

Wrecking A Building Soon As Completed

In addition to furnishing fuel consumption saving of from 15 to 35 per cent—often greater—The Johnson Pneumatic System of Temperature and Humidity Control *saves the building*. Without automatic control, offices are constantly overheated, and the humidity in offices decreased to naught. This excess, dry heat dries out the walls, floors and wood-work, warps them, cracks, opens the joints, and reduces the building's materials to lifeless brittle. Natural building depreciation is rapid enough, without hurrying it at the building's very beginning by this process of rack and ruin. Moreover, the building's desirability and rental value go down. All told, the loss is enormous: and easily can be avoided.

For this very reason architects specify The Johnson Pneumatic System of Temperature and Humidity Control: to save the building from the foregoing disasters.

For the same reason install The Johnson System in your building: and, too, save the great difference of 15 to 35 per cent in annual fuel consumption cost.

JOHNSON SERVICE COMPANY
 Factory and Main Office Milwaukee, Wisconsin
AUTOMATIC TEMPERATURE CONTROL FOR 34 YEARS TWENTY-EIGHT BRANCHES, UNITED STATES AND CANADA

A 1922 ad promises energy savings of up to 35%.

1912

Pneumatic clock systems are promoted as more reliable and less expensive than electric clocks.



1912

Reliability of valves improves when metal diaphragms replace rubber ones.



1914

Dampers, once made of wood louvers, use sheet steel by 1914. Original motors operated using rubber balls and springs.



1924

For the war effort, the Company equipped defense facilities with temperature and humidity control systems, and also engineered special products for the military.

The radiosonde was developed to help gather weather data as an aid for combat pilots encountering unknown flying conditions. The devices were attached to helium balloons and collected and transmitted weather data while aloft. The Company also made leak detectors that were used to inspect barrage balloons used above military installations, ships, and landing barges. Echo boxes, devices that tested radar sets, were produced into the 1960s.

After the conclusion of WW II, the Company's backlog began to swell with civilian construction orders and with them came a new surge

of interest in air conditioning. Hospitals sought its healthful benefits and southern U.S. facilities clamored for year-round comfort. In 1959 the Company's sales had climbed to \$50 million from \$10 million in 1949.

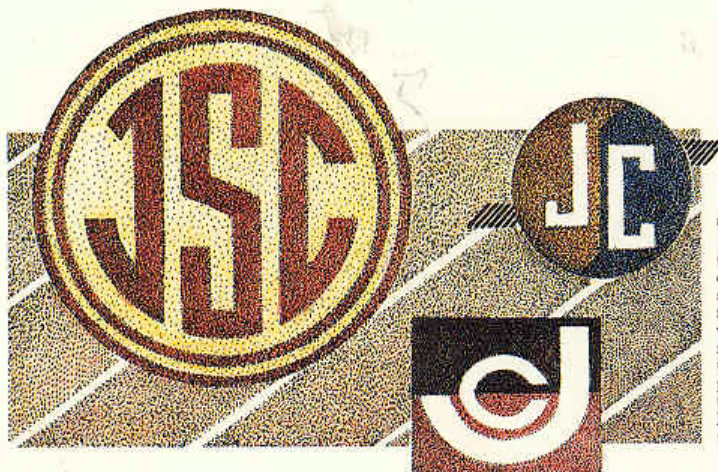
CENTRALIZED CONTROL

Buildings were getting larger and temperature control systems were getting more complex and diversified. In a typical large installation hundreds of monitoring and control products were scattered throughout a facility, putting an onerous burden on a building engineer. The introduction of capillary tubing in the early '40s eased the monitoring task. These liquid-filled tubes provided an accurate, although somewhat costly, way of monitoring a tem-

perature at a location up to 50 feet away from the sensing device.

Capillary tubes gave way to the principle of pneumatic transmission, with air pressure replacing the liquid. Not long afterward, twisted pairs of copper wire that transmitted control data electrically provided further economy.

The Johnson Service Co. began to fabricate and install pneumatic control centers in 1956. With the centers one individual could scan panels displaying individual room temperatures, ventilating conditions, chilled and heated water temperatures as well as the outdoor temperature. The need for a



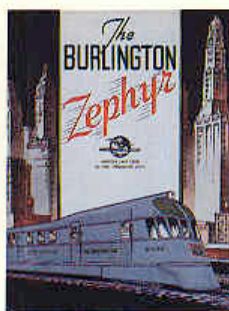
The logo at left is used by the Company between 1913 and 1955. The "S" for service is dropped from the 1955 and 1960 versions, reflecting a new emphasis on the Company's control products even though the name remains Johnson Service Co. until 1974.

