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The Amazing Inverted L

- - antenna for 20, 40 and 80m

Are you looking for an antenna that will outperform the usual horizontal dipole or trap vertical? How about an antenna that "works" just as well day or night on 80, 75 and 40, whether it's long or short skip conditions prevailing at the moment? Does the thought of a tendency to minimize signal fading (QSB) strike your fancy?

As illustrated, this antenna system requires a transmatch. Well, there go about half of the readers scrambling off to the next article. Those remaining might want to try something that is out of the ordinary, and certainly better than some of the simple coax-fed types.

If you examine Fig. 1 closely, you will see why this is called a *system* antenna. It consists of *all* of the ground reflecting screen wires *and* radials, as well as the simple antenna radiating element. All of this is what gives it the above average characteristics in overall signal strength.

Some Theory

Ideas for this system were heavily borrowed from articles in *73*, *QST* and *CQ* magazines (see references). The inverted-L is somewhat noted for a bit of diversity action. I enhanced this by extended (at least for 40 and 20) radials for the vertically polarized field, and a ground "screen," parallel to the flattop, for the horizontal field. This seemed to stabilize the overall response regardless of seasonal weather changes upon the earth in the immediate vicinity.

There seem to be several factors concerning signal fading. Some of these are changes in the skywave angle for transmitting and reception, as well as polarization shifts. This antenna has vertical and horizontal polarization, as well as high, medium and low radiation angles. At first one might think that "spraying" the rf in many directions of angles and polarizations will reduce the field strength in any one plane. However, *on-the-air results* dispel this notion. Instead, the opposite seems to be true over skip paths, with a *higher* average of signal strength as compared to ordinary dipoles and verticals, trapped or untrapped.

For 20 meters, the end-fed flattop will have several lobes at the medium radiation angles. The vertical section has a very low angle omnidirectional pattern. On 80 (75) and 40 meters, the flattop contributes to the high angles necessary for daytime use. The ground screen underneath it seems to give it short skip gain on 80 (75) and 40. A "barefoot" transceiver at 130 Watts average input on SSB usually sounds stronger than "normal," for example. The vertical section, along with the radials, takes care of the low angles for DX at night.

