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A Useful, Small, Tunable Loop Antenna

A Review of the AEA IsoLoop®

Probably most of us have at times wished for a small HF antenna with gain comparable to a full-size HF dipole, and yet of a size that would easily mount in a closet, attic, or other small area. Well, small-loop antenna technology can supply just such an antenna. These small loops do yeoman service in various applications such as sites where there is not space for a larger antenna, and in situations where you want to be able to install and remove the antenna quickly, as on field day, on a boat or mobile home, or for vacation operating.

Let's take a look at a representative model of this kind of loop and get an idea of both their virtues and their less-favorable features.

The AEA IsoLoop 10-30

The AEA IsoLoop (fig. 1) looks and feels remarkably different from any antenna most of us have used before, and it is. It consists basically of a high-Q (high selectivity), single-turn, loop inductor 35 inches in diameter. A plastic housing contains a high-Q tuning capacitor with a stepper motor and controller which enables you to tune the antenna to resonance from your operating position.

The loop can be oriented horizontally (fig. 1A and 1B), which yields horizontal polarization and a good non-directional radiation-reception pattern. When mounted vertically (fig. 1C) it has vertical polarization and two nulls perpendicular to the loop; the nulls are useful for nulling-out interference coming from fixed directions.

Frequency coverage is from 10 MHz to 30 MHz with a nominal feedpoint impedance of 50 ohms and a power rating of 150 watts. Its weight is 14 lbs (6.35 kg)—very significantly heavier than a wire halfwave dipole.

The antenna must be tuned quite precisely to the desired frequency of operation because its bandwidth is quite narrow—approximately 10 to 100 kHz depending upon the tuning range in which it is operating. For receiving purposes this narrow bandwidth helps prevent interference from signals near the frequency to which the loop is tuned, and makes receiver overload and intermodulation distortion (IMD) much less likely. When transmitting, the narrow bandwidth helps keep your signal cleaner and reduces TVI.

The other side of the coin is that, with such narrow bandwidth, all but very small changes in operating frequency require that the antenna be retuned. Tuning is accomplished by operating two switches and two knobs on the antenna's controller, while listening for maximum received noise (or maximum signal) or watching for maximum indication from an LED level indicator on the controller.

Using the IsoLoop 10-30

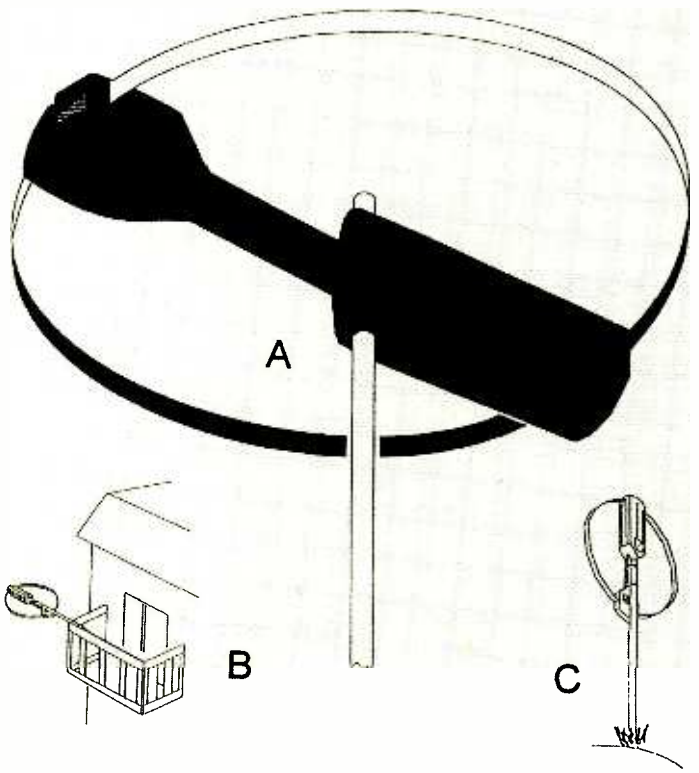
The instruction manual told me that the IsoLoop would perform "quite efficiently" at 10 to 15 feet above ground, and it did. Incidentally, at low mounting heights, this antenna is said to have considerably better low-angle radiation (DX) than a halfwave dipole at the same height, and this seemed to be true of my installation. I mounted the loop horizontally about 12 feet above ground and erected a halfwave dipole for 20 meters at the same height nearby for comparison. I compared the loop to the dipole during both monitoring and communications with other ham operators.

The technical specifications accompanying the IsoLoop 10-30 claim that SWR can be adjusted to less than 1.5:1 if there are no nearby obstructions; my loop was about 25 feet from a single story building with a metal roof, and its SWR ran about 3:1. The dipole's SWR was about the same, and so for this comparison I did not need to try reducing the loop's SWR as suggested in the manual.

