V3 Tracker - Instructions

These trackers are tiny radio transmitters designed to help the retrieval whenever the model is difficult to find after landing. The tracker installed on the model will be transmitting a short impulsive signal for days, being promptly locatable through a hand-held receiver. These devices use Zinc-air cells that deliver the highest energy density of any commercially available battery system at a low operating cost.

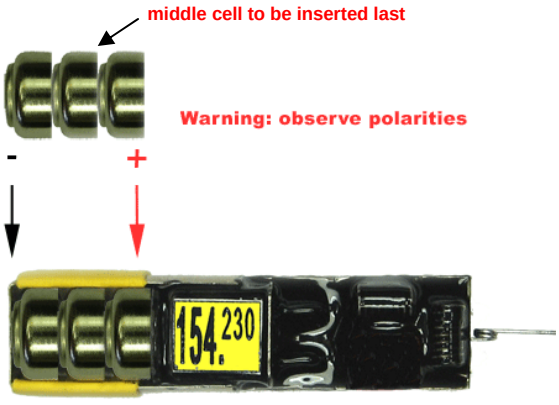
Receiver requirements - Most "Ham-Band" transceivers or VHF scanners will work for tracking. Minimum requirements for the receiver are: 5 KHz step tuning, squelch control, S-meter.

Positioning the tracker - the tracker must be installed on the model with the antenna straight and vertical for good signal propagation. A bent, slanting, or horizontal antenna wire will result in a poor ground range. Do not lay the antenna into metal or carbon tubes since these materials may decrease the range.

Preparing batteries for use - Zinc-air cells are stored with an adhesive metallized plastic tab seal in a battery that inhibits gas and vapor transfer. The batteries are ready to be used when the seal is removed, allowing oxygen from the air to enter the batteries. In most cases, nominal voltage levels are attained immediately after the seal is removed.

Battery life - The duration of a fresh set of batteries exceeds 340 hours (14 days) of continuos operation. It is possible to prolong the life of the battery by recovering the air holes with the tab after each use, but the benefits of this strategy are highly dependent upon the environmental conditions. **Discard the whole set of batteries if the seal has been removed over 2 or 3 weeks earlier**. The best practice is to place the cells in the device and use them until they are discharged.

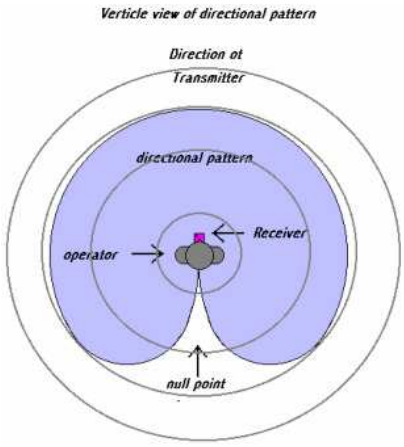
Turning-on the tracker – the tracker is turned on just by inserting the 3 batteries into their holder. Carefully observe the polarities as shown below.



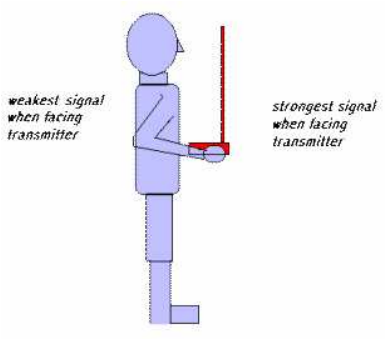
Tuning-in the receiver - Tune-in the receiver on the frequency shown on the label on the top of the tracker, then completely turn-off the 'squelch' on the receiver and adjust the volume as desired: short and regular pulses that break the ground signal noise will be heard on the receiver. Accurately adjust the squelch until the ground noise stops: the signal now breaks the squelch and the pulses will sound like short knocks. If the squelch threshold is set too high, weak signals will be cut off, therefore it must be adjusted carefully in order not to reduce the range of the whole system.

