Gene Strehlow
14-4804

Systems & Services Division
Johnson Controls, Inc.

Monitoring The Field

January, 1981
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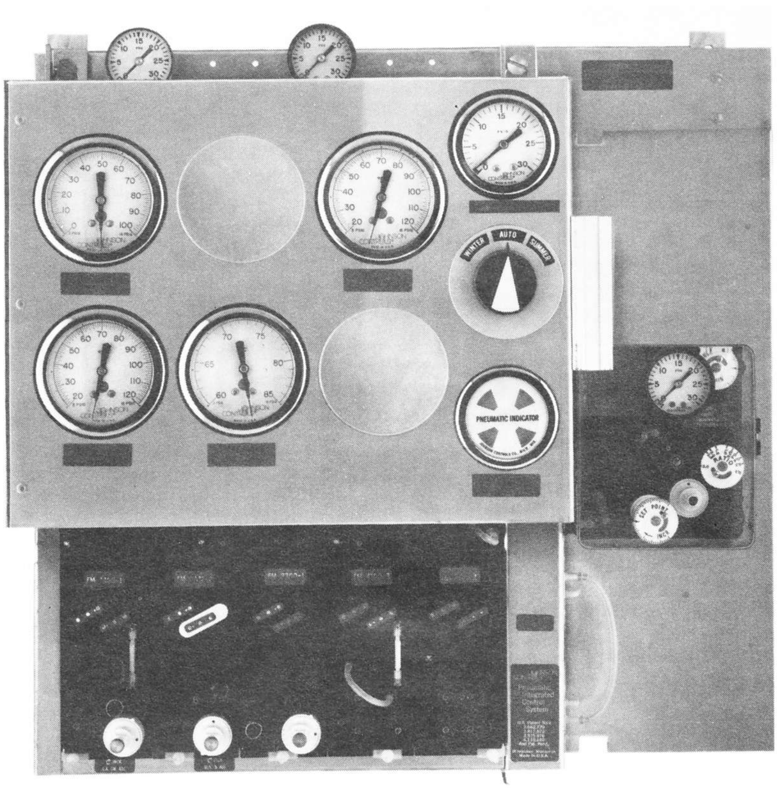
Pneumatic Integrated Control Systems



Introducing our computer designed and tested system controller that simplifies engineering, installation and service, in addition to insuring accuracy and standardizing hardware.

Johnson Controls' Pneumatic Integrated Control system for air handling units is a modular temperature and humidity control system that is designed, ordered and tested with computer assistance. The approach virtually eliminates design errors and startup delays. The system is standardized in hardware and design, yet customized for each building and its owner's needs.

Energy conserving and fail-safe strategies are incorporated into five function modules which satisfy logic and control requirements for, 1) economizer switching, 2) damper control, 3) heating, 4) cooling, 5) humidity, auxiliary and fan status.

A variety of modules for each of these functions can be used to allow the PIC system to be configured to almost any air handling unit whether it is 100% outside air, single-path mixed air or dual-path mixed air.

The versatility of the system can accommodate a change in requirements should the need arise at a later date. This can be accomplished by simply plugging in different function modules and related components without disturbing the rest of the system. This modular concept results in easier maintenance.

Installation is faster. Every system design is accompanied by a unique set of computer-generated troubleshooting and adjusting procedures which benefit the building owner when the system goes on-line and when routine maintenance is necessary. Because of the computerized factory calibration and adjustment of the controls, Pneumatic Integrated Controls will get a building HVAC system working sooner and with fewer errors.

The computer-aided design is written around a functional description of unit operation. Based on the designer's answers to computer-prompted questions, the computer will automatically select and integrate equipment to control air handling units with the desired logic functions.

Customized computer design, 100% computer testing of the system before it leaves the factory, and on-line hard copy documentation of setup instructions greatly improve system efficien-

