Expert Insight

CONTEMPORARY CONTROLS®

Interview with George Thomas –

Reflections on Contemporary Controls' 50 Years "in Control"

To commemorate Contemporary Controls' 50-year anniversary, President and founder George Thomas was interviewed by a long-time friend and industry veteran, Ken Sinclair.

Overview of Contemporary Controls

George Thomas founded Contemporary Controls in 1975 as a systems integration and consulting business focused on microcomputer and PLC applications. By 1985, the company transitioned into hardware manufacturing, developing STD-BUS microcomputer modules. It soon became a leader in ARCNET technology and later expanded into Industrial Ethernet and fieldbus technologies.

Contemporary Controls began its move into BACnet technology in the mid-2000s, recognizing the growing demand for open, interoperable building automation systems. They began developing products that supported BACnet/IP, the IP/Ethernet-based version of the BACnet protocol. Today, Contemporary Controls continues to be a leader in the development of networking and control solutions for building and industrial automation.

Contemporary Controls is headquartered in Downers Grove, a suburb 22 miles west of Chicago, with global offices in the UK, Germany, and China to support their customers worldwide.

About Ken Sinclair

Ken's journey into the world of building automation began in the 1970s with technical education in Air Conditioning and Design, and like George, Ken earned his place as a leader in the building automation industry. In 1975, Ken founded Sinclair Energy Services in Vancouver, Canada, which is now SES Consulting. In 1999, he founded AutomatedBuildings.com, a free on-line resource dedicated to the building automation industry. Today, he continues to lead AutomatedBuildings.com and actively contributes to discussions on the future of building automation and smart technologies.

Sinclair: You founded Contemporary Controls in 1975. Can you walk us through the journey that led to that moment?

Thomas: I was always interested in electronics and when I was in high school, I worked part time for a one-armed TV serviceman carrying his vacuum tube caddy helping him do customer calls. He taught me about the business and within one year I was doing my own calls. After graduating from high school, I entered the University of Illinois at Navy Pier in Chicago pursuing electrical engineering. I commuted from home and continued to work part time. It was too much for me. I had underestimated the effort needed for pursuing an engineering career. In 1965, I took a break from school and joined a Marine Corps Reserve unit in Chicago. I was sent to San Diego, California and attended Basic Electronics and Radio Fundamentals school, eventually becoming an air radio repairman. When I returned to my Chicago squadron in 1966, I joined Motorola, Inc.

This was a big break for me because I was a technician working with engineers developing automatic test equipment which convinced me to resume my engineering studies. Thanks to Motorola's tuition reimbursement program, I enrolled in the Illinois Institute of Technology evening division and saved enough money to eventually apply for full-time status which allowed me to receive my BSEE in 1970. From beginning to end, it took me eight years to get my BSEE. With encouragement from my professors, I applied and received a traineeship from the National Science Foundation, allowing me to gain my MSEE in 1971 which was the same year I was honorably discharged from the Marine Corps. In the Marine Corps, I gained confidence and discipline which I lacked as an undergraduate student.

In early 1972, I was hired as an electrical engineer at Johnson & Johnson's Baby Products division. I joined a project to build a new plant in the southern suburbs of Chicago designed to produce disposable diapers on multiple production lines. While I was already familiar with solid-state logic boards, this job introduced me to variable-speed DC and inverter drives as well as specialized processing equipment used in the textile industry. I also gained firsthand experience with the industrial control systems required to construct and launch a fully operational plant. We built the primary lines for producing pulp, shredding it, and converting it into fabric.

I could go on at length about how a diaper is made. I found the technology and process very interesting, but I was drawn to computers and their emerging technologies. Once the plant was up and running, I left to join a small software company called Datalogics. They specialized in computerized text editing systems for the newspaper industry using Digital Equipment Corporation (DEC) PDP-8 and PDP-11 minicomputers.

At Datalogics, I learned about serial port multiplexers and how to interface with the PDP-8's 12-bit bus. My boss was intrigued by the new Intel 8008 microprocessor, which was being used in desktop terminals. He thought this was going to be the future. The position didn't work out for me, and after a year, I was let go—a turning point that pushed me to consider starting my own venture.