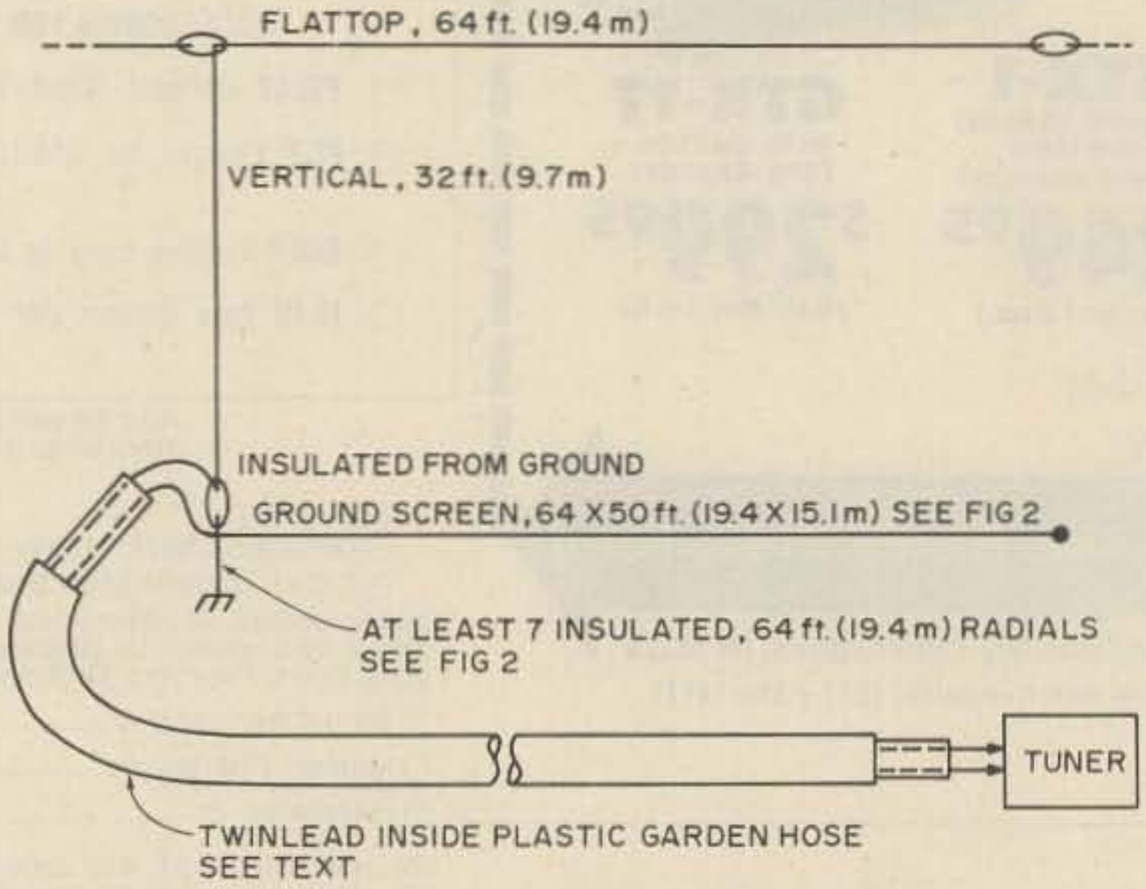

Fig. 1. Inverted-L system antenna for 80, 40 and 20, side view.

Details

When it comes time to put in the grounding system, don't conjure up frightening ideas of deep long trenches tearing up your dandelions. In fact, a deeply entrenched ground system will not work as well for this antenna as one that is above, on, or just below the earth's surface! My first ground system was simply lying on the snow-covered yard (and part of the neighbors' backyards). The antenna worked fine. When soggy spring season rolled around, I then took a large hunting knife and slit the spongy earth alongside the grounding wires and pushed them in about one inch. Now some of the radials were running just underneath my neighbors' well-manicured lawns!

One important item should be noted: *All of the grounding wires must be fully insulated, including the soldered joints.* Use a plastic type of insulated wire such as bell wire or hookup wire. The wire size is not too important. I used #20 solid insu-

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lated hookup wire from Radio Shack. Electrical tape can be used to insulate the soldered joints and ends of the wires.

Don't skimp on the radials. Laying them at night under a full moon into a reluctant neighbor's turf can be exciting. If your own property cannot accommodate fully stretched-out radials, and that German shepherd next door is uncooperative, then at least lay them zigzag on your own lot as best you can. Don't shorten or reduce the number of radials.

The radiating element is #12 hard drawn copper enameled "antenna" wire. I suppose #14 will work just as well. I happen to like #12 for increased strength and possibly lower losses. The flattop section was suspended between two maple trees. The "free" end was stabilized with a rope and pulley affair hooked to the tree, using an old rock-filled paint can as a weight. My flattop was oriented east and west.

Transmission Line

Here is the part that looks questionable, but it seems to work. The whole thing is fed with 300 Ohm "balanced" line. I used the oval foam core type of UHF TV line. This handled my rig's 100 Watts output. For high power, I recommend the 300 Ohm transmitting twinlead. My feed line was run through a cheap discount store ¾ inch plastic hose, buried about 3 inches. I split the ground with a garden spade, and wiggled it back and forth a couple of times to spread the earth after each "stab." Yes, it's a bit tedious. When the feed line equipped hose was buried, I then stomped on the trench over the entire length, and after a couple of rain showers, it became invisible.

Be sure that *both* ends of the hose are well sealed. I used tape, and then smeared G. E. Silicone Seal over this. It has been my experience to find that "breather" holes are prone to suck in water. So seal both ends of the hose well, and don't worry about so-called "condensation." If you are using the air-core type of twinlead, then seal up both of these ends also.

Perhaps the 300 Ohm *openwire* (half inch) TV "ladderline" may also fit inside a large diameter hose. Its own insulators may help to keep it "centered" within. I have not tried this, but it's an idea that should have good power handling capabilities. The hose is used only for the underground portion of the transmission line, to help keep it dry and physically separated from ground.

I used both a balanced and an unbalanced type of tuner. Either one gave the same field strength readings at about one city block distance. Both of mine were able to load the system easily. Should you encounter a loading problem on one of the bands, try cutting or lengthening the feeder a couple of feet or so. Chances are you will still load up all right on the other bands.

If you are going to use an *unbalanced* type of tuner, make sure that the "hot" lead goes to the "antenna" side of the line, and the grounded part of the tuner goes to the "ground" side of the line. That may have been stating the obvious, but it is easy to get these feeder leads reversed to an unbalanced coupler. Yours truly did it, and the effect is sneaky. Reception seems fine at first; however, your transmitted signal is very weak!