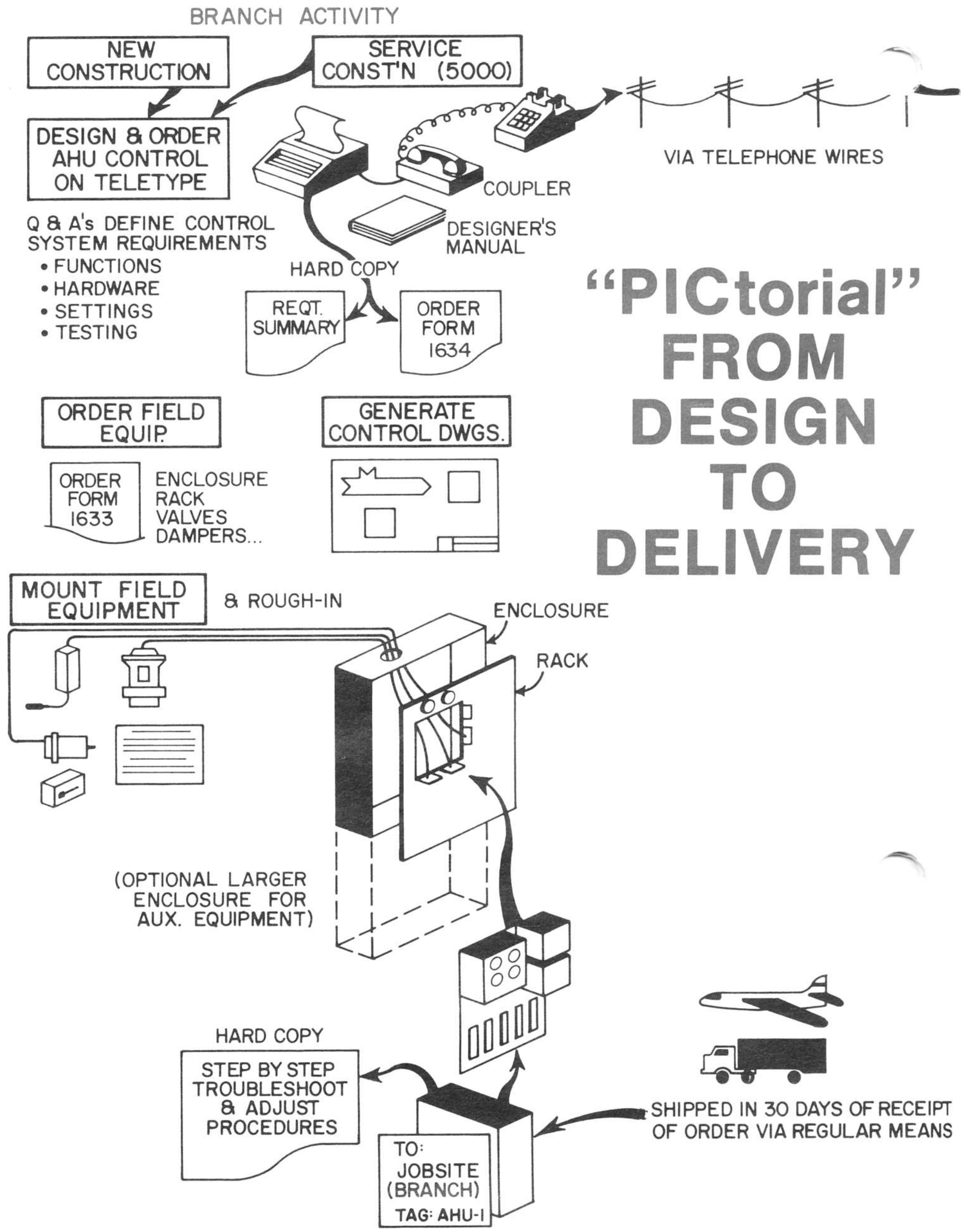
(continued on Page 2)

PIC *(continued)*

cy and dependability. Through our normal contractor operations, the branch offices provide design and installation of the system as well as service for all HVAC needs.

The unique structure of the Pneumatic Integrated Control system provides an additional benefit. The control enclosure and tubing can be installed on the job prior to the arrival of the control hardware, thus claiming wall space early, without exposing the working system to normal construction hazards.

The PIC system conforms to Department of Energy specifications and ASHRAE Standard 90-75 for energy efficiency.



Computer aided design provides:

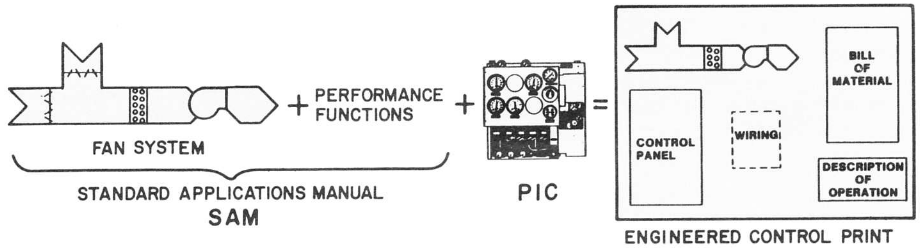
- Minimum time required to design a control system that satisfies the functional requirements of the specification.
- Accurate selection and connection of hardware.
- Perfectly integrated control system that operates on startup.
- Control system of standardized parts in customized configurations.
- Standardized system format allowing simplified drafting and job processing techniques — a time savings.
- Automatic listing of Material Bills for control unit and field mounted equipment.
- Customized troubleshooting and adjusting procedures.

