Mayday Moments

Catching Up with 406 MHz Changeover

A Year After 121.5 MHz's Sunset, New ELT Options are Plentiful and Smarter

STORY BY DAVE HIGDON

Artex's C406-N

Kannad's AF-406 Compact

Remember the old philosophy debate about "reality" — the one that raised the question as to whether or not something can be considered real if it is unobserved? "If a tree falls in the forest and there's no one there to hear it, does it make a noise?"

Consider the aviation variation on this and its clear real-world implication: "If an airplane goes down and there's no one around to see it — or hear it — is it really down?" The answer is no.

An airplane isn't really down — at least not from the perspective of anyone outside that airplane — until hours after it fails to arrive and someone notices the people didn't come back, then reports the fact. Until then, nothing happens.

This warrants explaining to pilots and aircraft owners. Without a reason to look, a crash unseen means: no FAA checking its records or calling airports; no law enforcement on watch; and, most importantly, no Civil Air Patrol flying search patterns. Officially, until a plane goes a couple of hours past due, it is simply running late. A plane could have crashed, and its pilot and occupants injured and bleeding, for hours longer than this wait period.

This plane is the tree that fell in the woods — and no one heard it. The plane is down and no one knows it. The plane has crashed and nothing is happening — and little to nothing happens for a couple more hours after the ETA, which is hours after the accident.

When a search does begin, what are the authorities going to do? Where are they going to look?

Absent a signal from a viable emergency locator beacon or some other indicator, the usual sequence involves phoning airports back up the route where they think the plane was flying, while listening and hoping and wishing and praying for a better clue.

But what about the trusty old 121.5 MHz emergency locator transmitter? Unless searchers get within a few miles of the crash, no one will hear this little warbling box — assuming it even triggered. Failure rates for pre-1995 ELTs in crashes were huge; newer post-1985 units do better, but they still aren't a sure bet. It takes a true bit of serendipity for anyone looking for a plane to pass close enough to pick up the warbling.

Satellites no longer listen for 121.5 MHz signals. Even when they did listen, hours could pass between a crash, the satellite

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Continued on following page

Continued from page 37

hearing the signal and officials getting enough of a fix to begin their search — with a search area as large as the average county.

For all practical purposes, the 121.5 MHz box offers as much help in air-crash salvation as the Loran C in the panel helps navigation.

Odds of occupant survival begin to deteriorate after a crash, and for those injured, the first few hours are critical; shock and exposure can kill in less than 12 hours, and it might be half this time or longer before the first fix develops on an approximate site.

It doesn't have to be this way. But it is this way if 121.5 MHz is the aircraft occupants' only hope. The Cospas/Sarsat system shut down its 121.5 MHz monitoring nearly 18 months ago; beyond a few miles, no one can hear them — period.

Thankfully, beacons using the alternative 406 MHz ELT are more plentiful and less expensive than a year ago. Faster than you can say "Civil Air Patrol," arguments against adopting the new technology continue to fall and, as a result, their appeal and popularity continue to grow.

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121.5 Didn't Go Down Without Warning

The end of 121.5 MHz monitoring in February 2009 marked the culmination of a transition started years earlier, a change made after international collaboration with search-and-rescue officials around the world.

Internationally, requirements for aircraft operators to carry the new 406 MHz beacons went into effect in 2008.

Thanks to consumer pushback in the United States, the FAA decided against mandating a changeover from the 121.5 MHz beacons, and it allows operators and owners to make their own decisions in their own time.

Internationally, however, the satellite operators stuck with the consensus schedule and shut down the 121.5 MHz receivers at the beginning of February 2009.

Of course, pilots still can buy and install beacons TSO'd to C91a standards, the 121.5 MHz models. They remain the cheapest option for fulfilling FAA requirements for an ELT — if the buyer solely considers the purchase cost in this equation.

Hear Them, See Them, Find Them

The beauty of the modern 406 MHz ELTs is more than the skin-deep international orange cases they share.

First, 406 MHz ELTs employ a more powerful 5-watt transmitter, which broadcasts in brief bursts a digital signal carrying a code identifying the aircraft, owner, phone number and other important information.

If the 406 MHz beacon is GPS-enabled, the exact latitude and longitude of the beacon also is broadcast.

Second, the satellites can hear this signal far better than the 121.5 MHz warble.

