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ANODE

Inside this issue:

Join us at the bring & fix evenings	**1**
The Snyder Antenna	1
The Fish Can Transmitter	2
The Robin Hood & Friar Tuck story	3
Characteristics of Metals Used for Shielding	5

Special points of interest:

- Antenna design
- Contact details on back page
- Boot Sale - 25th November

Join us at the bring & fix evenings

The first monday of every month sees us get together at the "Bring and Fix" evening at the club house.

Almost as popular as the main meeting, the Bring and Fix meetings have turned into a well attended getting together of members. Discussion of problems, assistance in repairs and modifications as well as great social evening usually take place.

Radios quite often get tested and fixed using the clubs

equipment. The HF antenna that was brought down recently is being worked on at the meetings as well.

OM John (ZS6BZF) usually brings computer spares and test pc's as well as his portable with Ham software for distribution.
Why not join us at the next "Bring and Fix" evening?

The Snyder Antenna

By Richard D. Snyder
Snyder Antenna Corporation Costa Mesa, CA 92627

When in tune with the frequency of the RF energy it must process, and in balance with the system it serves, an antenna functions as a resistive, predictable load. Expressed as radiation resistance, the antenna load in a circuit continues to appear much like a fixed resistor so long as all the factors which affect its function remain the same. The two factors that most affect the circuit value of the antenna are: Operating frequency shifts, and the introduction of conductive or grounded objects into its immediate environment. Operating frequency shifts ask the antenna to operate at non-resonance. Nearby, interfering objects cause the antenna to change its natural, resonant response.

Non-resonant operation alters the antenna as a circuit component the greater the shift from resonance, the greater the change in character. The change is from resistance toward reactance. When the applied frequency is higher than antenna resonance, the antenna appears as a combination of resistance and inductive re-

(Continued on page 3)

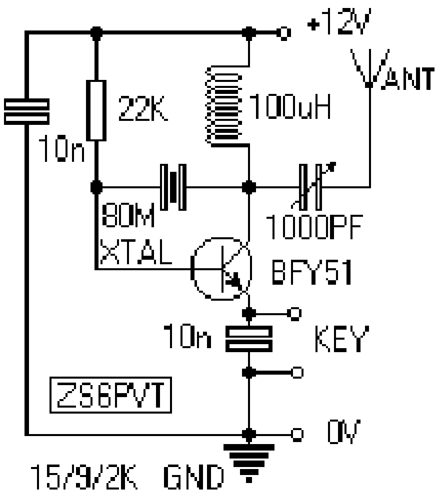
Fish Can Transmitter

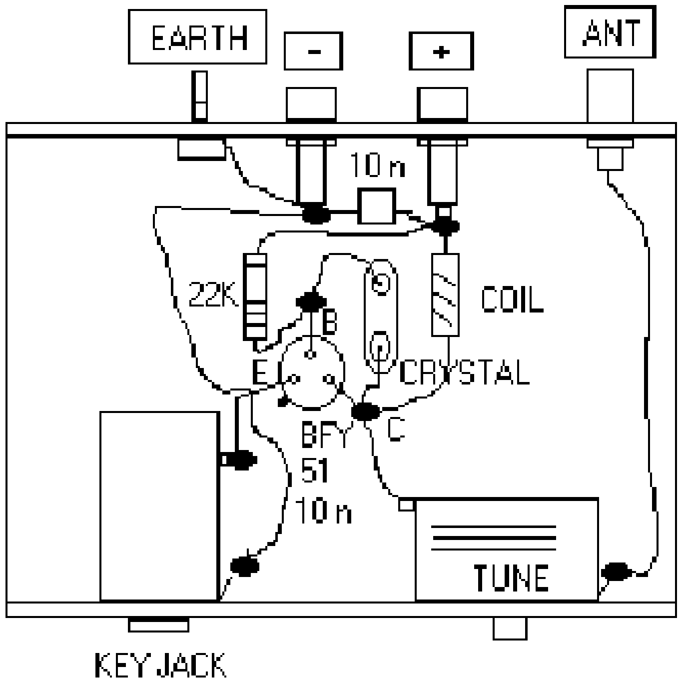
Here is a quick QRP project I found on the Internet. Steven G4RAW claims to build this rig in 10 Minutes flat and a QSO all in 15 minutes. Must be a world record I think. I thought this is the idea project for a club bring and fix or novice learner evening.

socket followed by the transistor, crystal and coil etc.