I could see the potential for microprocessors to replace traditional relay logic panels and instrumentation. I had already been thinking about starting my own business, so I decided the timing was right. My business plan was simple: reach out to former employers and contacts, offering to complete projects that had been planned but never executed.

I had recently received my professional engineer's license from the State of Illinois, so I hung out my shingle. But I needed a name for the business. I remembered seeing the phrase "Contemporary Systems" in a Motorola ad and liked the modern feel of it. But I wanted the word "control" in the name, so I decided on Contemporary Control Systems. This was in 1975.

My wife Judy and I formed the startup team. She was caring for our infant daughter, Kathleen, at the time, but she also took on administrative and marketing responsibilities. Admittedly, she had some reservations about the plan, but she believed in me—and I was determined not to let her down.

Since I had experience with J&J, a health care company, I was aware of companies such as Abbott Labs and Baxter in the Chicago area. Some former J&J colleagues who had moved to those companies provided referrals. One of those companies hired me to take over a project after they had dismissed their lead engineer. They simply said, "Now you do the controls." It was a big responsibility, but it gave me the chance to prove myself and begin building a reputation.

Sinclair: The obvious caption for this story is, "George Thomas puts a diaper on the industry." Our roots are similar. It's 1975, and everyone's shifting from minicomputers to microcomputers. How did you get involved with microcomputers?

Thomas: Around that time, some board-level products were starting to appear, and the hobbyist market was taking off. One popular platform was the S-100 microcomputer, which featured a 100-pin

The first- microprocessor-based computing ratiometer, developed by Contemporary Controls in 1975.

bus. It used large cards with linear power supply chips on each module fed by multiple unregulated power sources from the backplane. It was a bit of a kludge—relying on unregulated supplies and localized regulators—but it worked, and it gained a strong following.

Then Digital Research introduced an open operating system called CP/M (Control Program for Microcomputers), which became a big hit. We began building systems around CP/M using a compact 4-by-6-inch board with a 44-pin bus.

That same year—1975—we developed a ratiometer for Johnson & Johnson. It was used to measure the draw between adjacent pull rollers on a moving web. They were experimenting with cascaded AC drives and needed a precise way to measure tension. We built the instrument using Intel's new 8080 microprocessor to handle the calculations, and it worked beautifully. My former boss at J&J was thrilled with the result. We didn't sell many units aside from J&J, but it validated my concept that you could take an instrumentation application and successfully implement it on a microcomputer.

We developed both the instrumentation and the software, which was written in assembly language. I didn't have a strong background in coding and hired someone to handle the programming. I had a knack for identifying potential applications and committing to build solutions—even if I didn't yet know exactly how we'd do it. Whether it was splicing webs or managing web printing cutoff control, I was confident we could figure it out.

Sinclair: What is your secret to your company's longevity?

Thomas: The key has been building a business around something I truly love. From the beginning, I knew I wanted to work for myself in a field I was passionate about. My experience in both small and large companies gave me a well-rounded perspective, and I stayed active in professional organizations like the IEEE Chicago Section and the Instrument Society of America (ISA). I presented papers at local events and reached out to sales reps to let them know I was open for business.

But passion alone isn't enough, you need to grow to survive. That meant hiring people, which brought new responsibilities. Once you bring employees on board, you take on a leadership role. They look to you for stability and opportunities to advance, and it becomes your job to grow the business to meet those expectations.

Running a systems integration business is challenging because you're essentially selling your employees' time and expertise. Our turning point came when we transitioned into manufacturing. Selling products instead of just services gave us a more scalable path to growth.

I've always believed that if you create an environment where people can grow in their roles, they're more likely to stay. And that's proven true—today, we have employees who've been with us for more than 30 years.

