

# Fire Station Solar-Powered Flashing Beacons: A Hot Way to Stretch Your Budget

by Joseph Wise

As urban areas grow more congested, traffic issues surrounding fire stations have become more critical. The traditional approach to fire station safety has been to install static signs in advance of the station and sometimes, pavement markings in front of the facility. Unfortunately, drivers tend to become oblivious to static warning devices.

In the last 20 years, traffic agencies have advanced to using full-blown signal assemblies for fire stations, especially on arterials where high traffic volumes make it difficult for emergency vehicles to enter the traffic flow.

These traditional systems primarily consist of a control cabinet, two mast arm signals and a pre-emption device. They are expensive and time consuming to install as they require hardwiring from the controller to each of the signals. Their costs range from \$50,000 to \$65,000 per fire station for a set of signals. This creates a financial burden for any agency with limited funding.

An affordable and reliable option to the traditional signal assembly for fire stations is the solar-powered flasher with radio links. Solar-powered flashers eliminate the need to hardwire the signals to AC power or to a central control point, where most of the costs occur. Adding to their practicality and affordability, solar electric module prices continue to decrease. LED lamps are getting cheaper as well as more efficient, and license-free radio links continue to improve both in cost and quality.

In recent years, manufacturers have fielded systems around the country which are specifically targeted to these applications and have proven the affordability and

reliability of solar-powered fire station flashers. As with any properly designed solar-powered system, it's critical that the end user correctly define the load configuration (quantity and size of lamps per pole); the number of hours per day of anticipated use (duty cycle) and the geographical area in which the equipment is to be used. (See my article "Wireless Traffic Control Solutions" *IMSA Journal* - July/August 2002, pp 48 - 59.)

Presently, two types of systems are available for fire stations. The first, and most basic, Type I, consists of one or two amber beacons situated in advance of the station. The Type II system is more complex: a combination of amber and red lamps placed in advance or immediately in front of the station.

Each system can be configured for remote activation three ways: from either a hand-held radio transmitter; a wall-mounted transmitter assembly; or an optical detector unit with a radio transmitter.

There are two types of timing control algorithms for the systems: distributed and centralized. The timing logic in the distributed system is located at each of the flasher units. In the centralized system, the timing logic is located at the transmitter station. The choice of distributed or centralized timing is largely determined by the type of activation source used in the project.

Projects which require handheld transmitters will have distributed timing logic, as the transmitters generally transmit an activation signal and are incapable of running timed sequences. Systems using a

fixed transmitter can be configured with either a central or distributed timing logic set up, yet may benefit from use of central timing control logic since the position of the transmitter and receiver remain fixed.

Type I controls can be fairly simple. The electronics package includes the solar controls, radio receiver and the timing control logic for the distributed timing approach. Timing control logic can be as simple as a time delay relay or, for a more user-friendly approach, a micro-logic module with an LCD user interface screen. With a logic module, the user can keep track of the number of activation commands received by the unit; view the programmed run time; run control logic self tests; and depending on the radio, monitor for loss of the transmitter.

Figure 1 shows a typical Type I fire station flasher with two 8-inch amber LED lamps and distributed timing logic.



*Figure 1 - typical Type I fire station flasher with 2 LED lamps*

With centralized timing on a Type I system the logic control module is omitted as the central station's logic control handles timing functions and transmits a contact closure signal to the radio receiver at the flasher. Figure 2 is a Type I with dual 12-inch lamps, distributed logic and a clear confirmation strobe.



*Figure 2 Type I fire station with confirmation strobe beacon*

Since it involves both red and yellow lamps with specific sequences of operation, Type II system controls are more complex. The systems are usually configured to provide a flashing yellow interval, followed by a solid yellow interval then finished with a flashing red interval. Type II systems are equipped with both a radio and control logic since self-test functions are necessary for these units. Figure 3 is a Type II system mounted on a mast arm pole assembly configured with F signal heads and a clear confirmation strobe lamp activated during the red flash interval.



*Figure 3 - Type II system installed as a mast arm with type F signal heads*

Both Type I and Type II systems can be equipped with optional confirmation strobes. This is an effective way for the fire truck operator to observe that the lamps have been activated.

As I have mentioned, there are three choices for activating the fire station beacon system. Handheld or wall mount radio transmitters are the most common since they are relatively inexpensive. However, since newer fire trucks are equipped with optical preemption transmitters, the optically-activated flashers are being used more frequently.

Both of the major manufacturers of optically activated preemption systems offer DC sensor units which are well suited to these applications. These units do not need the card cages or additional circuitry a full preemption detection package requires.

The typical output is an open collector easily interfaced to a radio or a logic control module. Figure 4 illustrates an optical detector unit mounted at the end of a fire station driveway. Optical detectors can also be integrated into certain configurations of the Type II system by modifying the program's logic control and changing the radio from a receiver to a

transmitter. The system in Figure 3 is part of a set of crossing signals with one unit configured as a master with an optical detector and the other as a slave.



*Figure 4 - Optical detector unit with radio transmitter package*

How can these systems improve safety and stretch a tight budget? Without question, fire station flashers help reduce the incidence of accidents. They improve response times and alert motorists when emergency vehicles are leaving the station.

Personnel at the fire station served by the signals (as shown in Figure 3 ) indicate they have reduced response time by as much as one minute. Furthermore the cost of solar-powered systems is substantially less than my estimate of \$50,000 to \$65,000 for a set of traditional signals.

The agency which installed the signals in Figure 3 estimates the total cost—including construction, solar equipment, and poles—at approximately \$32,000.

The agency which purchased the system in Figure 1 spent \$9,900 for two Type II flashers and an optical detector/transmitter unit at the station driveway. In many cases, these expenses would represent the cost of trenching, boring, conduit work, and site remediation. In addition to these benefits, these systems can be installed in much less time than a traditional signal. There is little maintenance and the systems remain operational during power outages as they have their own batteries. **IMSA**

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