



The SGC

Many amateurs live in a property where outdoor antennas are at best 'frowned upon', or at worst totally prohibited. Others might want to operate from a temporary or portable location where it is impractical to spend a lot of time putting up an HF antenna. The solution in both these cases could just be the SGC 'Stealth' Kit, reviewed here by Chris Lorek.

The Stealth Kit user manual gives you a good idea of various antenna arrangements you can use. These range from a simple one-turn outdoor loop of wire, to more compact three- and four-turn loops for use in restricted spaces. You could, for example, have a two- or three-turn indoor wire loop arrangement around the wall edges of a room.

There are, of course, many types of loop installations which you could use, each of which would be unique to your specific location and available space, antenna supports and so on. A novel use of the system, however, would be for a compact yet quite directive four-turn loop hung from the ceiling for example. You could also construct a rotatable system using four brooms tied together at the middle, to provide a former for a single element quad loop.

SMARTUNER OPERATION

The heart of the SGC 'Stealth' Kit is the SG-237 'Smartuner' automatic antenna tuner. This is a fully waterproof unit measuring 230 x 180 x 40mm which contains a pi-network matching circuit using relay-switched capacitors and inductors, all operated under microprocessor control within the box. Inside the unit, an RF sensing circuit looks at the forward level of RF power, and as soon as it detects this, further sensors at the antenna connector monitor the system impedance, reactance, and the overall VSWR. Tune-up algorithms stored in the microprocessor's EEPROM memory implement the antenna matching.

The ATU circuit arrangement consists of seven shunt capacitors on the input arm, eight inductors on the series arm, and four more shunt capacitors on the output arm. These are all arranged in binary increments in value, and are selected by relays to switch in or out the various component values as needed. A quick bit of maths shows that you have 128 different values of input shunt capacitance, 256 values of series inductance, and 16 values of output shunt capacitance, overall a maximum of 524,288 matching combinations.

When you initially power-up the

Smartuner, it places itself into 'bypass' mode, where the antenna is connected straight through to the coax connector leading to your rig, ie with the internal tuning elements switched out. As soon as it first detects RF from your transmitter, it goes into its matching cycle to reduce the VSWR appropriately. When it's done this, typically within a couple of seconds in my experience, it stores the settings together with the actual frequency segment of transmission in its memory. It keeps these settings switched in as long as the DC power is connected, until you start transmitting in a different frequency range when it undergoes this cycle again. The settings are stored in memory and recovered when you power back on and transmit again at that frequency. All you hear is a single 'click' from the ATU, and you're on the air, with your antenna matched within a few milliseconds. Even so, it continually monitors the VSWR while you're transmitting, and should this VSWR exceed 2:1, for example if you change your antenna configuration from what was connect-

ed before, it'll go into its tuning cycle again to re-match it. It stores 170 such different 'locations' in its memory for quick re-tuning, certainly enough for amateur band operation. Internal jumpers can be used to 'force' the tuner to re-tune each time should you wish, also to switch out the matching circuit when in receive mode.

The frequency range the Smartuner will operate over is 1.8 to 60MHz, ie topband to 6m. SGC say you'll need a minimum wire length of just over 2m for 3.5 to 60MHz operation, and a minimum of 7m for operation on 1.8MHz and above. The tuner needs to be powered from a 13.8V DC source, and a combined RF and DC lead, just under 3m in length, is supplied. The Stealth kit system claims a minimum frequency of 2.5MHz, I found some single loop arrangements worked fine on 80m and, with a bit of careful antenna positioning, on 160m as well.

ON-AIR RESULTS

The Stealth kit manual gives you plenty of ideas for loop arrangements and positioning, and typical installations would be square or triangular single, two, three and four-turn loops. The best results you'll achieve will usually be with the loop outdoors and as much 'in the clear' as possible, although a loft-mounted arrangement could also work reasonably well as long as there aren't any other resonant lengths of electrical wiring or metal water pipes up there as well.

For most of the tests, I used the loop in a triangular configuration, with the Smartuner positioned at the bottom corner of the loop near to the ground and the two other corners of the loop positioned as high as possible. Here I used the supplied nylon rope to support the upper corners, stringing the loop alternatively between a couple of trees, a tree and the corner of the plastic rain gutter on my house roof, and as a test using my telescopic tower as a support. I found the installation was reasonably easy, although I did have to extend the DC power and RF coax connections: just under 3m really isn't enough in

The entire SGC Stealth Kit, made up of:
A - the carry case,
B - the SG-237 Smartuner,
C - the SG-237 manual,
D - the Stealth Kit manual,
E - 30ft of support rope and clip,
F - four antenna mounting clips and ropes,
G - two spare antenna mounting clips,
H - 12 reusable cable ties,
I - the 80ft of antenna wire.

THE SGC 'STEALTH' KIT CONSISTS OF:

- SG-237 'Smartuner' automatic tuning unit and pocket-sized manual
- Stealth Kit user manual, again a handy pocket size
- 25m length of black insulated wire for the antenna loop
- 9m nylon support rope
- Four antenna mounting clips and ropes
- Two spare antenna mounting clips
- Twelve reusable cable ties
- A cardboard carry case to put it all in



'Stealth' Kit

my opinion between the feedpoint and your rig and power supply for many typical installations. This naturally entailed weatherproofing the connections as well, good job I had a supply of self-amalgamating rubber tape handy.

Even though the system was acting almost like a full-wave loop on 20m in this configuration, I found the DX potential was limited, although plenty of European stations came romping in and with good signal reports received, as well as the occasional long-distance contact when conditions allowed. Likewise on other HF bands besides 20m, I found the results were quite similar to the 80m W3DZZ-type trap dipole I use which is also located above the garden. Not surprisingly, my three-element Altron compact HF Yagi on the tower outperformed the loop on 20/15/10m, but that's to be expected.