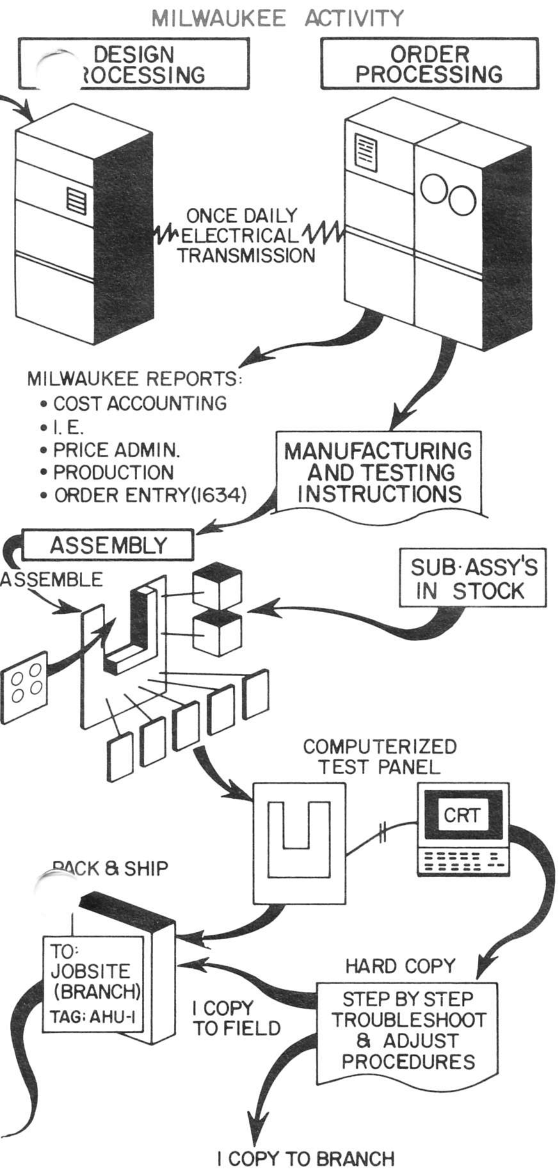
Putting it all together

The PIC system is a continuing effort to simplify the control of air handling units.

Do you remember last March, 1980 when the Standard Application Manual (SAM) introduced a "building block" approach to fan system equipment layout? It also stressed fan operation on a functional basis through the use of "performance functions." This functional design has now taken another giant step forward with the addition of the Pneumatic Integrated Control System.

From fan equipment to performance to control, SAM and PIC help put the whole picture together.





Where it all began

State-of-the-art changes in other industries made it apparent that computerized design of pneumatic control systems must also become a reality.

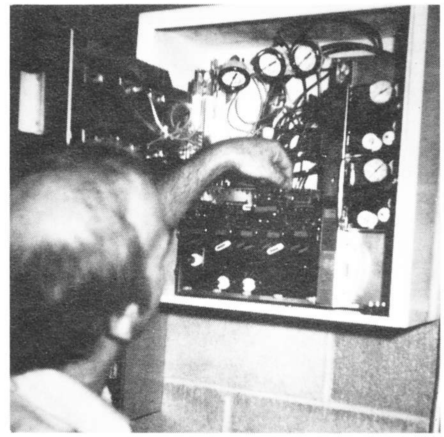
The efforts of numerous departments in Milwaukee, combined with guidance from many branch offices, culminated in the PIC system, an innovation in automatic temperature controls that will reduce costs by providing more reliable and efficient systems.

The PIC system is a timely computerized approach to pneumatic control systems, representing a significant advancement in the state-of-the-art.

Test sites

The release of the PIC system to our branches was preceded by a network of test site installations, with at least one operating unit installed in each of the regions and Canada. The first PIC test unit was installed in New Haven. Some of the other test site locations are Baltimore, Chicago, Cleveland, Dallas, San Francisco, Denver, Atlanta, Toronto and Milwaukee.

Phil Mayo, service superintendent, installed the PIC test site unit in Baltimore. "After a month of operation I wanted to let you know the PIC unit is still quietly and effectively doing its thing," wrote John Arbaugh, Baltimore's engineering manager.



Dick Sheehan, installation manager in the New Haven branch inspected PIC unit at test site in New Haven. He was asked to make monthly reports on the operation of PIC. "The PIC system we installed in New Haven has given us no trouble at all," wrote Dick. "I have personally checked it at least weekly. This included checking all transmitter indication, functions, etc., and all is A-OK. I really feel we have something here."

Phase-in to be gradual

Introduction of PIC to our branches around the U.S. and Canada will be accomplished in four phases, two regions at a time. This will allow the manufacturing process to keep pace with the anticipated initial demand for the systems. Units are now being manufactured in Milwaukee.

The phase-in periods will begin with a week of training in Milwaukee for one person from each branch in the designated regions. A month after the Milwaukee training is completed, those branches can begin designing and ordering PIC systems.