Third, because of their design and function, pinpointing a 406 MHz ELT is far more accurate. A 121.5 MHz ELT could be narrowed to a circle about 25 miles across — after multiple satellite passes. For a search aircraft to get a directional fix, it needs to pass within 10 miles on a good day.

A 406 MHz ELT can be pinpointed by the satellites to within about a 1.5 mile circle or less — and that's without a GPS position input.

Give the 406 MHz beacon the added information of a position fix, and the accuracy of the

search area improves to a few hundred yards.

These elements add up to some significant time-to-search differences:

• Typically, hours for the 121.5 MHz beacon.

• Typically, less than 2 hours for a 406 MHz without GPS position data.

• Typically, 45 minutes or so for a GPS-enabled 406 MHz ELT.

Plus, there's one other major advantage: The old 121.5 MHz beacons are totally anonymous. Searchers might not know for whom they're looking until they find them. More often than not — upward of 60 percent of the time — the search is for a false alarm, one that can't be corrected without expending valuable resources to track down and turn off the falsely reporting ELT.

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The Agony of Change; The Ecstasy of Being Found

As this transition began five years or so ago, the major complaint of the general aviation community was one commonly heard whenever new technology drives change: the cost.

Pilots complained when transponders were first required and, later, when Mode C altitude encoding was added to the requirement. The boxes available at first were not affordable.

Continued on following page

Continued from page 39

Ditto for the 406 MHz ELT. Five years ago, little existed under several thousand dollars — a lot for pilots and owners referenced to the typical $200 to $250 costs of the available 121.5 MHz beacons.

Two years ago, the first GA units under $2,500 arrived on the scene — encouraging but still not driving flocks of owners and pilots into the shop to replace a still-functional-but-of-little-use 121.5 MHz ELT.

Last year, two landmark barriers fell and 406 MHz beacons began to win the acceptance warranted for anyone interested in being found, quickly, in the event of an off-field, out-in-the-bush landing: a simple-to-install beacon with an integral GPS engine — priced under $1,500; and a non-GPS unit comfortably under the psychologically magical $1,000 price point.

The reasons arguing against updating are rapidly falling.

Take a look at some of the options available today and note their lower prices. Then, think about whether you want to withhold from your family a high probability of being found after an unfortunate accident, or whether you'd prefer to expose them to the added risks and save a few bucks.

406 MHz Options: Some of the New Choices

Last fall, Kannad unveiled its new, non-GPS-enabled 406 MHz beacon — its first priced at less than $1,000. This product offers easy mounting and a choice of antenna.

Kannad also offers GPS-enabled 406 MHz solutions starting at less than $1,900.

Late last year, a brand-new company received TSO approval for its first brand-new product: Emerging Lifesaving Technologies' new 406 MHz ELT with an integral GPS engine, listed for less than $1,500. A lower-cost, non-GPS unit also is available from Emerging Lifesaving Technologies.

Today, a few ELT options exist for less than $1,000.

For example, Ack Technologies, a familiar name in the field, offers a 406 MHz ELT kit for under $600. Throw in Artex Products, EBC and Pointer, and you now can find a 406 MHz solution for practically every aircraft need and budget limitation.

Some of these options require an interface to receive position data from an external GPS; many don't allow the option. All offer the aircraft occupants a better chance of rescue within a survivable timeframe than the old 121.5/243 MHz units.

Other Available Advantages

Some of today's 406 MHz solutions offer the option of portability — that is, a survivor of an accident can remove the beacon, pop on an accessory antenna and move to a safer location while continuing to broadcast the signal.

Most offer longer battery life — 72 hours of full power is the standard — while simultaneously providing longer time-between-replacement cycles.

Not long ago, the proprietary replacement batteries requirements of many ELTs meant spending nearly as much as the original purchase price, and doing so every two years. Next, came ELTs with a commonly available brand of over-the-counter D-cell batteries — and still on a two-year replacement cycle.

Today, with newer transmitters, digital control architecture and advanced battery technology, going five years between replacing the battery is common for these newer units.

At a price of about $225 for many of the replacement batteries, this means greatly reduced ownership cost — yet another benefit of upgrading.

For many an aircraft owner, pilot and their families, the biggest benefit of all is the increased peace of mind if the unforeseeable occurs: Searchers will be able to find their loved ones — quickly, with a minimum of delay and a maximum chance of helping.

This kind of peace of mind is priceless. ❑

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