

HVAC INSTRUMENTS Keep Military Cool Under Fire



Standardizing HVAC instrumentation for military bases helps deliver the consistent data needed to avoid callbacks in critical installations.

BY JACK SINE

A short time ago, Warren Brader brought his 25 years of HVAC service/maintenance experience to a major military contractor. His task: to maintain the HVAC equipment for one branch of the military service at bases around the world.

“It’s much more than keeping the soldiers comfortable,” says Brader. “The most important charge we have is to maintain the HVAC equipment that serves the computer operations.”

Most people think of military computers as those used at military bases for routine tasks such as data processing, but the computers most critical to the military are those used in armed conflicts—including Iraq and Afghanistan. “Those computers are critical to the military at every level and they can’t afford to have them go down because an air-conditioning unit malfunctioned,” adds Brader.

Dangers and problems

“All the computer information is classified,” says Brader. “But I can tell you that those central operations are, in essence, the offices in the field. The commanders spend much of their time there and, if an A/C unit goes down, the temperature ramps up in the servers in that facility, and they go down too. If that happens, they lose computer capability for everything. All communication goes down—artillery, fire command, combat operations centers, everything. The systems immediately go to back-up power—we do not lose data, but the standby power is for an emergency. That is why it is mandatory to get it right the first time using the proper tools and test procedures. You can see why it is critical to keep those A/C units up and running at maximum efficiency, especially in the summer.”

The military-tent computer complexes are cooled with



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«Tents and trailers serve as the homes for technologically advanced military operations in the field. HVAC systems and controls are critical to maintaining these operations.

»The backbone of military operations as it relates to HVAC is the GETT—Generator Environmental Tactical Trailer. Technicians use standardized test equipment to monitor and test the generators, air-conditioning units, air flow, and generator CO emissions to support mobile tactical communications and server components in operations around the world.



10-ton A/C units made by various defense contractors. They are arranged in trailers in combinations of 2–10 units, serviced by HVAC technicians from the assigned areas to make sure they run on demand and at optimum efficiency. According to Brader, therein lies the problem.

“I have a group of technicians at bases around the globe reporting to me, either directly or indirectly,” he says. “The challenge is to make sure everyone is on the same sheet of music, using the same procedures, and having a way to check on them to make sure they aren’t taking shortcuts. It’s an enormous challenge with devastating results if they don’t all perform their maintenance in the same way every time and with the same degree of accuracy.” And in the case of the Middle East conflicts, the consequences could be even more devastating.

“Part of the problem is the technician shortage and the other part is that, over time, many HVAC techs develop bad habits that they have to be trained out of,” notes Brader. “The technician shortage just means you have a smaller pool to draw from, so you must be more selective. The bad habits and use of shortcuts means you have to be careful what questions you ask in the interview process.”

The problem of shortcuts is not a new one and it continues today. HVAC instructors are keenly aware of the problem.

“Once some technicians get to the field, they take shortcuts,” says Bill Brown, an HVAC instructor at Brownson Technical School in Anaheim, CA. “For instance, instead of measuring suction-line temperature, a technician will wrap his bare hand around the pipe and judge by feel. We call it the ‘cold beer test’—if it’s as cold as good cold beer, the sys-

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tem is charged.’ We do everything to discourage this kind of sloppiness, but once they’re in the field we have no control. One of the reasons some techs cut corners is because some measurements are difficult and time consuming to take, and they’re under pressure to get to the next job.”



⤴ **Warren Brader and his team of technicians share standardized test data from HVAC system analyzers to diagnose and tune systems. Standardized equipment allows him to maintain control of operations and troubleshoot with his technicians on a global scale.**

Those are exactly the types of shortcuts that Brader can ill-afford on the job. Answers given to questions asked in the interview process helps him weed out candidates not skilled enough for the job and/or those with bad habits that could become future problems.

When reviewing candidates, Brader says “first, I ask them if they use digital equipment. You’d be surprised how many are afraid of digital technology and [so] cling to their analog instruments. Then I have a series of questions on diagnostic techniques that are designed to reveal if they take shortcuts. But even if they pass the interview, there’s still a good chance that they will lack the meticulous commitment to

our procedures that this job demands. That’s where instrumentation comes in.”

Standardization and accountability

The first thing Brader did when he arrived at his present job was, as he likes to say, “get everybody on the same sheet of music.” He did that by making sure they all used the same instruments.