The phase-in release schedule is as follows:

	Training	**Ordering**
Central Midwest	Nov. 17, 1980	Jan. 15, 1981
Northeast Mid-Atlantic	Feb. 2, 1981	Mar. 2, 1981
Southeast Southwest	Mar. 2, 1981	Apr. 6, 1981
Pacific Coast Canada	Mar. 9, 1981	May 4, 1981

Training focuses on technical aspects

Selection of the branch people who attend the PIC schools in Milwaukee is being coordinated by the regional installation managers.

The person selected from each branch should be someone who is influential and will be responsible for training the rest of his branch sales, engineering, installation and service people in the application of PIC. A strong background in the use of ATC products and systems is essential.

Each attendee will be expected to bring several actual branch jobs to the school and be prepared to review their operation and installed costs. During workshops, the attendees will design, build, test and then compare PIC systems with these branch jobs.

Although the PIC systems will be delivered to the branches completely assembled, the training sessions will provide an opportunity to assemble and test actual units.

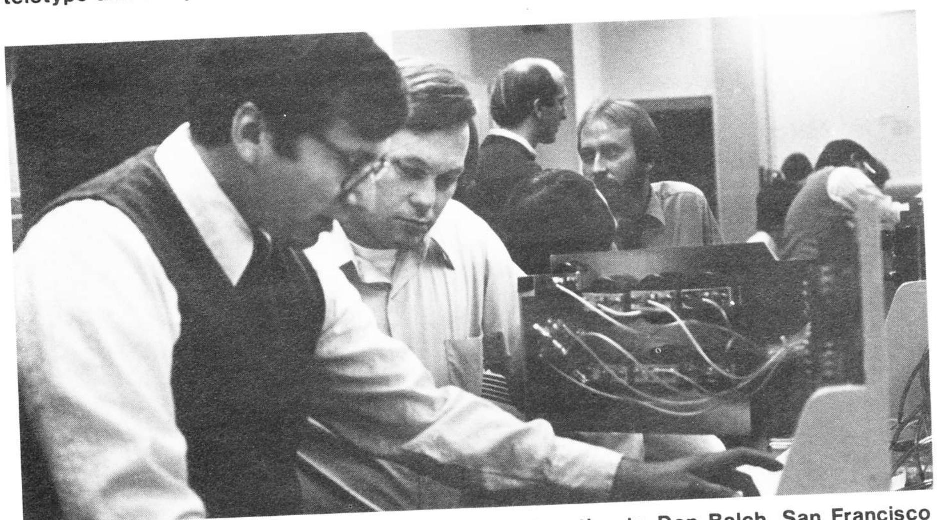
First PIC training session a success

Thirty branch people from the Central and Midwest regions (and from test site branches) attended the first PIC school conducted in Milwaukee the week of November 17th. The group included application engineers, engineering managers, installation managers, project managers, and a few sales engineers.

During the lab workshops the group was paired off in teams and asked to design two PIC systems each, using the branch jobs they brought to the school. In just a day and a half, the 15 teams designed, built and tested more than 60 different PIC systems, with each team using only a main frame and the equipment available in the school lab.

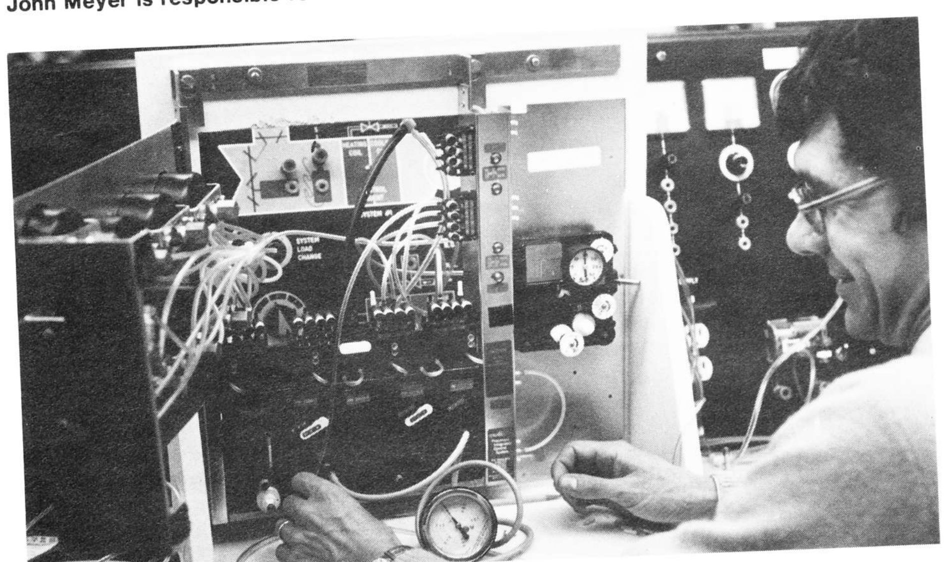
Toward the end of the week-long session they were asked to formulate plans for training the other people in their branches. Some of the features they felt were most impressive and should be emphasized in branch training are, the quality of the product, the company's long-term commitment to the pneumatic product line, compatibility with other product disciplines, short lead time, and standardized engineering.