A check using *NEC4WIN* antenna modelling software did in fact confirm my on-air findings. The modelled results for 10m and 80m using the loop are shown in **Fig 1** and **Fig 2**, showing that it would indeed act as a good 'all-round' antenna system. If you're after more DX and less local contacts, you'll need to raise the feedpoint higher. With this and the intended covert application of the Stealth kit in mind, I arranged the system as a two-turn loop located in the loft of my house.

Positioned vertically (ie for directivity and low-angle radiation) it performed quite nicely on the HF bands, I couldn't complain at all bearing in mind the location. Positioning the loop horizontally gave me better all-around coverage, especially for high-incidence take-off on the low bands. But the RF certainly made its way into various domestic electronic products in the house, like PCs, stereos etc, especially in the upstairs rooms. But then, it shows its radiating the power! Rather than get even more RF chokes out, a reduction in transmit power level to around 10W reduced the breakthrough somewhat and restored normality to my household.

LONG WIRE

The Smartuner can of course also be used with whip and wire antennas fed against a ground. So I also tried the SG-237 Smartuner as a covert long wire tuner, with a black insulated wire going vertically up from the ground behind a black plastic rain-

water downpipe at the corner of my house, and then horizontally along the black plastic gutter running along the side of the house. I was fortunate in having a substantial earth mat, consisting of around two miles of copper wire, beneath the rear garden and I used this for the SG-237's earth connection. Was I cheating here? No, I don't think so, as a buried earth system is certainly covert! I must say that, on the higher bands (20m upwards), this system worked far better for DX contacts than the earlier loop arrangements, no doubt due to the vertical radiator section at the feedpoint as well as being helped by the earth system. On the low bands, especially 80m, it performed very nicely for both local and European working, as well as getting my 100W SSB signal 'across the pond' at 59+ several times during grey-line path openings (eg early morning as the dawn is breaking). Compared with my 80/40m trap dipole with its feedpoint on the house chimney, this system was typically only a couple or so S-points down on the low bands, and did in fact work a little better in some cases on the higher bands when compared with the same trap dipole.

If you'd like an idea of 'who's worked what' around the world using the Stealth kit in various arrangements, just take a look at the SGC website on the Internet where there is a number of reports from various amateurs in different locations detailing their findings and what they've managed to work.

CONCLUSIONS

The SGC Stealth Kit can provide a useful multi-band HF antenna system, not only for covert use but also for a rapidly deployable system, for example for portable work. Using the antenna as a loop there's no need for a ground; as such the system can be erected very quickly. Indeed it could even be erected just when needed, and taken down at other times, the black insulated antenna wire being reasonably inconspicuous in itself. Strange goings-on in the middle of the night come to mind in covenant-restricted housing estates!

Thanks to Waters & Stanton plc (tel: 01702 206835) for the loan of the Stealth Kit reviewed. The cost of the kit has recently been reduced and it is now available from W&S for £349.95.♦

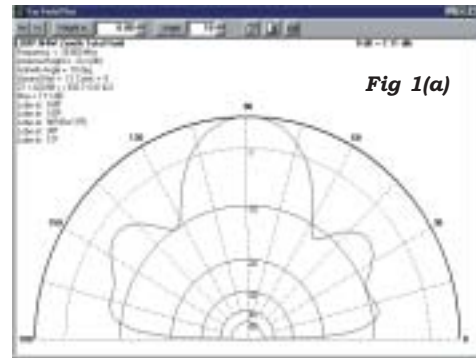


Fig 1(a)

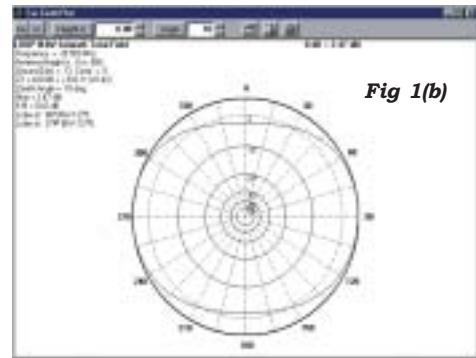


Fig 1(b)

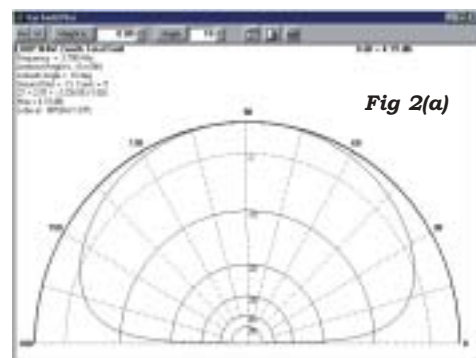


Fig 2(a)

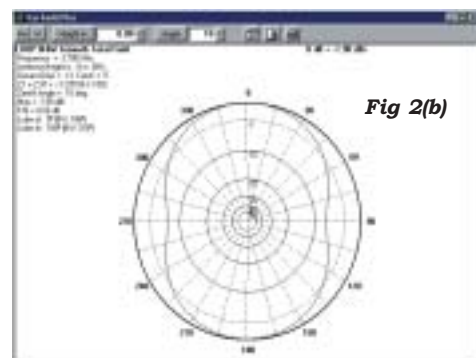


Fig 2(b)

Fig 1: *NEC4WIN* modelled results for SGC Stealth Kit loop on 10m (a) in the vertical plane and (b) in the horizontal plane.

Fig 2: *NEC4WIN* modelled results for SGC Stealth Kit loop on 80m (a) in the vertical plane and (b) in the horizontal plane.

W E B S E A R C H

SGC Stealth Kit user comments <http://www.sgcworld.com/cgi-local/guestbook.cgi>