1924 1934 1940 1943 1945

When program clocks are linked to automatic controls, greater convenience and savings are achieved.



Air conditioning systems add to the pleasures of rail travel.



A variety of thermometers are installed.



Leak detectors use a porous clay backing and diaphragm to check for escaping gas from barrage balloons.



Radiosondes, reported as a "new war science," are released from the roof of the Michigan Street building.



dedicated source of customized control panels led to the 1960 acquisition of a panel fabrication operation in Poteau, Oklahoma.

Back in Milwaukee, manufacturing space in the Company's headquarters building at 507 E. Michigan Street was being squeezed. A building on the city's north side was purchased to house its brass foundry and metal fabrication operations. Soon afterwards the plant was expanded to accommodate an increasing amount of assembly and machining work.

DIVERSIFICATION

In the same year that the Company celebrated its 75th anniversary, Richard J. Murphy was elected its fifth president. While his term, 1960 — 1966, was the briefest of his peers, the man who had started as a Johnson timekeeper in 1918 was responsible for starting the firm in several important directions.

After decades of serving overseas markets through a handful of offices and an export group, an International Division was established. Subsidiaries were set up in England, France, Australia, Belgium, Italy and Switzerland. Construction of the first foreign manufacturing plant began in 1964 in Lomagna, Italy. Like those in the

U.S. and Canada, the international offices were managed as virtually independent businesses providing customers with one source of support.

Murphy also decided to formalize the Company's approach to its proliferating amount of controls work in industrial and military installations. Since World War II, the Johnson Service Co. had earned a reputation for its expertise in atomic research plants and other projects requiring higher levels of reliability than commercial buildings.

The Systems Engineering & Construction Division was formed in 1961 and was soon involved in all major Air Force missile programs including all 57 Titan II launch



Air-conditioned movie houses offer an escape from the woes of the depression and the summer heat in the early '30s.

1949

New Canadian headquarters opens in Toronto. The subsidiary was formed in 1899.



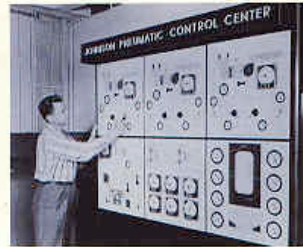
1952

Milwaukee offices mushroom with the addition of four stories facing Clybourn St.



1956

Key temperatures are supervised, checked, recorded, and changed from a pneumatic control center.



1959

Commensurate with plans for foreign expansion, the Export Division becomes the International Division.



complexes. Commendations for its work were also received from the National Aeronautics and Space Administration which turned to Johnson Service throughout the decade for "mission control" instrumentation for the Apollo-Saturn program. The division later undertook work in nuclear power plants requiring unmatched standards of performance.

The Company's move into projects requiring stringent quality standards was broadened through its 1966 acquisition of Associated Piping & Engineering Corp. and Western Piping and Engineering Company. These operations were headquartered in Los Angeles. They fabricated piping and expansion joints for nuclear and fossil fuel generating plants and a variety of industrial installations.

In 1967 Fred L. Brengel became the sixth president of the Company. Brengel was educated as an engineer and worked his way up through the branch sales organization. In the year following his election, the Company's sales were boosted about 20% to \$155 million by the acquisition of Penn Controls, Inc.

Since its organization in 1917 by founders Ralph and Albert Penn, the Penn Electric Machine Company manufactured a diversified line of controls for original equipment manufacturers, distributors and wholesalers. After starting with their initial design for a water pump pressure switch, they gradually expanded to help supply the accelerating need for electrical controls. Through the acquisitions of Baso, Inc. and Pioneer Electric, the

Penn product line swelled to comprise controls for commercial refrigeration, compressors, oil and gas heating equipment, appliances, and air conditioning.

With the Penn acquisition, Johnson Service now had an in-house supply of electrical products for its installation projects. Penn also provided further inroads to international markets through its manufacturing plants and subsidiaries in Canada, The Netherlands, Argentina, and Japan.