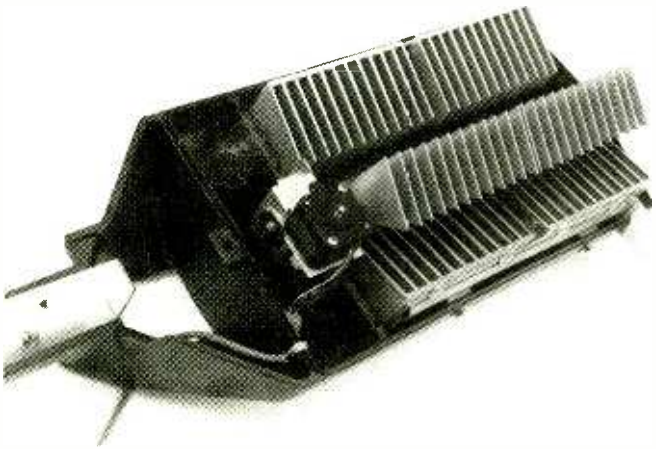
As the IsoLoop's instruction manual correctly points out, the antenna's performance is much more sensitive to its being properly tuned than it is to a less-than-optimum SWR. On the other hand, many transceivers will reduce power output as SWR rises. You might think that you could reduce high SWRs by adding an antenna tuner. However, using an antenna tuner with the IsoLoop creates serious problems with tuning the antenna itself: don't do it.

Tuning the IsoLoop is a

FIGURE 1



The AEA IsoLoop 10-30 (A), alternate horizontal polarization mounting (B), mounted for vertical polarization (C).



AEA IsoLoop antenna with case off and large capacitor

relatively demanding process and requires patience to learn; once you learn, it is still tedious. The bothersome and frequent need for retuning whenever the operating frequency is changed is an important factor; it is probably the only significant downside of this antenna.

Let me clarify that this is not a reason to avoid the antenna—it is a price you pay for having a good performer in such a small package. I found that tuning was often easier if I used a technique suggested by Bill Fawns, KE6HEZ. Bill's technique consists of connecting the loop's feedline to an MFJ-259 SWR Analyzer (*see DeMaw's Workbench in this issue*) and tuning the antenna for minimum SWR.

In the same vein, AEA offers the optional IT-1 Automatic Tuner to ease the burden of tuning. The IT-1 tunes for minimum SWR or maximum noise. Although I have not reviewed this unit I expect that it would make tuning the IsoLoop 10-30 much easier.

Ye Olde Bottom Line

In actual operation I found that the signal output of the IsoLoop compared surprisingly well to that of the halfwave dipole. Much of the time the dipole was somewhat better, but the IsoLoop was frequently better than the dipole; often they were about equal. It was necessary to tune the IsoLoop very carefully or it would appear to be quite inferior to the comparison antenna, even though retuning was all it required.

If you have space to put up a full-sized, halfwave dipole; if you don't need continuous coverage from 10 to 30 MHz; or you don't need to move the antenna around from place to place often, then you probably don't want or need a small, high-Q, tuned loop. On the other hand, if you have very limited space for putting up antennas; if you can't put up outside antennas, but have attic space or crawl space for one; if you want an antenna that is continuously tunable from 10 to 30 MHz with a choice of a good all-around horizontal radiation and reception pattern (horizontally polarized), or one with two nulls (vertically polarized); or, if you want an easily-mounted (though a bit heavy) antenna, then you may want to consider an antenna like the AEA IsoLoop 10-30.

The IsoLoop 10-30 and IT-1 automatic tuner are made by Advanced Electronic Applications Inc., PO Box C2160, 2006-196th St., SW Lynnwood, WA 98036. Literature request line 800-432-8873.

RADIO RIDDLES

Last month :

Our riddle was: "What world-famous tower was saved by radio?"

Well, my "Paris correspondent" informs me that mounted somewhere on the Eiffel tower there is a plaque which explains that during the first World War the tower was scheduled to be destroyed by the French themselves. Then a radio operator found that the tower was the only location from which he could hear German military radio messages with enough strength to read them; thus the tower was spared. Wouldn't most of us just love to put our monitoring station's antenna on top of such a tall tower!

This month:

The folks who study such things are saying that we are at the bottom of the 11-year sunspot cycle. Just what is this cycle, and what does it have to do with propagation of the signals our antennas send and receive? And why are hams who like to work 10 and 15 meter DX, and CBers who like that illegal CB (11 meters) DX glad to hear that the cycle is about to take an upswing?

Get the answer to this riddle and much more in your next issue of *Monitoring Times*. 'Til then, peace, DX, and 73.

IsoLoop is a registered tradename of the AEA company.