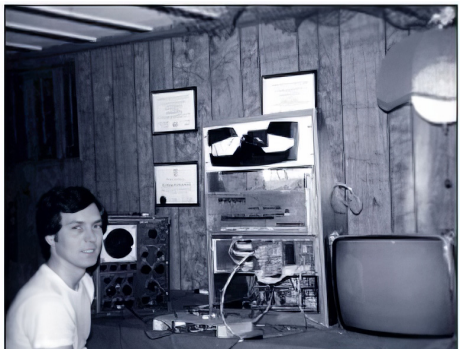
Sinclair: What obstacles and opportunities did you face when starting the company?

Thomas: In the beginning, it was mostly obstacles. My basement became both my office and lab, and the pool table turned into a workbench.

I had ideas for microprocessor-based products, but I also needed a steady income to keep things going. Fortunately, I had industry contacts who offered me systems integration work. I was programming programmable logic controllers (PLCs) to implement control sequences for various projects across Illinois. The end clients were often industrial companies like Caterpillar Tractor or local sewage treatment plants.

These jobs helped pay the bills, but they also pulled me away from home and from the product development work I really wanted to focus on. I often had to be on-site for system startups, which meant long hours and travel.

On the opportunity side, I was fortunate to have industry contacts who referred me to other com-



George in his basement with his primitive 8080 development system.

panies in the Chicago area. Those referrals led to larger projects and introduced me to panel shops and consulting engineering firms. These firms often outsourced the controls portion of their projects because it was considered a specialized skill set. That opened doors for me.

It took about four years before I could stabilize my income and begin focusing more on the kind of work I had originally set out to do.

Sinclair: Can you provide an example of a failure you faced and how it impacted future decisions?

Thomas: One of our biggest failures actually stemmed from one of our early successes. By 1985, we had shifted our focus to hardware manufacturing, developing a line of 55-pin STD-BUS microcomputer modules. Around that time, a former colleague from Datalogics approached me with an idea to build a networked, microprocessor-based text editing and publishing system to replace legacy minicomputer systems. We both knew the market well, so the plan was clear.

We spent a year developing it. He handled the software, I built the hardware, and together we designed the network architecture. We chose ARCNET for its real-time capabilities and lower cost compared to Ethernet. We expanded our STD-BUS product line with ARCNET-compatible interfaces, such as disk drives, network adapters, and active hubs. The business took off and quickly grew to represent nearly 80% of our revenue.

But we made a critical mistake, we weren't paying attention to the IBM PC. Our customers began experimenting with 286 and 386-based PCs, which offered better performance at a lower cost. While

George Thomas promoting the company's STD-BUS microcomputer modules in the early 80's.

our partner was willing to port his software to the new platform, we were locked into an 8-bit architecture. Our attempt to develop a 286 accelerator came too late. The business collapsed, and we found ourselves in serious financial trouble.

At the same time, we were working on a microprocessor design project for a healthcare provider. I approached them, and they agreed to acquire our team and assets. We operated as a division under their ownership for three years, with me as division president. From our employees' perspective, nothing changed. Eventually, they offered to sell back the industrial product side of the business to me, and I accepted. Contemporary Control Systems became independent once again.

Most of our customers never realized we had been sold and re-acquired, but the transition wasn't without pain. The buyer retained all of our technical staff, while I took back some production and sales personnel. Others were let go, though they received severance. I also had to carry a multi-year note and personally loan the company funds to cover initial expenses.

The upside was that I regained control of the business, kept our customer base, and even retained the buyer as a client. I paid off the note early and came away with some hard-earned lessons: diversify your customer base, keep headcount lean, minimize debt, and always stay alert to technology shifts that can upend your business. Engineers often fall in love with their technology, but that loyalty can hinder their ability to embrace change.

Sinclair: Tell us about Contemporary Controls' transition from industrial automation to building automation.

Thomas: When I started the company, building automation wasn't really a defined field, at least not in the way we know it today. At the time, we were focused on industrial and process automation, and we worked on projects in both areas.

It's amazing how much success can come from simply being in the right place at the right time. In the late 80s, we were showcasing our ARCNET for Control product line at the ISA (Instrumentation Society of America) show. The show was completely sold out, so we ended up with a booth in the hallway, far away from the main exhibitors. Someone came

to visit our booth and told me, "You've got ARCNET, you should talk to Johnson Controls."

