

THE QUANTUM (or Q-) STICK

A Passive Antenna Booster for Use with Portable Radios

Gerry Thomas

In recent years, my main job (the one that pays the mortgage) has required that I do quite a bit of traveling. On these trips I always try to bring along a portable radio and outboard antenna and give DXing a try from my motel room. My preferred DXing equipment on these short trips is a modified Sony ICF-2010 and Quantum Loop which I always bring packed in "carry on" luggage. In the past few months, airport security has apparently picked up with the result being an increased scrutiny regarding the exact nature of the Quantum Loop. While I have yet to be taken to a back room and interrogated, I have been questioned about this "strange electronic device" and have even had to demonstrate it. What I needed, I thought, was something a little less intimidating that would still give a significant kick to the 2010 (and/or my smaller back-up portable, the Radio Shack DX-380 (aka Sangean ATS 808)).

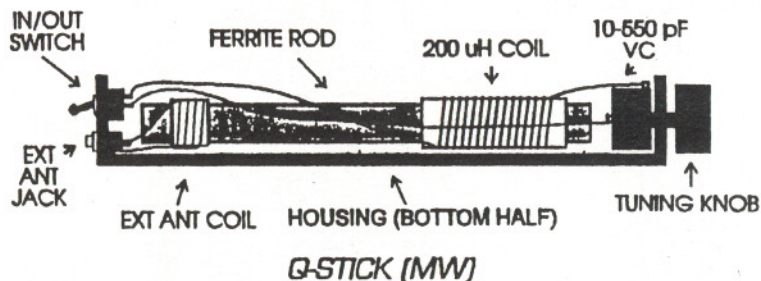
The obvious solution was a passive booster such as the "Hot Rod" I first built some years ago, or the discontinued Radio West Shotgun. I discounted the currently available Select-A-Tenna because of its size, and the similar Black Box antenna because of its tuning arrangement (and because I didn't think it would provide a sufficient boost, although I have never tried one). Also, because I have developed a recent interest in those experimental longwave beacons (i.e., "lowfers"), I thought it would be neat if I could try logging some of those from different parts of the country. Therefore, longwave capability would be nice. So, I set about designing a new passive booster with some features that I thought would be useful.

BASIC DESIGN

There is certainly nothing new about this design; it is nothing more than an oversized ferrite rod with a tuning coil and a variable capacitor. Similar designs have appeared in the past, as noted above, as the Hot Rod and the Radio West Shotgun. I did add a few features that I thought would be useful—a bypass switch (so that you could disconnect the booster without physically moving it), a smaller overall size (I found that an 8" rod, for all practical purposes, performed as well as two 7.5" rod glued end-to-end), a tuning knob on the right end of the enclosure (closer to the radio's main tuning knob) and, in the case of the "QUANTUM STICK PLUS+ (or simply, "Q-STICK PLUS+)", longwave capability down to 150 kHz (the regular QUANTUM STICK, or Q-STICK, covers just the MW band).

CONSTRUCTION

The basic construction of the Q-STICK is illustrated in the following drawing. There is nothing particularly critical about the assembly as long as everything fits. Because this is a MW club, I'll be talking about the regular Q-STICK, with occasional comments about the PLUS+ model.



COMPONENTS

Ferrite rod — These have become hard to find and incredibly expensive in recent years. They are available from Amidon Associates, POB 956, Torrance, CA 90508 and Nebraska Surplus Sales, 1502 Jones St., Omaha, NE 68102. The larger ones (i.e., 7"-8" x .5") are now running \$15-\$18; they used to be about \$3 a couple of years ago (the 12" x 1" is almost \$100 00

these days!). Rods made of Material 61 are fine for MW but choose Material 43 if you are making the LW/MW model. The rod used in the Q-STICK series is 8" x .5". (If anyone knows of other sources for large ferrite rods, I'd deeply appreciate knowing them (Thanks Bill Bowers for the Nebraska Surplus tip!)).

Variable capacitor — A small polyvaricon from Mouser Electronics can be used in this application. It has two sections of 266 pF that should be ganged together to provide the approximate 10-550 pF range needed. Mouser's address is 2401 Hwy 287 N., Mansfield, TX 76063-4827. Current price is about \$3.

Tuning coil — The tuning coil is a conventional single-layer solenoid. I tried using Litz but Q was too high for easy tuning so I ended up using 28 gauge magnet wire on a 5/8" diameter form. About 7 feet of wire will provide the 200 uH of inductance needed but you will have to determine the proper position of the coil on the rod by trial and error (unless you have an inductance meter). The PLUS+ model requires about 23' of wire to produce the needed 2200 uH.

External antenna coupling coil — I use eight turns of the same magnet wire on a 5/8" diameter form and locate it toward the end of the rod. One end is connected to the center conductor of the external antenna jack, the other end to the ground lug.

Bypass switch — A single pole, single throw toggle will work fine for the Q-STICK; a single pole, double throw, center-off toggle is needed for the PLUS+ (LW/MW) model; there are many sources.

External antenna jack, tuning knob, ferrite rod mounts, etc. — Your choice.

