

## snow science

## Is Your Beacon Ready to Retire?

Story by Jeff Lane

Do you know how old your beacon is? Do you know when you're finally going to put it out to pasture and buy yourself a new beacon? Have you even considered just how old your beacon needs to be before you really ought to retire it?

I hadn't considered that last question until this winter, when a search and rescue team we work with offered to give away their beacons to another team that had a higher likelihood of heading out for a rescue in avalanche terrain. These particular beacons had been sitting at home, unused for years except for sporadic practice sessions. They seem to be in perfect working order, but are they too old to give away?

I had assumed there was a standard that I just wasn't aware of, so I began asking around. I asked a variety of people: guides, avalanche forecasters, manufacturers, and professional rescuers. Quickly I learned that there was no industry standard, though as it turned out, plenty of common ground is shared on the topic among those I spoke to. Most people thought the question was one worth finding a good answer to and were interested in knowing the results.

One of the most common themes that came up again and again was that regular practice is the most important thing one can do. Stories abound about the crusty old veterans using ancient beacons who, in scenarios and contests, routinely put on a clinic for their younger colleagues. There's no secret to what they're doing; it comes down to familiarity with their equipment and solid fundamental search skills.

In addition to practicing, another common theme is the importance of taking care of your beacon. This includes good habits such as removing the batteries for long-term storage, protecting it when burying it for practice, and regularly inspecting your beacon thoroughly. As much as these themes came up often, the issue of beacon age and lifespan remained as elusive as an above-the-ankle powder day in New Hampshire.

If age were the only factor when considering when to retire a beacon, the question would have been answered long ago. As it is, complicating factors make every situation slightly different, and I believe this is part of the reason why no consensus exists within the avalanche industry. Beacons aren't used in a vacuum, so how the beacon is used and cared for plays an important role, as is the case with any electronic equipment regularly subjected to a harsh environment. Some beacons are used daily by professionals, while others are used only for a couple days each season. Others are used by an assortment of people throughout the season, making it impossible to truly know their history. They get strapped to sweaty bodies, left in cold backpacks, dried out indoors, and probed during practice sessions. Most people I spoke with agreed that how a beacon is used and cared for should have a significant impact on its service life.

In addition to the environmental and usage factors, technological advances are another prime motivator for people to purchase a new beacon. However, this still skirts the issue of what to do with the old beacon. Does it get fully retired, does it become a designated practice target, or do you sell it on eBay to an unsuspecting and self-righteous free-heeler?

Outside of all these factors that can drive a beacon into retirement, the next biggest problem is aging electronic components. Just how long one should put trust in old electronics is subject to debate. The quality of components used in electronic equipment definitely plays a strong role in their longevity. The companies that produce the components do guarantee their products to stay within specifications for a long time. One beacon manufacturer told me their suppliers guarantee components for 15-20 years, which is much longer than I would have guessed. But the components themselves are only a part of the larger picture.

Each manufacturer I spoke with had a different perspective on beacon lifespan. Since I was also interested in developing talking points for our avalanche center to use with visitors to our

forecast area, this discrepancy complicated the task. Generally speaking, following the manufacturer's recommendations is a good idea. Unfortunately, the vast majority of people using avalanche terrain in New Hampshire's Presidential Range do not carry any avalanche safety gear. I would rather see a person using an older but well-cared for beacon than using nothing at all, and I personally know a few of those crusty veterans with ancient beacons mentioned earlier. With that in mind, we want to offer people reliable information to help them make their own informed decisions. Ironically, this is similar to our philosophy of managing avalanche terrain – we provide information and analysis, but you make your own decisions.

Two of the four manufacturers I spoke with, Mammut and BCA, do not have a set age after which one should retire a beacon. Mammut recommends electronic diagnostic checks every three years for the Pulse and every two years for the Opto 3000. In addition, they recommend regular inspections and practice sessions specifically looking for any errant behaviors. BCA also recommended thorough inspections and scenarios, but did not specifically recommend sending a beacon in to them for a checkup. They feel that a comprehensive inspection is something that a beacon owner can do, and in doing so, he or she would be gaining a better working knowledge of the beacon as well as logging valuable practice time.