ELECTRONICS REVOLUTION

Early in the 1960s Johnson Service management recognized that it needed to acquire another capability. It was apparent that electronics technology would not only be used in products and



Control valves are tested before leaving the factory in 1944.

1959

The foundry is moved to Milwaukee's Humboldt Avenue. Machining and molding operations are later added.



1962

Atlas, the first U.S. inter-continental ballistic missile, uses Johnson instrumentation and controls.



1966

Associated Piping & Engineering Corp. is acquired. It supplies the power generation and other industries with specialized piping and cryogenic hardware.



Johnson Service Co. joins the "Big Board" in 1965.

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equipment used by building occupants, but that it could be used to control the building.

In 1963 the electronics division of Fischbach & Moore was purchased, which served as a base upon which Johnson Service would increase its in-house electronics capability. Four years later, the Milwaukee laboratory introduced the T-6000 solid-state, digital data logger.

Until the arrival of the T-6000, a building engineer for a large complex could have used a dozen pairs of eyes to watch over hundreds of dials on his pneumatic control center. The T-6000 was designed to operate on a "management by exception" principle; that is, an engineer's attention was needed only when the system announced that data variables were outside

prescribed limits. If necessary, the engineer could stop and start mechanical equipment or reset a temperature, humidity, or pressure throughout the building from his command post. The amount of information and control instructions being transmitted was accommodated by multiplexers. Individual pairs of wires to each sensing and control point were eliminated.

In addition to performing heating, ventilating, and air-conditioning functions, the T-6000 could also monitor fire and smoke detection, security and emergency lighting systems. During the decade, several small makers of program clocks and security and alarm systems were added to the Johnson organization as demand for protection of life and property increased.

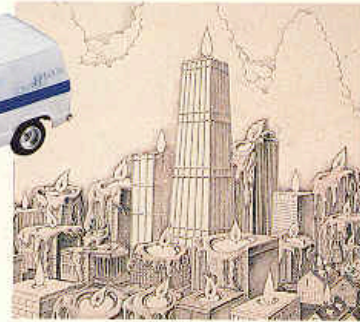
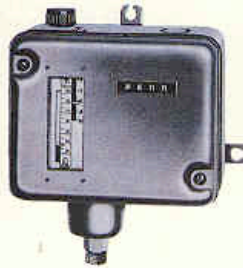
Shortly after the T-6000 was interfaced with a digital computer, Johnson Service introduced the industry's first mini-computer system dedicated to building control, the JC/80®. A typical control center of 1972 included a cathode-ray terminal with a keyboard, an intercom, a printer, and a mini-computer. In large installations the system used field units for distributed processing, furthering the management by exception principle.

One of the many customer benefits of the JC/80 was that it lowered the degree of technical training required of system operators and eased people into using the computer's capabilities. The software programs also included monitoring and data collection features to aid in scheduling equipment service.



The JC/80, introduced in 1972, is the first mini-computer designed and fully standardized to meet building control criteria.

1967	1968	1976	1978
T-6000 solid-state, digital data logger introduces the concept of "management by exception."	The acquisition of Penn Controls, Inc. expands manufacturing capabilities and international business.	A fleet of more than 2,000 vans comes to symbolize the service business.	Energy savings is not a new theme for Johnson Controls, but it receives new attention as building operating costs soar in the '70s.



The introduction of the JC/80 was timely. In 1973 international embargoes on oil were dramatic reminders of the world's tenuous energy supply situation. Energy costs shot up. Everyone began analyzing their utility bills for ways to reduce costs. Proper maintenance of energy-consuming equipment was seen as a fundamental way to save money. And although a JC/80 system installation might carry a million-dollar price tag, its payback in reduced energy costs could be achieved in a few years.

In spite of the worldwide recession, in 1977 the Company's backlog of uncompleted contracts, involving building control systems and process control and piping systems, rose to nearly \$500 million.

President Fred L. Brengel's message to analysts and shareholders was as appropriate then as it was for his predecessors.

"We believe that we hold a strong position in an excellent market. The incentives for spending on energy conservation measures, both in the traditional heating, ventilating and air conditioning areas, and for building automation systems, are greater than ever. High energy costs and the recognition by building owners of the ability to control these costs have significantly increased opportunities in the new and retrofit building markets."