Care should be take to insure that the body of the transistor does not short to any thing, as this is also the Emitter connection.

All that is left is to switch on and transmit. It is a good idea to check the output frequency to be sure you are in the right band. A good idea would be to use a 3.560 MHz crystal that would put you on the QRP frequency for this band.





Construction is straightforward. I used a piece of PCB board the size of a matchbox. I soldered a piece half the size to the front and back for the face and the back plate. This might take longer than 10 minutes but less than a half-hour. The front and back PCB's was pre-drilled for the tuning capacitor and a 6.3mm jack plug for the Morse key. On the back plate I drilled holes for the M3 brass bolt (Earth) and a hole for a RCA connector (Antenna). After mounting the tuning capacitor and the sockets, I started by soldering the 10nF capacitor to the key

The description of the circuit did not say much more than "Tune the capacitor for best tone." As far as the components are concerned, the crystal should be in the 80 Metre band. I used a 3.600 MHz I found on an old computer board. The tuning capacitor can be found in any modern transistor radio stripped for spares. I connected the two gangs of the tuning capacitor together to give me the required value. You will ten to one find the rest of the components in the same transistor radio where the tuning capacitor came from.

Hope you have as much fun with this project as what I had.

73's

De

ZS6PVT

Phillip van Tonder

Feedback E-mail to:
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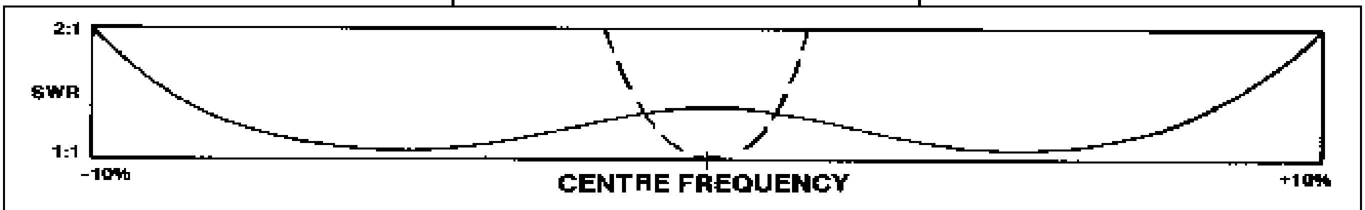
The Snyder Antenna

(Continued from page 1)
actance. When the applied frequency is lower than resonance, the antenna looks more like a combination of resistance and capacitive reactance. Resulting mismatches between the antenna and the system it serves are expressed in terms of impedance shift at the antenna input. To illustrate a simple-example of impedance shift all one need do is mount a half wave dipole at various levels above earth. The radiation resistance of the antenna, the main component of impedance seen by the system, rises steeply from under 30 ohms at 1/10 wavelength above earth to over 90 ohms between 1/4 and 1/2 wavelength, and then fails to around 72 ohms when the height is stabilised at 1/2 wavelength above earth. In terms of circuit and system function, the results of such changes are obvious. Add to this the effects of reactance intrusion, and the results are even more dramatic. Nothing can be done to correct the height-above-earth and other extra system induced changes in antenna characteristics except to isolate the antenna. When using conventional antennas, whose tolerance to operating frequency shifts is extremely narrow, only limited options for correction exist. Hence, a

(Continued on page 6)

The dashed line plot shows the usual plus or minus 2 percent frequency shift tolerance as the conventional antenna presents a 2:1 SWR. The Snyder antenna tolerates a shift of plus or minus 10 percent before it presents the 2:1 SWR. The acceptance of such shifts, whether due to operating frequency or externally induced effects, enables this form of antenna to remain a more constant value circuit component as compared to narrow response antennas.