Conclusion

This antenna system does not completely eliminate QSB, but if you compare it by switching it between an ordinary dipole and vertical (including the trap varieties), you will hear the differences.

One more thing. A "different" type of antenna makes a good conversation topic — especially if your signal is above normal for that particular time of day! ■

References

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Technical Correspondence, *Antenna Type vs. Distance,* Hardacker W6IT, *QST,* Oct. 1968, p. 43.

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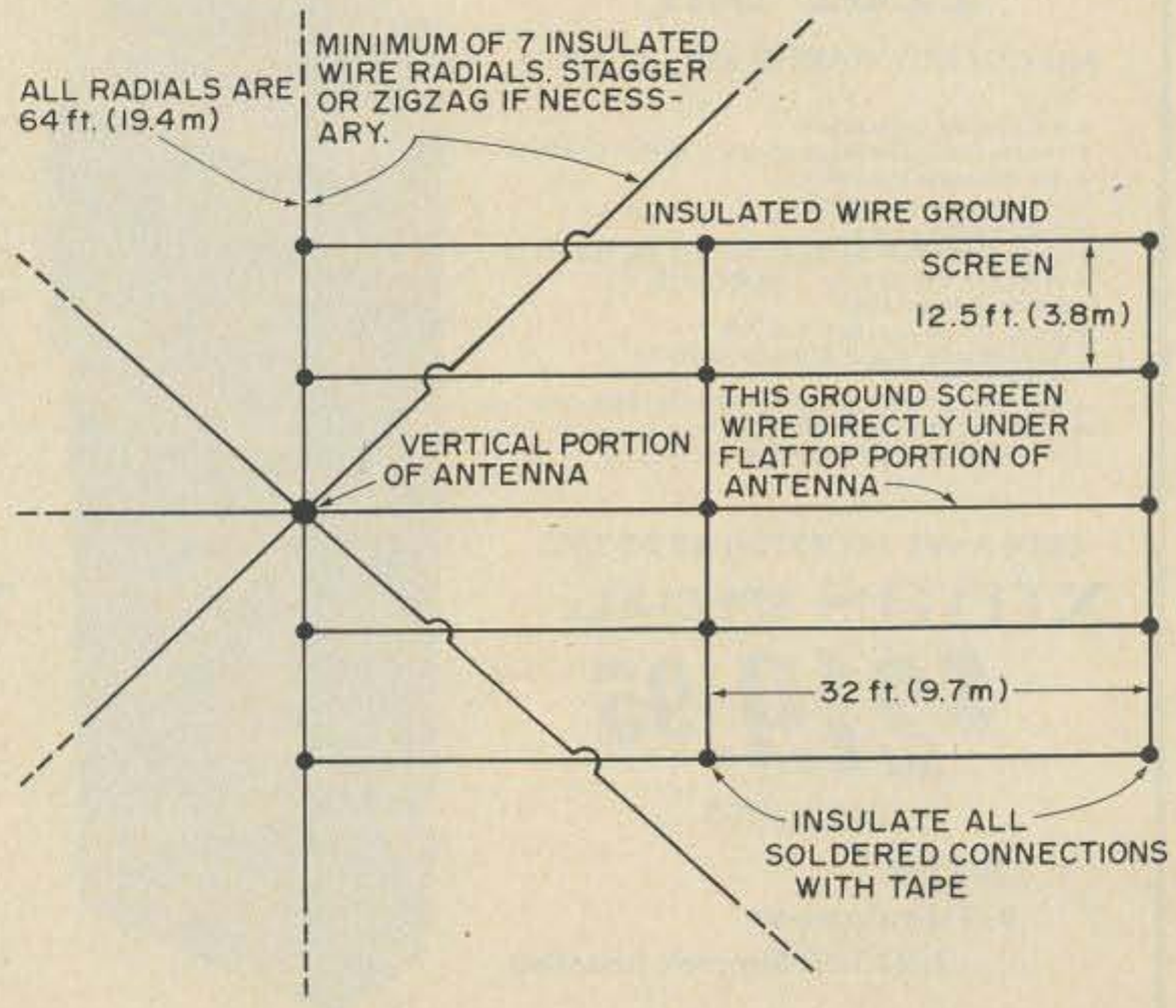

Fig. 2. Inverted-L ground system, top view.