The Company, which was renamed Johnson Controls, Inc. in 1974, had additional reasons to enter the '80s with confidence and enthusiasm. A host of new electronic control systems and devices were in the offing. An acquisition in West Germany would strengthen its position in the European market for building controls. And in 1978 it merged with Globe-Union, the largest U.S. manufacturer of automotive batteries. The merger doubled Johnson Controls' sales, expanded its strong financial base and gave it leadership in the field of energy storage. In 1981 Johnson Controls became a billion dollar enterprise.

It is a hale and hearty sales force of 1900 that spreads the message of the Johnson System of Temperature Regulation.



MAKING IT ALL WORK.

It is the people of Johnson Controls, what they did and what they believed in, who have made the Company what it is today.

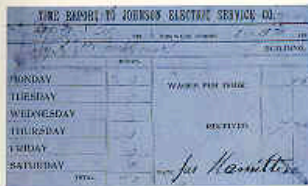
The most important reasons for a company flourishing and reaching its 100th birthday usually aren't documented in the papers that find their way into its archives. By and large, these only report on an organization's results, symbolic representations of millions of hours of labor, good and bad ideas, successes and failures, anguish and joy.

The real history of Johnson Controls is the stories about its people. Not just about what these people did, but also about what they deemed important.

Each organization feels comfortable "hanging its hat" on certain key values. Warren Johnson had his. The Johnson System of Temperature Regulation was to be the best — without qualification.

1897

James Hamilton works on the first known Canadian installation, Toronto's City Hall.



1907

Thermostats are readied for shipment.



1912

The calm portrayed in these scenes inside the Michigan Street headquarters belies the activity accompanying the Company's rapid growth.



1912



Johnson had the same requirement about the people, his employees, who represented the Company. They needed to share his resolute confidence in the benefits provided to society by his control systems and to be determined to uphold promises of performance.

EARNING A GOOD NAME

The employees most closely screened by the Professor were those asked to join his sales force. This hand-picked lot was true to the image of the classic American entrepreneur. Bold, ambitious and tireless, they were the pioneers who carried the story of the Johnson regulation system to distant cities and untapped markets.

Their success depended to a great degree on the personal integrity and friendship shown to their customers. Indeed, the reputation of a salesman often preceded the Johnson name. Neophytes making sales calls on contractors in the southwest, for example, were cautioned to expect an order only if they remembered to add that they worked for "Shep" at the Johnson office in Kansas City.

F. A. "Shep" Sheppard started at the Kansas City branch in 1914. He gave up the managership in 1949,



but was still putting in five half-days a week in 1977. As with other salesmen, Shep fully appreciated that his good name depended on Johnson people back in Milwaukee.

The men employed at the Milwaukee factory were mostly sons of immigrant craftsmen, motivated by a desire to earn a secure livelihood helping to produce modern devices. The happenstance for their employ often involved curiosity propelling them across a street to see

what was going on in the Johnson invention mill. Many stayed for over four decades.

THE HUMAN CLIMATE

Factory life in the early years had qualities that were found in most all successful organizations. The Johnson, Globe, and Penn companies earned reputations for treating their employees well. In each firm, "the old man" was frequently seen on the foundry or manufacturing floor, inquiring as to the health of a loved one or the grades of an aspiring youngster.

1915

Many Johnson Service employees are members of the American Society of Heating and Ventilating Engineers.



1935

Team sports provide entertainment for Penn employees in Indiana.



1937

A variety of labor unions begin to represent employees across the U.S.



1940

A modern health and safety program is launched.





Many long-service employees are among these captured in a 1920 portrait in front of the Milwaukee headquarters. President Ellis is shown with cap in hand in the lower right.

The feeling of family found within these three organizations was preserved, perhaps longer than in other firms, by the long tenure of their leaders. Johnson Controls counts only six presidents in its 100-year history. Globe was guided almost entirely by the Wanvig family and the Penn organization by its namesakes.

The personal concern and desire to do what was right by their employees was backed up by the

early adoption of all the innovations in employee benefits: hospital and surgical assistance, pension and survivors payments, and stock purchase programs.

Company policies of fair and equal treatment were extended beyond U.S. boundaries. It became standard procedure for nationals to staff and manage operations as distant as the Far East. In the 23 nations where Johnson Controls now operates, principles expressed in the corporate creed are mingled with local practice.

