

There's Nothing New Under the Sun

by Dean K. Wilson, P.E.

***Question:* I work as a fire marshal for a medium-size southern city. I am seeing less and less traditional, hard-wired fire alarm systems, and more and more programmable multiplex systems with individual point annunciation for each fire alarm initiating device. Is my experience typical, or do we just have a bunch of “new technology geeks” running our fire alarm system installation companies in town?**

Answer: Your experience seems typical, as I speak with public and private Authorities Having Jurisdiction located in various parts of the United States and Canada. If anything, we in the U. S. lag a bit behind Europe, where programmable multiplex fire alarm systems have represented the bulk of the installed fire alarm systems for quite some time.

While we may think of multiplex systems as “new technology,” they have existed for well over 30 years. In fact, if you take the definition of “multiplex” in its most traditional sense—multiple signals sharing the same interconnecting communications pathway—multiplex has existed in the fire alarm system arena for more than 60 years.

Just the other day, I spoke by telephone with an old friend from my middle years in the fire alarm profession—a former deputy chief and superintendent of fire alarms for a major New England city—who reminisced with me about the Gamewell Dualarm system. Gamewell developed the Dualarm system at a time when the predominant method of connecting automatic sprinkler

system waterflow alarm initiating devices or interior manual fire alarm boxes to a coded wired municipal fire alarm system involved the use of shunt-type master fire alarm boxes.

The shunt-type system offered a major “high” to any techno-geek of the 1920s or 1930s. It took the 100 ma direct current municipal fire alarm circuit and “shunted” a portion of the current into a building and throughout the building over a closed loop. The initiating devices had normally closed contacts that opened when actuated. When the interior building loop opened, it caused the current to flow through a tripping mechanism that mechanically pulled the actuating arm of the coded fire alarm box. As the spring-wound clockwork mechanism of the master fire alarm box began to turn, a code wheel transmitted a coded signal to fire alarm headquarters over the closed direct current 100 ma circuit.

While the shunt-type system offered some disadvantages, namely that a ground on the interior loop appeared as a ground on the municipal loop, it offered the advantage of requiring no local building power to operate. The National Fire Protection Association’s *Standard for Installation, Testing, and Maintenance of Auxiliary Protective Signaling Systems*, NFPA 72B, did not permit automatic fire detectors on the shunt-type interior building loop. It only permitted automatic sprinkler waterflow alarm initiating devices and interior manual fire alarm boxes. (Interestingly, NFPA 72-2007, *National Fire Alarm Code*, has retained this requirement in Table 9.4.3.2.2.3.)

When a majority of the building owners using this system began to want the ability to operate audible fire alarm notification appliances, usually bells, throughout their premises, Gamewell developed the Dualarm system. The Dualarm control panel used local building power to impress an alternating current signal over the direct current interior building loop. When a fire alarm initiating device actuated, the AC current flowed through the wiring causing connected bells

to operate. A choke prevented the AC current from feeding back into the 100 ma DC municipal fire alarm circuit. Thus the system used the same wiring for two different signals.

When one recognizes that this technological development occurred in the middle part of the first half of the 20th century, a side-to-side shake of the head seems an appropriate response. It's true: There really is nothing new under the sun.

Dualarm—what a concept! In the mid-1970's, Simplex Time Recorder Company—now SimplexGrinnell—even developed a “Dualarm Module” for its 2100 series fire alarm system to meet the demand for this feature in certain New England jurisdictions.

Flashing back to the present day, one major issue that a building owner must keep in mind when considering whether or not to purchase a technologically complex programmable fire alarm system: “How much will it cost to maintain the system?”

A “rule of thumb” in fire protection engineering states that “The more complex a fire protection system, the more potential exists that it might fail when needed.”

“Keep it simple!” offers a reasonable watchword. At the same time, a modern programmable fire alarm system offers a building owner a host of features that can assist in managing or overseeing the fire protection systems installed at the premises.

I always recommend that building owners give great care to the planning of a programmable fire alarm system. The requirements of NFPA 72-2007, section 10.4.1.2, can significantly increase the cost of maintaining such a system if the owner does not carefully plan the installation and programming of the system.

10.4.1.2* Reacceptance Testing.

A.10.4.1.2 Reacceptance testing is performed to verify the proper operation of added or replaced devices, appliances, fire safety control function devices, control equipment, and so forth. It is not the intent of the committee to unduly burden the

owner with increased costs for repeated testing of devices not directly affected by the replacement of devices with like devices.

For example, if a 2 amp fuse is replaced with another 2 amp fuse in the fire alarm control unit, verification of the circuit(s) served by the fused supply is required, but it would not be necessary to test 10 percent of initiating devices not directly affected by replacing the fuse. Likewise, it is not necessary to test all these initiating devices whenever a smoke detector is replaced with a like smoke detector.

When wiring changes are made to correct improperly supervised circuits, a test of the affected device or appliance is required, but not a test of 10 percent of initiating devices not directly affected.

10.4.1.2.1 Reacceptance testing shall be performed as required in 10.4.1.2.1.1 through 10.4.1.2.1.4.

10.4.1.2.1.1 When an initiating device, notification appliance, or control relay is added, it shall be functionally tested.

10.4.1.2.1.2 When an initiating device, notification appliance, or control relay is deleted, another device, appliance, or control relay on the circuit shall be operated.

10.4.1.2.1.3 When modifications or repairs to control equipment hardware are made, the control equipment shall be tested in accordance with Table 10.4.2.2, items 1(a) and 1(d).

10.4.1.2.1.4 When changes are made to site-specific software, the following shall apply:

- (1) All functions known to be affected by the change, or identified by a means that indicates changes, shall be 100 percent tested.
- (2) In addition, 10 percent of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, also shall be tested and correct system operation shall be verified.
- (3) A revised record of completion in accordance with 4.5.2.1 shall be prepared to reflect these changes.

10.4.1.2.2 Changes to all control units connected or controlled by the system executive software shall require a 10-percent functional test of the system, including a test of at least one device on each input and output circuit to verify critical system functions such as notification appliances, control functions, and off-premises reporting.

It can prove quite costly to make too frequent changes to a programmable fire alarm system, particularly in light of requirements stated in section 10.4.1.2.1.4 and 10.4.1.2.2.

“Isn’t technology wonderful?” Yes it is! But, like everything else in life, “moderation”—that is, thoughtful and careful planning and execution of a project—will go a long way in helping to make certain the building owner gets a system that will meet his or her fire protection goals.

Oh, in case you want to latch on to one of those Dualarm systems, you might try a fire protection museum.

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