I had no idea Johnson Controls was using ARCNET. They were in Milwaukee, just 90 miles away from our offices, so I paid them a visit. That meeting led to us manufacturing ARCNET adapters for their first Metasys system. And just like that, we found ourselves entering the building automation industry.

(Editor's Note: Ironically, Ken's first job out of school was with Johnson Controls in Milwaukee around 1970. He worked as a service and sales engineer and gained hands-on experience with mechanical systems, including pneumatic controls and early digital systems.)

Over the next decade, ARCNET became a major part of our business. We developed ARCNET boards, modular active hubs with copper and fiber ports, and even the first ARCNET PC Card adapter.

Another turning point came at an AHR (Air Conditioning, Heating, and Refrigeration) Expo in Chicago. I attended a session titled, "Introduction to BACnet," and learned BACnet was an open standard for building automation that supported both MS/TP and ARCNET. I was immediately intrigued—especially since BACnet supported ARCNET—and I appreciated the openness of the standard and was impressed with the number of companies endorsing this new BACnet standard.

We walked the show floor and realized we needed to be part of this community. Even though we were still on the fringes of the building automation industry (pursuing Ethernet and ARCNET), we fully realized the importance of this industry. We've been exhibiting at AHR Expo ever since and are proud members of BACnet International.

Today, if your product doesn't support BACnet, you won't even be considered for many projects. It's become a baseline requirement.

Throughout all of this, we've stayed focused on hardware. We never wanted to compete as systems integrators. I had done integration work before and knew how demanding it was. It's a feast-or-famine business, and I didn't want to invest all our resources into something that required such deep, ongoing involvement. Instead, we chose to support integrators by providing reliable, open, and standards-based hardware solutions.

Contemporary Controls at 2007 AHR Expo in Dallas, Texas.

Sinclair: Let's talk about the transition to Ethernet. At some point, Contemporary Controls began making BACnet routers. How did that come about?

Thomas: BACnet routers are a big part of our business. In 2007, we introduced the BASremote, which allowed BACnet devices to connect to IP/Ethernet networks. In 2008, we launched the BASrouter, a BACnet/IP to BACnet MS/TP router based upon a portable router design. That product line really took off and helped us establish a strong presence in building automation.

The broader transition to Ethernet has been a revolution in itself. Back in the 1980s, Ethernet started with thick coaxial cable, then moved to thin coax, and eventually to twisted pair and fiber optics. ARCNET, which we had worked with extensively, also came from coax. Later, companies like SMC introduced twisted pair versions of ARCNET, which made it more commercially viable.

One of the early criticisms of Ethernet was that it wasn't deterministic, which is something that industrial users cared about. That's why ARCNET and MS/TP, both of which use token-passing, were preferred in control systems. But Ethernet kept evolving. The DEC-Intel-Xerox consortium introduced the DIX standard in 1980, and by 1985, IEEE adopted it, though they didn't call it Ethernet at the time. Then came 10BASE-T, 100 Mbps, Gigabit Ethernet, and beyond. There's really no upper limit now, and Ethernet remains a strong seller for us in industrial and building automation.

I think the bigger story is the shift to IP networks. Everyone wants BACnet over IP now, and that brings a whole new set of challenges, specifically around security. It's no longer enough to be a LAN engineer, now you have to be a security expert too. Customers expect you to manage firmware updates, patch vulnerabilities, and stay ahead of evolving threats.

Supporting IP networks also means using open operating systems like Linux, which require more powerful hardware, typically 32-bit processors with substantial memory. You can't effectively support IP networks today with an 8-bit microcontroller. And once your products are deployed, you can't just walk away. You need to work with security maintenance partners whose only responsibility is to monitor and respond to changes in standards and threats. It's a long-term commitment.

Sinclair: Tell us about Modbus

Thomas: At Contemporary Controls, we've always focused on supporting open protocols that promote interoperability in automation systems. Modbus is one of the earliest and most enduring protocols in industrial automation, and we've supported it for many years—especially in our role as a hardware provider.