Leonard Fretland, Fargo, and Pat Nassif, Des Moines, are designing a PIC system via teletype and computer.



John Meyer of Field Engineering, Milwaukee offers tips to Don Balch, San Francisco (test site) who is assembling the PIC unit according to the computerized instructions. John Meyer is responsible for PIC field support, literature, applications, etc.

Checking system operation: From left, Paul Wichman, Milwaukee; Clete Graham, Indianapolis (background); Ray Kral, Peoria, and Rick Moe, Columbus. Paul Wichman is a principal engineer in Milwaukee's ATC engineering department. He is the originator of the PIC system concept.



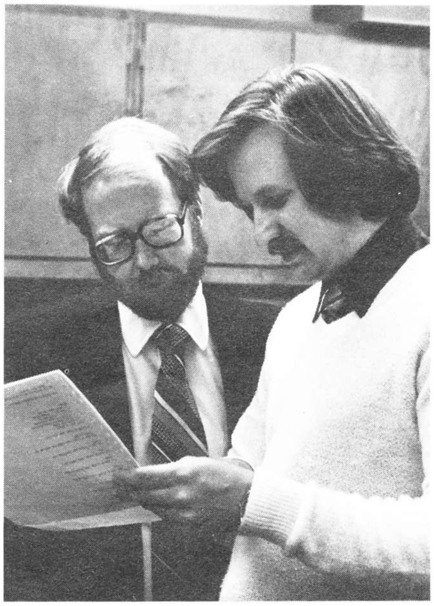
Don Engstler, La Crosse, following PIC test strategy steps.

PIC points you should know

You may have seen Robertshaw's "Pneumodular" control system. To the best of our knowledge, the following is a comparison of their system and our Pneumatic Integrated Control System.

The Robertshaw system was advertised in various magazines including the August, 1980 issues of *Heating, Piping and Air Conditioning* and *Specifying Engineer.*

Robertshaw	Johnson Controls
System Design	
Specifications are converted into equipment via personnel using application data. The modular concept of equipment packaging allows for selection to meet functions required.	Specifications are reviewed and desired functions are obtained. Via an interactive computer program, equipment selection and system design, including properly connected field equipment, are specified. System set points and adjustments are all obtained through the computer-guided design program.
System Configuration	
Panel mounting consists of a back plate to which up to 12 bases are assembled depending on the system complexity. Each base has 15 possible air connection points, any number of which could be used. Modules containing controllers, relays, adjustments and reset relays are then mounted to these bases.	Mounting consists of a rough-in rack with 24 terminations for 5/32" plastic tubing, any number of which are connected directly or through interface gear (V-24's, etc.) to field mounted equipment on the air handler. Numbering on the connections corresponds to computer generated instructions for the piping system reducing engineering time and error. The factory assembled and adjusted control unit then hangs on this rack and connectors (now piped to the air handler) are transferred to the control unit from the rack. Installation is complete. The control unit has 5 function modules to handle all logic which integrate properly because they are computer specified. These 5 modules connect to a main manifold which distributes the signals between, to and from the modules. The controllers are mounted on the control unit or in the field as room or duct mounted equipment.
System Checkout	
A manual test that is detailed as required by the person specifying the system on a system by system basis.	A computer directed test using values as captured during design phase. The unit must perform or it will not pass inspection. Full documentation of the test, which is unique to each unit, will be furnished with each unit.
System Maintenance	
Since there is not much documentation provided, a complex system of troubleshooting is suspected.	If trouble develops, the unique set of troubleshooting and adjustment procedures generated by the computer lists in proper order which steps are to be taken in adjusting the unit. This will shorten the time required to get the problem solved and place the unit back on line. Original design values for set points etc., will show up as an integral part of these adjusting instructions.



Bruce Pollock of Central Installation/Engineering, Milwaukee (left) reviewed plans with Dave Lippe, Dallas (test site) prior to designing a PIC system in the training session. Bruce is the Milwaukee liaison with the field for PIC installation information.

"A Real Winner"

"The PIC system looks to be a real winner. I believe I can speak for all in attendance at the Baltimore PIC test site installation and say that we are very, very impressed. Congratulations on an outstanding achievement."

Harry Peddicord
Mid-Atlantic regional installation mgr.

"I am very enthused about the PIC system and I foresee great things happening with it."

Ardy Dorman
Hartford construction manager

"In short, the PIC system could be a very important advance in the industry."

