the next generation of digital computer machines rendered the first generation obsolete.

Honeywell's very first product, the Butz damper-flapper, was an analog computer. It transferred information from the thermostat to the furnace, dealing directly in the variable of room temperature. The Norden bombsight determined the time of the bomb release according to the interactions of variables, such as wind speed and directions and anything that could affect the drop. The Honeywell C-1 autopilot helped make the Norden bomb sight more accurate by eliminating the human error. Honeywell developed a computer in 1947. This was the work of Hugo Schuck and Waldo Kliever. The B-D was designed to determine airline schedules by factoring wind speed, visibility, and changing conditions of flight. It took its name from two of these variables – Bearing and Direction.

In the 1950's, the company management checked out many sources regarding the progress and development of the current computers. The recommendations were that Honeywell should get into the computer field. As a result of its feasibility study, Minneapolis-Honeywell formed a joint venture with the Raytheon Corporation to develop and manufacture a digital computer for general business and scientific use. Headquartered in an old tannery building in Newton, Mass, the new business was named Datamatic Corporation. Honeywell retained majority stock in a 60-40 ownership stake. The papers were signed on April 12, 1955 by Honeywell President by Paul Wishart and Raytheon President Charles Adams, Honeywell executive John Wilson was named president of Datamatic, though he retired one year later. He was succeeded by Vice-President and General Manager Walter Fink.

Raytheon had considerable experience in computers and by using Minneapolis – Honeywell marketing and research, the new venture proposed to use designs already developed by Raytheon for a "special purpose government computer", and adapt them for general purpose business applications. This early machine, called the Raytheon Digital Automatic Computer (RAYDAC), had been developed under a contract with the US Navy.

Datamatic Corporation started business with about 200 employees mostly engineers and mathematicians hired by Raytheon for government projects. This was a distinguished group of Harvard, MIT and Aberdeen Proving Ground people. They were involved in the early break through in digital computing, including Harvard's Mark I, II and III analog computers, ENIAC, EDVAC and ORDVAC. From the earliest days of its computer business, Honeywell approached the market place aggressively. Even before DATAMATIC's first computer was completed, Honeywell bought out Raytheon's interest. The joint venture became Datamatic Division of Minneapolis-Honeywell, and in 1960, the name was changed to Electronic Data Processing (EDP).

Datamatic first computer was the D-1000, developed from 1955-1957. The Datamatic D-1000 was a vacuum tube system costing $1.5 million, first sold and installed in 1957. It weighed 25 tons and took up 6,000 square feet. It was comparable to many other first-generation vacuum tube computers; it did embody several technical innovations. The most important was the 3 inch magnetic tape system that Raytheon had been developing. The D-1000 used an air suction system which made magnetic tape storage much more reliable for digital computers. It was a relatively fast computer, with a ten micro-second logical access time. It performed 4,000 11-digit additions per second, handled 10 tapes simultaneous, and boasted a printer which could print 900 characters per minute and a card reader which read 900 cards per minute.

This first D-1000 was sold to Michigan Hospital Service, in Detroit, in 1957. With 1.4 million subscribers, MHS was the second largest Blue Cross organization in the country, conducting 25,000 transactions per day. The D-1000 was a welcome tool in the management of such a huge operation. In 1958, installations were made for the First National Bank of Boston, the Baltimore & Ohio Railroad, the County of Los Angeles, and the U.S. Treasury, along with two machines sold “in house” to Honeywell’s home offices and to Datamatic itself.

In 1959, Honeywell announced the development of the H-800. The transistorized H-800 could run up to 8 programs simultaneously, and was much faster than its predecessor. Each second it could handle 1.67 million characters, 4,000 additions or subtractions, and 6,200 multiplications. Facilities were expanded in Wellesley, Mass. and branch sales offices were established in New York, Chicago, Los Angeles, Boston and Washington. The first H-800 was in 1960 to Associate Hospital Services of New York, American Mutual Life Insurance Co., the Army Map Service and the Army Finance Service. The price of the new computer was about one million dollars, but the high price would be offset by a rental system developed by EDP, in which a customer could lease an H-800 for a base price of $15,000 per month. Thirteen H-800 were installed in the first quarter of 1961 and several companies in Australia purchased the system.

In 1962, the H-800 demonstrated a new first of digital technology. It became the first computer to successfully transmit data by satellite, sending information from Honeywell to Bell Laboratories via telestar satellite. Honeywell, repeating UNIVAC’S 1952 performance, used the H-800 to predict the outcome of the national elections on ABC television.

Viewers were periodically updated on the elections, as well as the performance of Honeywell’s computer. In tandem with a later model, the H-400, the H-800 gathered reports from 16 sources in 12 states transmitting updates by teletype directed to ABC. The teletype was received by paper tape which was fed directly into the computer.

The introduction of the H-200 enabled Honeywell capture 5% of the world wide computer market by 1970. The success of the H-200 actually proved unfortunately in the long run, as it helped seal Honeywell’s commitment to a market that never, in the long run that never blossomed. But, H-200, proved that technical insight, coupled with strong marketing could compete successfully, even against a long-term monopoly like IBM. By 1969, EDP carried a comprehensive line of 2,000 computer products, and more than 5,000 computer systems installed.

In the late Sixties, government agencies began to use computers to create nationwide communication networks that could be used in a national emergency. These early efforts eventually led to the internet, a loose association of colleges, universities, corporations, institutions and individuals. The internet is actually an association of several computer networks including ARPANET, one of the pioneer networks developed by the Department of Defense. In 1968 Honeywell hardware was used in the

creation of ARPANET because its developers “concluded that the most efficient and reliable interface between a large number of dissimilar computers and the network itself was a specially modified Honeywell Model 516 mini. “General Electric had pioneered time-sharing, a method by which many different users could use the same computer at the same time for different purposes. As early as 1960, Walter Finke, the president of the Datamatic Division, was predicting the development of a system like the internet. He referred to the possibility of expanding the communications capabilities of digital technologies in order t “give electronic computation a sort of geographical omnipresence”.

In the 1970’s, Honeywell merged computer operations with GE’s information systems in a concerted effort to catch IBM, or at least gain a more profitable share of the market. The merger doubled the size of Honeywell’s computer interests, and resulted in the second largest computer in the world. In 1956, GE won a $60 million contract with Bank of America. Like Honeywell, GE‘s computer section dreamed of capturing, “the title of ranking contender” against IBM. In 1969, a gathering of top management and engineers analyzed and speculated on future technologies and planned an advanced product line. There was one problem. Estimated pre-production cost was between $450 and $500 million. The belief was that GE wasn’t in a position to make that kind of investment.

Raytheon approached Honeywell in 1955. GE contacted Honeywell contacted Honeywell in 1970. Honeywell accepted, in principle, the proposal of merging EDP with GE’s Information Systems. After a series of complex negotiations between two very large companies, a partial “pooling approach was approved, in which a third company called “Honeywell Information Systems” would be formed. Honeywell would own 81.5% of the company’s stock, and GE would control 18.5%. Honeywell paid GE 1.5 million shares of stock and $100 million in notes. Public arrangements of the planned merger were made in 1970. Although company sales were increasing every year, Honeywell was not gaining a market share. When GE elected to get out of the business, Honeywell officials felt they had a golden opportunity.

One result of the action between GE and Honeywell was the formation of Compagmie Honeywell Bull and Honeywell Information Systems Italia.