My first exposure to Modbus goes all the way back to my time at Johnson & Johnson, when Modicon was trying to sell us their PLCs. The hardware was bulky—one salesman even hauled what appeared to be a 100-pound unit up the stairs to demo it—but the protocol itself was simple and effective. While the original Modicon hardware has long since faded, the Modbus protocol survived and remains widely used today, particularly in industrial settings. At Contemporary Controls, we've integrated Modbus support into several of our products, especially those designed for bridging industrial and building automation systems. For example, we offer Modbus gateways and routers that allow Modbus RTU devices to communicate over IP networks, and we've developed tools that help integrators connect Modbus devices to BACnet systems.

That said, we've always viewed Modbus more as a protocol for integration rather than a core platform. It's reliable and well-understood, but it lacks some of the richer features and scalability of protocols like BACnet. Still, because of its simplicity and widespread adoption, Modbus continues to play a key role in many of the systems we support.

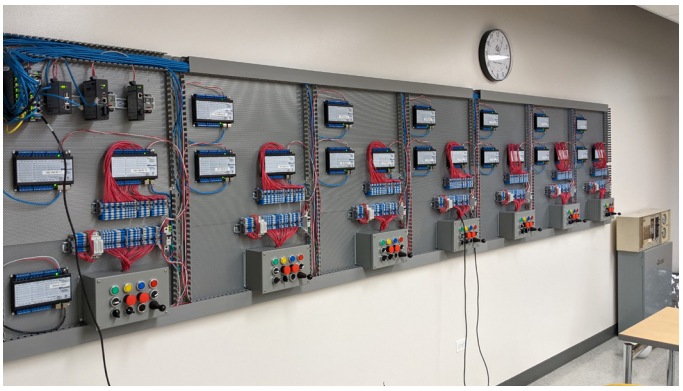
Sinclair: Can you talk about your commitment to education and training for HVAC students and professionals in the industry?

Thomas: My professional career began as an electronics technician, and I was fortunate to learn from experienced professionals who generously shared their time and knowledge. That early mentorship made a lasting impact on me, and it's one of the reasons I'm so committed to supporting education and training in the HVACR industry.

Not everyone needs a four-year degree to build a successful career. As a manufacturer, we believe we have a responsibility to support technical education programs. One example is our long-standing partnership with the HVACR program at College of DuPage (COD), a local community college. They have a state-of-the-art lab where students gain hands-on experience using our BACnet open controllers and our free BAScontrol Toolset which allows them to program and commission BACnet devices that mimic a real-world building automation system.

Our goal is to make it easy for instructors to prepare students for HVACR and system integration required in these technical careers. We do this by providing reliable, user-friendly equipment built on open-source technologies, educational discounts on all hardware, and free access to our software tools.

We've seen great success with products built on Raspberry Pi in HVACR programs. There's no licensing, the tools are accessible, and students can learn functional Sedona programming in a practical, applied way. Once they understand the Sedona



Contemporary Controls supports the College of DuPage HVACR and building automation programs.

fundamentals, they're well-equipped to adapt to other systems that use similar block programming approaches.

Sinclair: What are you most proud of in terms of Contemporary Controls' technical accomplishments?

Thomas: I am most proud of my technical team. I did not write the code. I did not layout a multi-layer BGA board design. I did not determine the process steps to produce a BGA board using a double-sided reflow process. I did not design or build the test fixtures to test our products. I did not provide the direction on what operating system to use, what security software to use, what compiler tools were needed, or what test scripts to run. My team did all that. I just encouraged them.

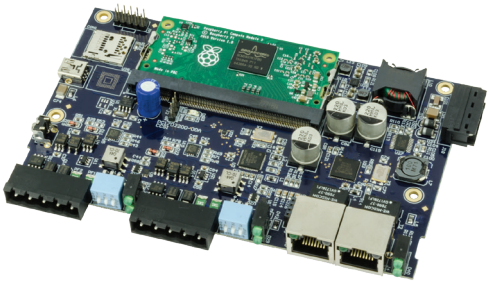
The Contemporary Controls team 2015.