The quid pro quo of fair and equal treatment was good performance. The nature of this relationship is captured in remarks by President Ellis while interviewing a young candidate for employment in 1915:

"If you ever find an executive who says that he can tell by the shape of a man's head whether or not he'd be any good, you can tell him for me that he doesn't know what he is talking about. Go on to work. Come back in three years, and I'll tell you whether you're any good or not."

"On second thought," Ellis said, as his newest employee retreated from the president's office, "if you're not any good to this Company, you won't be here three years from now, so you won't have to come back and ask me."

EMPHASIS ON ENGINEERING

Performance requirements of employees took a decidedly technical bent following World War II. To meet the surge in new building construction and keep up with the wide range of control demands

1942

Team pictures of the Thermostats, Switches, and Valves.



1942

Wartime brings women into the Johnson factory. Globe first hires women for assembly positions in 1927.



1943

Junior Achievement Players present radio dramatizations to help "build up the morale of young Americans."



1943

Loyalty awards and pension programs are initiated.



1944

Employees, families, and friends gather in Milwaukee for presentation of the Army-Navy 'E' Award for outstanding war production.



and applications, Johnson Service began a major recruiting effort for graduate engineers. By 1952, the number of engineers and technicians in the field organization was more than three and one-half times the pre-war level. Approximately 160 engineers were hired, more than there were in the entire Company at this time.

In this process, President Cutler brought to bear his experience as a college engineering instructor. He lectured before engineering societies, architects, conventions, and a variety of educational meetings where he sought individuals who could measure up to Johnson standards.

The rapid changes in technology pointed to the need for training existing employees, as well as new recruits. In 1946 the first job training program was developed for clerks, mechanics, drafters, and administrators at the branch offices. The next year, newly hired engineers began attending training classes of five to six weeks duration in Milwaukee. While in-house training

provided employees with knowledge unique to the business, a tuition reimbursement program was also instituted to fund continuing education at colleges.

In 1959 the Company added another dimension to its commitment to do more for customers than just sell them devices. Training classes were expanded to include personnel responsible for operating control systems in customer buildings. Today, the Johnson Controls Institute offers some 80 different courses to customers and employees, ranging from the basics of heating, ventilating and air-conditioning, and programming direct digital controllers to sales skill development.

CUSTOMER COMMITMENT

If there is a single value that permeates each organization that has come together to form Johnson Controls, it is the commitment to customer satisfaction. By tracing the growth of each business, whether it be building controls, batteries, process controls, or piping systems, one can see that the

impetus was customer need. Helping to make customers successful was recognized as the most compelling way for the organization and its employees to succeed. The customer is seen as the ultimate source of employee, shareholder, and community benefits; it is the customer who determines whether the Company fulfills its mission of leadership in its industries.

Today, more than 20,000 employees carry on this obligation and tradition of customer satisfaction by providing excellent value through improving productivity, quality, and service. This means that for every effort employees make, every resource they use, there are results that count. It's using new tools and technology and Johnson Controls people offering ideas, being creative, and making suggestions.

Being a quality company takes even more than offering products and services that are good. Quality is an attitude that involves striving for the best, doing it right the first time, and people taking responsibility and pride in their work. Responsiveness to customer needs and expectations is stressed.

1945

Token is made of ceramic material used in Centralab electronic products.



1947

Salesmen demonstrate the power of compressed air with their pneumatic kits.



1952

Johnson Service Foundation is established to support causes such as the arts, education, and health.



1960

New York City branch office moves to Long Island City.



Of the various factors that have contributed toward the success and leadership earned by Johnson Controls, the fundamental reason is considered to be its ability to satisfy its customers. So although Johnson Controls steps into its second century a far more diverse organization than when it began, the values its people deem important have changed little.



Joseph Cutler, center, joins Richard Murphy, right, and A. J. Otto for a taste of 75th anniversary cake. Cutler serves as president from 1938 to 1960 and remains on the Board of Directors until 1975. Murphy is president until 1967 and is presently a director emeritus of Johnson Controls.

1965

Children of employees compete for the Company's new college scholarship program.



1968

Sales of \$155 million place the Company in the listing of largest industrials.



1972

Employees are hired to fabricate piping in a new facility in Clearfield, Utah.



1982

Pledge of customer satisfaction is rewarded by top supplier honor from Sears.