Ray Matlack
Philadelphia application engineer

"This is a super step in the right direction to make our systems simple to sell, engineer and install."

Vern Pickel
Southwest regional installation mgr.

"I feel the PIC system is the way to go in our industry and that Johnson Controls has taken some big steps toward this end."

Jim Mulloy
Milwaukee branch application eng.

PIC — a team effort in Milwaukee

Paul Wichman	Overall system design and requirement specifications, application engineering, testing specifications.
Dick Laakaniemi	Hardware design, project scheduling, budgeting and coordination.
Bruce Pollock	Field tests and related branch interface, field introduction, BEIMS.
John Meyer	Application engineering support, literature, training, field support, marketing.
Tom Merkert	Manufacturing engineering, tooling, packaging.
Bob Tode	Computerized design, ordering and factory routing procedure implementation.
Steve Burkhardt	Test equipment and procedures.
Jim Szyjakowski	Quality assurance.
Jim Filipiak	Production planning and inventory control.

Quality Assured

Overcoming oil in pneumatic instruments

The following information is intended as a guide to eliminate oil in air systems.

1) All air systems which use Johnson Controls equipment should be installed with a coalescing oil-removing filter. The two models Milwaukee recommends are the A-4000 (Wilkerson) and Balston (replacement elements now listed on repair parts sheet RA-4000-2).

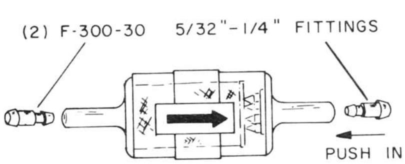
2) On jobs where the customer furnishes the air system, it must be pointed out that a coalescing oil removing filter must be installed before air is supplied to our instruments.

3) Oil-removing filters should be installed before any air is passed into the system. (All piston type air compressors pump break-in oil and this is a very critical time in the life of the system.)

4) Instruments like the T-9000's, N-1000, N-2000, C-2100, C-2120, T-9111, P-5217 and P-5215 (low flow instruments) cannot function with even the smallest amount of oil in the air system. These will be the first instruments to start drifting from their settings or set points before the instruments "die" completely.

5) Other items like a 5 micron prefilter, drip legs after the PRV station, and the A-4000-120 oil indicator can minimize or detect oil before it becomes a problem.

6) On jobs where oil is present in the system and the instruments listed in (4) above have not been effective, they should be removed from the system and the entire air system cleaned with Freon TF. After the system is cleaned the instruments can be returned to the air system. On systems where the instruments cannot be removed, and it will be some time before the system is cleaned, a Balston in-line oil filter (Code No. PIC-1000-6222) should be attached to the supply air connection of each of the instruments.



Balston filter adapted to 1/4" poly tubing

Address correction

The October, 1980 Quality Assured column in MTF listed a supplier for precision test gages. We have been informed that the correct address for the supplier is Mueller Sales Corp., **3725** N. 126th St., Brookfield, Wisconsin 53005.

Canadian Forces Base gets IC²

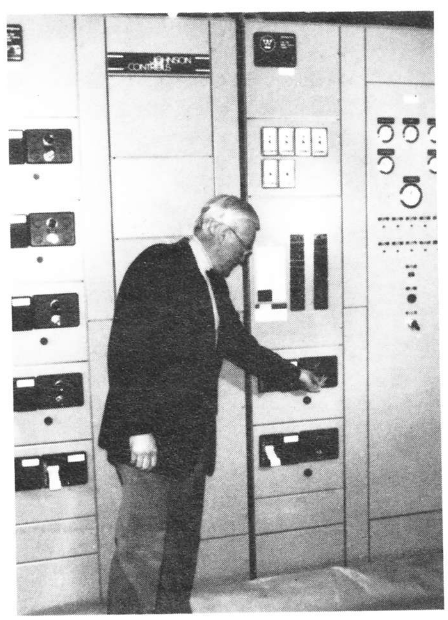
Contract salesman **Mike Dutka, Winnipeg** branch, has been successful in pointing out the features of our IC² packages to the officers of No. 1 construction engineering unit, Canadian Forces Base, Winnipeg. The panels in the accompanying photographs are shown in the Winnipeg branch shop, ready for testing by the Armed Forces personnel. Since they will be installed in a remote, isolated base, it is extremely important that they operate according to Forces needs when installed.

Dutka says, "the Forces personnel like the idea of having panels arrive on site knowing that they'll work as specified. They also like the idea of complete responsibility, including design for the package, being taken by one reputable manufacturer, such as Johnson Controls."