Figure 1



The Robin Hood, Friar Tuck Story

Back in the mid-1970s, several of the system support staff at Motorola discovered a relatively simple way to crack system security on the Xerox CP-V timesharing system. Through a simple programming strategy, it was possible for a user program to trick the system into running a portion of the program in `master mode' (supervisor state), in which memory protection does not apply. The program could then poke a large value into its `privilege level' byte (normally write-protected) and could then proceed to bypass all levels of security within the file-management system, patch the system monitor, and do numerous other interesting things. In short, the barn door was wide open.

Motorola quite properly reported this problem to Xerox via an official `level 1 SIDR' (a bug report with an intended urgency of `needs to be fixed yesterday'). Because the text of each SIDR was entered into a database that could be viewed by quite a number of people, Motorola followed the approved procedure: they simply reported the problem as `Security SIDR', and attached all of the necessary documentation, ways-to-reproduce, etc.

The CP-V people at Xerox sat on their thumbs; they either didn't realize the severity of the problem, or didn't assign the necessary operating-system-staff resources to develop and distribute an official patch.

Months passed. The Motorola guys pestered their Xerox field-support rep, to no avail. Finally they decided to

(Continued on page 4)

The Robin Hood, Friar Tuck Story - contd.

(Continued from page 3)

take direct action, to demonstrate to Xerox management just how easily the system could be cracked and just how thoroughly the security safeguards could be subverted.

They dug around in the operating-system listings and devised a thoroughly devilish set of patches. These patches were then incorporated into a pair of programs called `Robin Hood' and `Friar Tuck'. Robin Hood and Friar Tuck were designed to run as `ghost jobs' (daemons, in UNIX terminology); they would use the existing loophole to subvert system security, install the necessary patches, and then keep an eye on one another's statuses in order to keep the system operator (in effect, the superuser) from aborting them.

One fine day, the system operator on the main CP-V software development system in El Segundo was surprised by a number of unusual phenomena. These included the following:

- Tape drives would rewind and dismount their tapes in the middle of a job.
- Disk drives would seek back and forth so rapidly that they would attempt to walk across the floor (see {walking drives}).
- The card-punch output device would occasionally start up of itself and punch a {lace card}. These would usually jam in the punch.
- The console would print snide and insulting messages from Robin Hood to Friar Tuck, or vice versa.
- The Xerox card reader had two output stackers; it could be instructed to stack into A, stack into B, or stack into A (unless a card was unreadable, in which case the bad card was placed into stacker B).
- One of the patches installed by the ghosts added some code to the card reader driver... after reading a card, it would flip over to the opposite stacker. As a result, card decks would divide themselves in half when they were read, leaving the operator to recollate them manually.

Naturally, the operator called in the operating-system developers. They found the bandit ghost jobs running, and X'ed them... and were once again surprised. When Robin Hood was X'ed, the following sequence of events took place:

```
!X id1
id1: Friar Tuck... I am under attack! Pray save me!
id1: Off (aborted)
id2: Fear not, friend Robin! I shall rout the Sheriff of Nottingham's men!
id1: Thank you, my good fellow!
```

Each ghost-job would detect the fact that the other had been killed, and would start a new copy of the recently slain program within a few milliseconds. The only way to kill both ghosts was to kill them simultaneously (very difficult) or to deliberately crash the system.

Finally, the system programmers did the latter - only to find that the bandits appeared once again when the system rebooted! It turned out that these two programs had patched the boot-time OS image (the kernel file, in UNIX terms) and had added themselves to the list of programs that were to be started at boot time.

The Robin Hood and Friar Tuck ghosts were finally eradicated when the system staff rebooted the system from a clean boot-tape and reinstalled the monitor. Not long thereafter, Xerox released a patch for this problem.