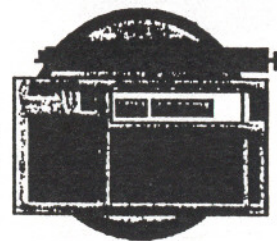
Housing — I construct the Q-STICK housings out of black plexiglas. Its overall measurements (not including knobs and switches) is 10" L x 1.25" W x 1.25" H. You can make yours bigger or slightly smaller if you want; a plastics fabricator can probably make you a custom one for probably around \$10 or so.

OPERATION AS AN ANTENNA BOOSTER

Using the Q-STICK is quite simple. Place the Q-STICK parallel to the portable radio's internal ferrite rod; rotate the tuning knob for a signal peak; move the Q-STICK laterally back and forth for maximum signal (once found, this point remains the same); then move the Q-STICK away from the radio for optimal signal level.

As the distance between the radio and Q-STICK is increased, the tuning sharpness, or "Q," will increase. Concurrently, gain will tend to decrease as the distance is increased. At some distance, signal level and "Q" will be optimal for a given situation.

A very useful arrangement with the Q-STICK is placing the radio and Q-STICK on a Tupperware turntable (available for a few dollars at most supermarkets). This permits the simultaneous rotation of radio and booster for nulling.



SONY 2010, Q-STICK, AND TURNTABLE ARRANGEMENT

OPERATION AS AN ANTENNA COUPLER

The Q-STICK can also be used as an external antenna coupling device. Hook up an external antenna to the external antenna jack and peak the tuning knob as before. For maximum signal transfer from the external antenna, be sure to provide a ground for the ground side of the external antenna jack. Assuming you have even a mediocre external antenna, a significant increase in level should be realized. You can control the amount of gain provided by the external antenna by moving the Q-STICK closer to or farther from the radio. When using the PLUS+ model on LW, I sometimes notice MW feedthrough if a potent, untuned external antenna is used and the Q-STICK is in the "bypass" or untuned mode (it still couples an external antenna even though it is untuned). In these instances, the overloading is remedied by moving the Q-STICK PLUS+ farther from the radio.

Similarly, if you are hooking up an external tuned loop (like the Quantum Loop), you can leave the Q-STICK in the bypass mode until a really tough situation arises, then you can flip in the Q-STICK's tuning for a high-selectivity, double-tuned arrangement. Be sure to position the Quantum Loop far enough away from the radio/Q-STICK arrangement to prevent interaction (although this interaction is regeneration (or Q-multiplication) which through careful manipulation of the Quantum's gain control and loop head orientation can result in extremely high tuning sharpness). Also, you'll notice when using the Quantum Loop that some unusual nulling patterns can sometimes be generated by meticulously combining the signals of the Quantum and the Q-STICK through control of the Quantum's gain and loop head orientation.

Using the Q-STICK to inductively couple the MW signal of an external antenna is generally far superior to most portable radios' external antenna jacks. As you know, most manufacturers (e.g., Sony, Panasonic, Sangean, General Electric, etc.) insert attenuation in the external antenna jack's circuitry (either by electrical components or by loose coupling to the internal ferrite rod) so that overloading will be less likely to occur if a overly powerful external antenna is installed. Using a coupler like the Q-STICK or QUANTUM COUPLER bypasses this situation and much greater signal strength is realized.

Using the Q-STICK with a portable radio that does not have an S-meter or some means of indicating signal level is a little tricky because you are using your ears to detect changes in signal level and the radio's AGC is doing all it can to keep signals at a constant level (and below a certain maximum level). The result is that the apparent effect of an external antenna on local or other strong stations is minimal eventhough the radio's front-end is receiving a much higher voltage. The advantage of devices like the Q-STICK is, however, readily apparent on weaker stations which, in some instances, may not be audible at all without the boost.

COMPARISON OF THE TWO MODELS ON MW

Because the PLUS+ model tunes from 150 kHz to over 800 kHz when the range switch is in the LW position, and because the LW coil has about three times as much wire as the MW coil, a significant gain advantage is realized on the lower end of the MW band when in the LW mode. So, if you do a lot of low-end DXing on the MW band, you might want to consider the PLUS+ model.

CONCLUDING REMARKS

In my opinion, using a booster antenna like the Q-STICK, is one of the least expensive ways to dramatically increase portable radio performance on MW and LW and I'll be taking mine on all my future business trips. I just hope that airport security doesn't think it's a pipe bomb, hi.

If you have any questions regarding the construction of the Q-STICK, please feel free to drop me a line. If you'd rather just purchase a RADIO PLUS+ Q-STICK or Q-STICK PLUS+, drop me a line at RADIO PLUS+ ELECTRONICS, 3635 Chastain Way, Pensacola, FL 32504 (Ph. (904) 432-8208) for availability and pricing. (Pricing is not yet final but the Q-STICK should be in the \$45-\$55 range; the Q-STICK PLUS+ should be somewhere between \$65 and \$75; as always, club members get a 5% discount.) (Please don't hold me to these prices; they are best guesses.) 73's...GT