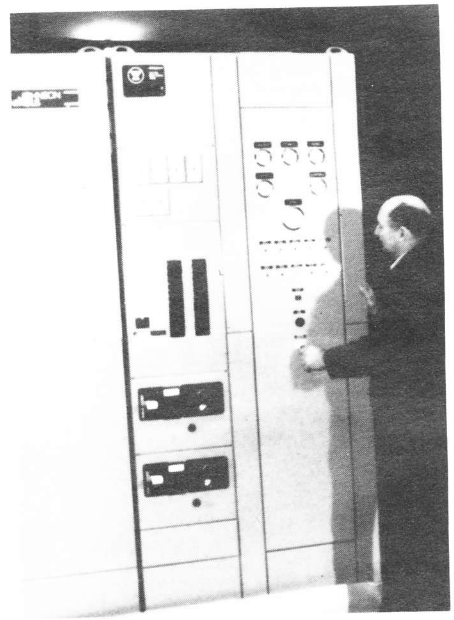
These panels will control fans and pumps as well as temperature in one of the operation buildings at the site.

This is the third set of panels shipped to this one isolated base. From the Winnipeg branch, they are crated and shipped by military C-130 Hercules aircraft direct to the final location.

Winnipeg branch personnel Mike Dutka, Ed Dacombe, Barrie Russell, Dave Johannson, Tom Holland, and Ron Salome accompanied the units for final site commissioning.



Winnipeg branch manager Jack Patterson inspects the IC² before it is shipped to the Canadian Armed Forces base.



Ed Dacombe tries his hand at being a model.

IC² school

A one-week IC² training school for application and sales engineers will be held in Milwaukee March 30 to April 3, 1981. This will be the only IC² school offered in 1981 so take advantage of it. Refer to section 2.3.5 in sales memo 41-C (8/25/80) for more details. Applications for this school should be on Form 1178; regional approval is required.

Monitoring The Field

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Letters may be addressed to the Managing Editor, *Monitoring The Field*, Johnson Controls, P.O. Box 423, Milwaukee, WI 53201.

JOHNSON CONTROLS

What's New

PIC at ASHRAE

Our new Pneumatic Integrated Control System will be among the featured exhibits in Johnson Controls' 84 ft. long display at the International ASHRAE Show to be held in Chicago during the week of Jan. 26 — 29, 1981. The theme of our exhibit is "We Put You in Total Control."

Faster mail service to Canada

In an effort to speed up delivery of company mail from Milwaukee to the various branch locations in Canada, a different system of mailing is being used.

Each Tuesday and Friday, mail (letters, not literature) from Milwaukee to **all** Canada branches (packaged separately) will be sent via U.S. Express Mail to Johnson Controls Ltd., Toronto head office. Express mail should arrive in Toronto in two days, rather than the ten days or more it took in the past.

From Toronto, Canada branch mail will be sent through the Canadian postal system, which means that mail should arrive in much less time than if it were mailed directly from Milwaukee.

Mail for Canada branches was sorted in the SSD Milwaukee mail distribution center by Kathy Kleinow.

New facility slated for Albany, NY

A new 12,000-square-foot office and warehouse facility for the Albany, NY branch will be constructed in Albany's Karner Industrial Park. The new facility will be located on about three acres of land. Johnson Controls will be the second company to move into the 87-acre industrial park. Construction will begin next spring, with a tentative completion date of Dec. 1, 1981.

CAPS becomes APS

In response to sales memo 326 (dated 11-15-80), APS manager Bill Ranganath was asked to comment on the change from CAPS (Communication and Protective Systems) to APS, Automated Protective Systems.

Mr. Ranganath replied that "a primary business of SSD is building automation systems. The future market trends and our own strengths indicate that our best opportunities lie in automated protective systems. With the increased emphasis placed on the automated protection systems market, the decision was made to rename the CAPS group APS — Automated Protective Systems."

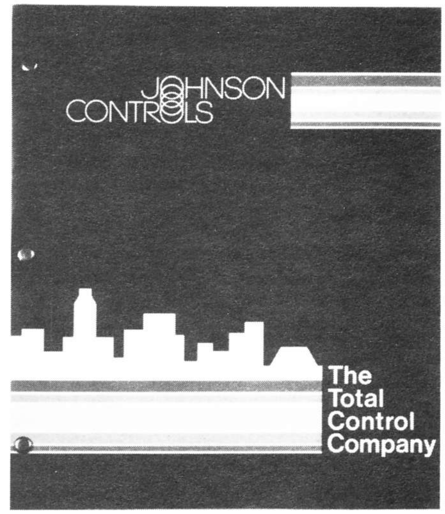
New face in Milwaukee APS

Dave Weber, formerly CAPS tech rep in the Seattle branch office, has assumed duties as application engineer for fire management systems in the Milwaukee APS group. Dave will work with Bill Pauers and Tom Wissbeck to provide a marketing team geared to meet the requirements of all regional and branch offices in this APS product area.