It is alleged that Xerox filed a complaint with Motorola's management about the merry-prankster actions of the two employees in question. It is not recorded that any serious disciplinary action was taken against either of them.

Extracted from Jargon.wri from Jargon.txt a large file containing much about computing.

Characteristics of Metals Used for Shielding

Metal	Conductivity Relative to Copper	Relative Permeability (100 kHz)	Absorption Loss (dB per mil (0.001") 100Hz	Absorption Loss (dB per mil (0.001") 10kHz	Absorption Loss (dB per mil (0.001") 1MHz
Silver	1.05	1	0.03	0.34	3.40
Copper-Annealed	1.00	1	0.03	0.33	3.33
Copper-Hard Drawn	0.97	1	0.03	0.32	3.25
Gold	0.70	1	0.03	0.28	2.78
Aluminium	0.61	1	0.03	0.26	2.60
Magnesium	0.38	1	0.02	0.20	2.04
Zinc	0.29	1	0.02	0.17	1.70
Brass	0.26	1	0.02	0.17	1.70
Cadmium	0.23	1	0.02	0.16	1.60
Nickel	0.20	1	0.01	0.15	1.49
Bronze	0.18	1	0.01	0.14	1.42
Iron	0.17	1,000	0.44	4.36	43.6
Tin	0.15	1	0.01	0.13	1.29
Steel (SAE 1045)	0.10	1,000	0.33	3.32	33.2
Beryllium	0.10	1	0.01	0.11	1.06
Lead	0.08	1	0.01	0.09	0.93
Hypernam	0.06	80,000	2.28	22.8	228
Monel	0.04	1	0.01	0.07	0.67
Mu-Metal	0.03	80,000	1.63	16.3	163
Permalloy	0.03	80,000	1.63	16.3	163
Stainless Steel	0.02	~1	0.15	1.47	14.7

It is often assumed that most materials which have adequate structural rigidity will also possess sufficient thickness to provide satisfactory shielding efficiency. This is not generally true for equipments operated in the audio-frequency region. At these low frequencies it is necessary to use a high permeability material such as hypernom, mu-metal, permalloy, or Netic or Co-Netic foil to provide satisfactory shielding efficiency to magnetic fields.

While the above equations and figures show a theoretical value of shielding efficiency from magnetic materials which is quite high, in practice such levels are seldom achieved, particularly at low frequencies where the required thickness is substantial. Some of the best results have been obtained by the use of multiple permalloy sheets or the Netic and Co-Netic sandwich foils. These latter products are available in a variety of ready made forms and sizes to fit diverse applications.

The Snyder Antenna

(Continued from page 3)

logical first step in an attempt to stabilise the antenna as a circuit component would be to provide a new form of antenna with greater tolerance to operating frequency shifts. Working with this as a starting advantage, the designer can find new opportunities in communication system design.

The Snyder Antenna

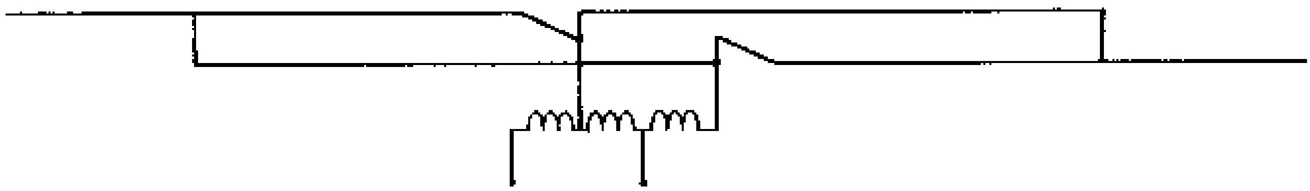


Figure 2

The Snyder design, which has been proven in transceiving and receiving antennas, produces antennas that are far less sensitive to shifts in operating frequency than are conventional units. The range of frequency response is from 5 to 6 times as wide as in ordinary, fundamental antennas. The most easily derived reading of antenna response is the Standing Wave Ratio plot. Increases of SWR in a 'clean' antenna system that occur as frequency is varied represent the antenna's intolerance of applied frequency. Figure 1 shows two SWR plots. The dashed line is the typical response of a conventional dipole; the solid line plot is typical of the response of a Snyder antenna. The frequency excursion is plus or minus 10 percent.