“I was doing HVAC maintenance long before I was a certified technician,” notes Brader. “My mom owned some restaurants, but couldn’t afford to pay for maintenance. As soon as I was old enough, I started working on all the equipment, including the HVAC systems. My mom was the owner, [Being that my mom was my ‘client,'] you can imagine how I came to hate callbacks. After I was certified, I kept that aversion. When I came here, I made sure that everyone working under me used the same instrumentation. I was using a test instrument that consisted of a digital stick meter, a data logger, an electronic handle and 11 modular test heads that fit all three—and measured just about everything a tech needs to measure. I saw to it that everyone working under me had [the same test instrument] but I still couldn’t guarantee that [the guys in the field] were doing everything by the book.”

Then, Brader was given a one-time chance to put the perfect tool kit together for all the technicians. “When a chance to upgrade comes along, you don’t pass it up,” says Brader. “I would need a multimeter, a clamp meter, different [tools] to test [for] carbon monoxide, something to analyze superheat with, and different manifold sets.”

Brader believed there was technology available that would make his technicians’ jobs easier and more versatile, while giving him more control. After performing extensive research, he found a handheld instrument that fit the bill. Not only does the multi-function multimeter lead the tech through each step, but it records each test and its results so that Brader receives a record of what was done and the outcome of each test.

“When I speak to my technicians via e-mail, they can send me the test results directly to my computer and I can store the data on the share drive. [This way, I can] see what



^ Brader attaches wb/db thermocouples into the supply and return ducts on a mobile unit to get the most accurate readings. He leaves them in attached, seals the system and wets the bulb through a tube he rigged so he doesn't have to disconnect the supply and destabilize the system in 140°F weather. "I'd have guys coming out of the tent with guns drawn," he jokes.

is being done to other units and use this data to track repeat problem areas and evaluate the quality of work," says Brader. "Then I can send that data upon request to [any military review/oversight personnel] to back up our work requests and show the quality of the job."

"The key to this instrument's capabilities is the firmware," says Fieldpiece Product Manager Russell Harju. "It leads the technician step-by-step through superheat, subcooling, target evaporator exit temperature and combustion analysis. It's very easy to use and all the necessary tables are built right in, so the technician will not have to carry different tables and charts for each test. It stores up to 200 tests that can be downloaded to a PC. It saves all of the tests, enables the contractor to perform thorough customer tracking and creates a work order that can

be given back to the customer. The firmware is upgradeable so, as new tests are developed, they can be uploaded from [the company's] Web site."

Maintaining and certifying

The changes and demands of these jobs mean constant upgrades and reviews. "We had to do a major changeout of some control valves and a compressor," notes Brader. "After finishing the changeout, we were faced with—what used to be—a lengthy process to adjust those valves so the superheat on the evaporator is just right. These things have to be spot-on or the system won't work right. The superheat called for 10°F and, using the [analyzer] to make the adjustments, our test results were 10.5°F. We were only a half-degree off—essentially a gnat's eyelash. In the past, it would have taken us a lot longer to get anywhere near that accuracy."

In addition to A/C systems, Brader is able to monitor heating systems as well. He says Fieldpiece introduced a firmware upgrade for the analyzer that includes a program that can be used to certify both A/C and heating systems according to ASHRAE specs. "In heating [the program and instrument work together] with both electric and gas units," he adds. "It will tell you likely causes of problems. Tests results can be saved so you have records of everything. We check [for] carbon monoxide, [and perform] combustion analysis,



⚡ **Using a multifunction analyzer allows monitoring of the compressor input, line voltage in the environmental control unit, charge, air flow and more at the same time. Technicians also monitor the tent for CO from the generator.**

and pilot and air-quality [testing.] With an A/C unit, we can enter different parameters. We put in all [the] factory specs, and the instrument [tells us] if the system is operating optimally. We simply don't have callbacks because we don't miss parameters, and we know when something is weak."

Brader reports that he used to constantly worry that his technicians were either developing bad habits or reverting back to doing things the way they used to, before he trained them. But with the consistency in equipment being used and the way the tests are being performed, Brader has been able to ensure good habits and accuracy—traits the military service certainly appreciates.

"Now the defense contractors that maintain the gear for other military branches are using us as a model," says Brader. "They have the same kind of computer/HVAC setups as [us, and] they're telling their technicians to do [what we are doing and [they will] be good to go." 🙌

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« **Whether in a war zone or working on base, Brader and his team use standardized test kits designed for mobility. "In the field, we carry our service truck on our shoulders. When everyone uses the same compact modular technology, we have everything we need to do the job and know what to expect no matter where we are or what we run into."**