Dave graduated from the Wisconsin School of Electronics in 1972 with an associate degree. He has also studied at the University of Wisconsin and is currently working toward a degree in computer science at the University of Wisconsin.

We welcome Dave to the Milwaukee staff and wish him well in his new endeavor.

Proposal Cover



The crisp, bright style of the new proposal cover will give an impressive appearance to your proposals. The back center is perforated for separation to accommodate thicker proposals.

Complementing the new cover is a new title page which has been completely reformatted and stylized to show the global scope of our business.

The title page and proposal cover #80 can be ordered from Milwaukee on Form 814.

Tech Tip Calendars to feature Cybertronics

Beginning in February, 1981, the next eleven monthly Tech Tip calendars will feature our Cybertronic (electronic) controls. Products to be featured are the TC-4500, TC-4100, DA/VA-3200, HC-4100, HC-4500, PC-3001, RQ-3000, HQ/LQ-3000, NQ-4500, TE series sensors, and GQ-4000.

The word "Counterline" has been removed from the calendars so they will be more appropriate for use by other service groups.

In addition to serving as a pocket-sized appointment calendar, each month features a different "technique" and "product" tip from Johnson Controls.

The calendars are mailed from Milwaukee to thousands of customers who have ordered our Counterline catalog, as well as other service customers as requested by our branches.

Salmon fishing derby held in Vancouver

On September 27th, the Vancouver branch held the first of what is to become an annual salmon fishing derby. Those who participated traveled 60 miles north by ferry up the "sunshine coast" to the Pender Harbour area.

Although they were not fishing in open sea waters, the ocean was rough enough for some of the landlubbers. Honorable mention goes to office supervisor Lori Capaldo's husband who braved the swells despite turning various shades of green while visiting that great white porcelain altar commonly known as the "head."

Everyone enjoyed the trip immensely, and most returned with "fish stories" and/or fish.

GERRY DEDRICK, prepared for the worst, caught the largest ling cod. As with all fishing adventures, there's a story about how it was caught, but Gerry's not telling.

LEFT: DAN SHEWCHUK, Vancouver service mechanic, with his derby winning salmon (left) and a rat fish which could have won a prize for the ugliest fish caught; PAT MILLER, service electrician, with a ling cod, and LORI CAPALDO, office supervisor, who won the coveted "rubber boot award" by reeling in the largest mudshark.

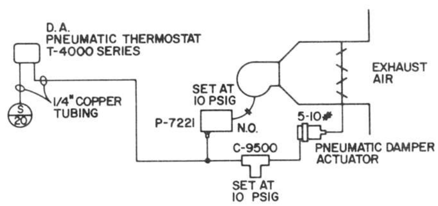
Ideas of the month

C-9500 application

Stan Lawrence, estimator for the **Chicago** branch, will receive a $50.00 award for submitting this handy application for the C-9500 cumulator.

On pneumatic jobs where electric exhaust fans and dampers are operated by means of a room thermostat, the Chicago branch has usually used a T-26 to electric motor with a relay. This works out to be about $114.00 in material and 6.5 hours of labor.

With a T-4002, P-7221, D-251 and C-9500 with exposed copper tubing (for mechanical equipment rooms) the same thing can be done for about $64.00 in material and 3.5 hours of labor. Stan says this method is not only less expensive, but eliminates much of the worry about voltages, and is more reliable. "You can really save if it is in an area where you can run bare poly," said Stan. "You can use it without damper operation as well."

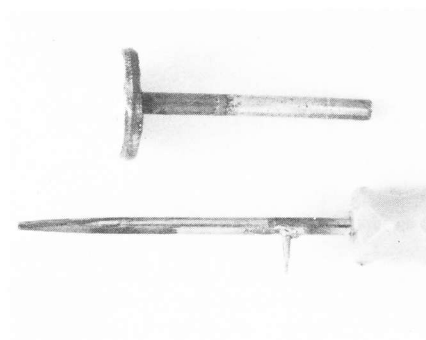


NOTE: C-9500 set point must be at the end of damper motor range and beginning of PE setting. C-9500 can be mounted directly on damper motor.

T-4000 adjusting tool

Don Nixon, service mechanic for the **Birmingham** branch, devised a calibration tool which he found to be not only easy to use, but also extremely accurate when adjusting T-3610 low limits and T-4000 series dead-band thermostats.

The three items Don used to make the device are a T-4002-5009 calibration tool, a piece of 1/8" I.D. copper tubing, and a pointer added to a screwdriver.



Don says the tool allows him to calibrate or make set point changes without body heat from his hands effecting the setting because his hands are farther away from the elements. It is also easier to locate the adjusting screw on the controller. The pointer makes it much easier to make accurate adjustment.

Don will receive a $50.00 Idea of the Month award for his suggestion.