Ortovox had the strongest stance toward retirement. They warranty their products for five years (similar to others) and believe that after this time the beacon should be retired. (Find the date code for this warranty period inside the battery compartment.) Their position comes from the idea that aging electronics may not be detectable in a hands-on inspection or through an electronic diagnostic check. Since a beacon is a life-saving device requiring 100% reliability, the best way to ensure this is through replacement of the unit before it's too late.

Pieps stood on middle ground, stating that "no beacon should be older than 10 years," especially given the conditions under which beacons are used. Similar to the others, they say beacons should be thoroughly checked at the start of each season. They offer to do diagnostic checks, but with the caveat that diagnostics cannot extend the lifespan of the unit and can instead only prevent the use of a faulty beacon.

Regardless of which beacon you use, you should follow the manufacturer's guidance. After all, nobody knows their products better than they do, and nobody shoulders the weight of potential liability as much as they do, either. On top of the manufacturer's recommendations, one other common theme that came up multiple times was, "If in doubt, retire it." This seems like good advice to me.

If you're the type of person who never does any practice or never gives your beacon a thorough inspection, you might never have any doubts about its performance, and therefore you'll never see the need to retire it. If this describes you or your partner, read the next section carefully and follow these instructions on how to do a comprehensive examination of your beacon. Remember, you may not care whether your beacon is working properly or not, but I'd put good money down that your partners care quite a bit. When it's time to do the comprehensive exam, here's what you do:

- 1 Perform a check of initial signal acquisition range. This varies enormously among different models, so compare your results to an identical model. Start with your beacon in send mode well outside of its receive range. Then switch the beacon to search and walk at a moderate pace toward the target beacon. Note the distance, turn the beacon back to transmit, and repeat the test a couple times. How you position the two beacons relative to each other (the coupling position) will affect the distance, so be consistent when comparing different units.

- 2 Perform a check of transmission range. This range is very similar among different models, so just about any other beacon can work as a comparison unit provided you can orient the transmitting antennae identically. The simplest way to do this is to use an identical model as the comparison. Orient carefully when using beacons that have angled antennae or have the ability to switch to a different transmitting antenna. To do this check, simply repeat the prior test, but this time swap the transmit units, not the search units.

- 3 Inspect the beacon's casing and harness system for any physical damage such as cracks or loose switches.

- 4 Inspect the battery compartment for signs of corrosion or looseness, and for Pete's sake, take the batteries out if you're not using the beacon for any length of time. This will prevent battery leakage inside the compartment.

- 5 Inspect all the display components, including making sure the direction arrows function properly when in search mode.

- 6 Ensure the functionality of all buttons and switches. Do they do what they're supposed to do? Does the auto-revert function actually revert to send after the correct amount of time?

- 7 If you have access to another beacon with the capability, check for frequency drift. This is particularly important with older analog beacons, such as the F1 Focus, which may drift outside of the international standard for avalanche beacons: 457kHz ±80Hz. Unfortunately, you can't test for frequency drift with the range tests previously described, since different beacons have widely varying abilities to pick up a drifted transmission.

- 8 Run through a couple practice searches, looking for errant behaviors. Try it with single burials and with multiple burials; this is particularly important with modern beacons running fully digital software. Make sure the technology does what it is supposed to do. As an added benefit, you'll get some quality practice time.

- 9 If you are an avalanche professional responsible for a fleet of beacons, document your inspection findings. Should your organization be unfortunate enough to have an accident, you'll truly impress the OSHA inspectors when you pull out a file documenting years of regularly performed inspections.

If any of the points above lead you to question the functionality of your beacon, you've got a few options. You could play it conservatively and use the "when in doubt, retire it" piece of advice, relegating it to a practice target (if its transmission is still okay). After going through all that work, don't you deserve to treat yourself to a shiny new beacon? You could also send it in to the manufacturer for a checkup. This might make you feel better, but isn't this line of reasoning the same as someone who hopes their compression test results are good enough to make them ignore that large natural avalanche that just took place on another slope? If you've already got evidence that the beacon may have a problem, you don't need a second opinion to tell you to retire it.

The ideas presented here represent a lot of people's opinions and personal statements, all of which have been filtered through my interpretation and writing ability. There is a lot of subjectivity, not the least of which is related to how the beacon gets used during its lifespan. Always consider a beacon's history, and when in doubt, retire it.

Jeff Lane works as a snow ranger for the Mount Washington Avalanche Center. He is both a snowboarder and a humble telemarker, and he enjoys a good debate over which is more fun. ❄️