Sinclair: What technology are you most excited about today?

Thomas: I am impressed with some of the System-on-Module (SOM) technology where CPU and memory resides on one module that can be placed on your main PCB. If you are making a router, gateway, or controller, you can use the same SOM that can be programmed for the target application. With all the security requirements for modern designs, we need to shift to more powerful processors and more memory. Picking the most flexible SOM can greatly reduce development time and production time.

Sinclair: Can you share an innovative way the company has recently adapted to industry changes?

Thomas: I'm not sure if it qualifies as innovative just yet, but we've been actively exploring various AI solutions to find one that the entire company can



This dual-port gateway is driven by a Raspberry Pi Compute Module. The baseboard was built and tested at our Downers Grove plant.

adopt. It's a challenge, the technology is evolving so rapidly, and with so many options available, there's always the concern that we might invest in a solution that turns out to be less effective or quickly outdated.

That said, we recognize the potential, especially in areas like technical support, where hiring qualified staff has become increasingly difficult. We're considering the use of AI-powered chatbots that, if properly trained, could handle a significant portion of support inquiries. The big unknown is how much effort it will take to train and maintain such a system effectively. We're still in the early stages, but we're committed to learning and adapting as we go—just like many other companies navigating this space.

Sinclair: What are the most exciting opportunities you see for the company in the near future?

Thomas: The first would certainly be AI. Imagine being able to call your rooftop unit and ask what's wrong. Or better yet, having the unit proactively notify you when it needs attention. These kinds of capabilities are becoming increasingly possible.

That said, AI is a rapidly evolving field and that presents challenges. What looks promising today might be outdated in six months. For small companies like ours, it's difficult to lead in this space, we're more likely to follow the direction set by larger players. And that comes with risk. You have to be cautious about which technologies you invest in, because the landscape can shift quickly. Big companies can be unpredictable; they might change direction or even shut down business units devoted to the technology you are trying to adopt.

So, while AI holds tremendous potential, especially for predictive maintenance and smarter automation,

we're approaching it thoughtfully. We want to make sure we're investing in solutions that are sustainable and aligned with our long-term goals.

Sinclair: What was your favorite product?

Thomas: It takes me back to the beginning, to the microprocessor-based ratiometer. It validated my core business concept—that we could take a microprocessor chip and, as even a small company operating out of my basement, create a hardware solution driven by software. It proved my idea was sound and reassured me that we were on the right track.

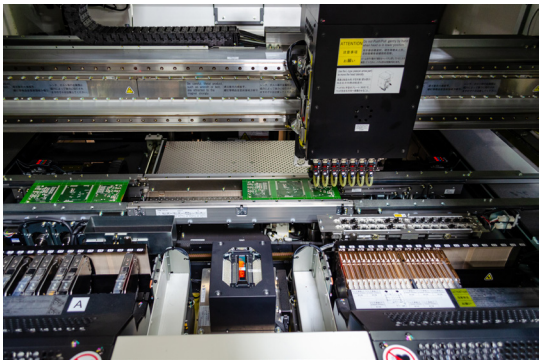
Sinclair: What advice would they give to a younger entrepreneur?

Thomas: Develop a network of contacts. Modern social networking has changed significantly over the past 25 years, even in the past decade—focus on what works best for you. If you are comfortable with LinkedIn, then use it. You will never know when you need a resource. You might get that lucky referral because someone remembered you.

Know some accounting. Understand financial terms so when you are seeking debt or equity funding, you can speak to the financial community in their language. You may want to talk technology, but they want to understand risk.

Pick your life-long partner wisely. My partner of 55 years handled the ups and downs extremely well. Keep that person well informed and seek counsel before making big decisions. Especially with HR issues, run your ideas by your partner for validation.

If you fail, pick yourself up and move on.



Surface-mount technology (SMT) process lines at the Downers Grove, Illinois location.

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