Tracking and retrieving the model - The VHF waves have good directional properties, but both the shape of the ground surface and possible interposed obstacles affect the field strength. The range depends both on the receiver sensitivity and the gain of the receiving antenna. With a common hand-held receiver using a short rubber antenna, the ground range should be over 500 meters and the signal of a flying model should be received from many kilometres. The range will sensibly increase by providing the receiver with a good directional, that can be used when the model lands very far from the launching point.

"Body Shielding" - An easy way to "sniff" your lost model - All you need to get started quickly and find your lost model successfully is the tracker installed on the model, a VHF receiver and perhaps some simple accessories. The most elementary method is called the "body-shielding" technique, which takes advantage of the human body attenuating the received signal. Hold your receiver tight against your chest and turn around slowly, looking for the direction at which your body blocks the signal most effectively (the signal "null").



At this point, the signal is coming from behind you. Turn back and walk in the direction of the null, taking bearings at regular intervals using your receiver S-meter deflection and observe the signal strength get stronger.



When you get so close that the signal strength meter (S-meter) goes off scale, you will need to attenuate the signal into the receiver without affecting directivity since it does not seem to decrease no matter which way you turn. If you don't have some sort of attenuator between your antenna and the receiver, remove the entire antenna and try again. You may even have to tune your receiver 5 or 10 KHz away from the transmitter's frequency. You'll probably still be able to hear it, but it should now be weak enough to allow body-fade again to work.

Attenuating the received signal - Beyond using the "tune off frequency" method when you get close as mentioned earlier, a useful trick to attenuate the received signal is replacing the receiving antenna with a short piece of wire. You may want to directly solder the wire to the axial contact of a coaxial connector so that it can be connected to the receiver as if it were a short antenna. The length of the wire must be experimentally determined by gradually cutting the wire with your back pointing the model until the required range is reached. You may want to prepare a couple of these simple elements to obtain a known short range, e.g. 10 meters and 30 meters. You'll probably find even more useful a real attenuator between the antenna and the receiver, to keep the signal strength within a manageable range as you approach your model and its signal gets stronger. The amount of attenuation needed is adjusted time-by-time depending on the landing location and distance. An excellent signal reduction device is an "active," or "offset" attenuator. It converts a strong on-frequency signal into a weaker off-frequency signal.. To use it, tune your receiver to the offset signal (usually from 1 MHz to 4 MHz up or down the transmitter frequency), and then adjust the attenuator for the needed attenuation.

Using Directional Antennas - Using a directional antenna usually gives you even better accuracy than body-fade. You'll get much more accurate bearings, plus more sensitivity when hunting weak signals, if you use a high-gain antenna. The technique is simple: turn a 360-degree circle with the antenna until the signal seems the strongest, as indicated by your S-meter, and then the antenna should be pointing in the direction of the tracker. Again, as you get close you'll have to use attenuation of some sort to keep the signal within range of your S-meter.

Managing unwanted reflections - The above techniques work best if you're well away from your vehicle, buildings, or other large metal objects which can cause strong reflections and add confusion. The body-fade null, which is rather shallow to begin with, can be filled in by signal reflections (multi-path), nearby objects, etc. When using the above methods, stay away from large buildings, chain-link fences, metal signs and the like. If you do not get a good null, move to a clearer location and try again.

Conclusions - It is recommended to practice and simulate possible real situations, in order to get familiar with the combination of these trackers and the receiver-antenna system.

Hints and warnings

- Gently handle the battery holder when installing the batteries. Do not tamper with the holder contact spring. In order to protect the holder contacts, the middle cell must be the last to be inserted.
- Do not bend or shorten the antenna: this will decrease the range and may break the thin wire
- The micro-transmitters may be damaged under bumps, shocks, vibrations and exposure to high temperatures, dust or damp. Keep oil and fuel far from the battery holder
- On engine-powered models, it is recommended to install the trackers free from vibrations. Using some shrink tubing on the batteries is suggested
- Due to the epoxy encapsulation, any servicing or repairing of the tracker is very difficult

V3 - Model Radio Tracker

For radio-retrieval of free-flight models

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