The two conductor elements appear to form a simple folded dipole with single conductor extensions. Further examination shows that the elements' two conductors are cross connected across the secondary of a trifilar transformer (balun). In this unique arrangement, the two-conductor portions of the elements become opposing stubs whose function cancels build up of reactance, allowing the antenna to appear much like a pure resistance over a relatively broad frequency range. The effect of maintaining the antenna's radiation resistance at a relatively constant level has two important ramifications. First, as a circuit component, its characteristics remain acceptable with

Operating frequency shifts and externally induced resonance changes. Second, antenna efficiency remains high despite changes in either operation or environment. The balun in the Snyder design is conventional in all regards except the way it is used. It may therefore be wound to accommodate a variety of feedline and system impedances. Its size is controlled by power handling requirements. Receive only antennas, as in those for FM radios, use bead cores about .200" long. Transmitting antenna toroidal cores for powers up to 5 kW are 2" in diameter. As in conventional baluns, core configurations are not important; rods or toroids may be used.

Inside The Snyder Antenna

A Snyder dipole looks very much like a conventional dipole. Its elements are one quarter wavelength long, and they may be installed in all the usual configurations: flat top, inverted "V," flat "V," loop, or whatever. The resemblance stops there. Electrically, the Snyder elements are made of two conductors in place of the conventional one. Figure 2 is a diagram of the design.

Mechanical Construction

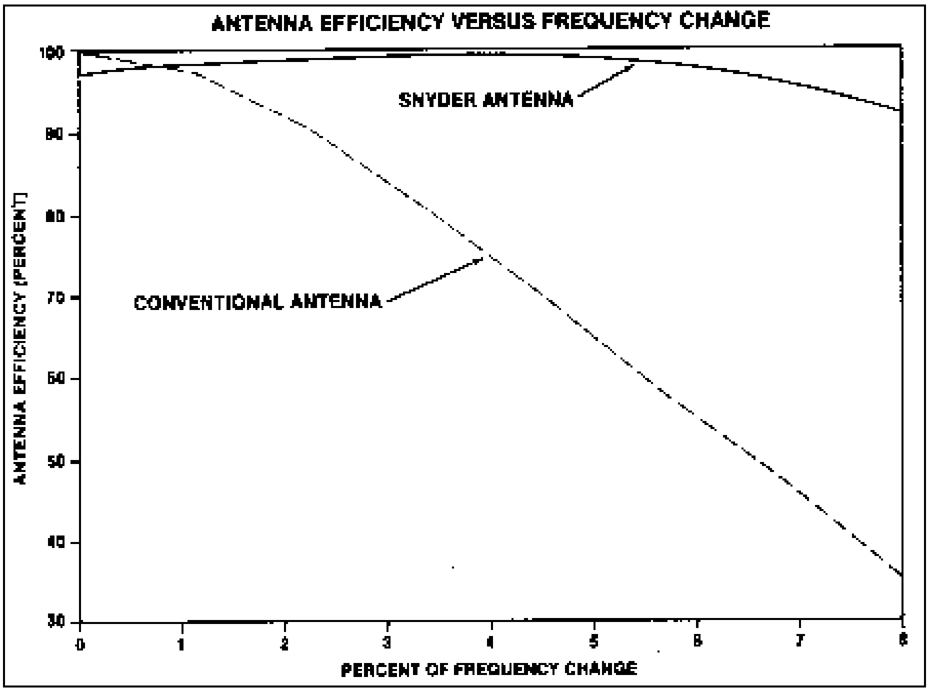
(Continued on page 7)

If you missed the Boot Sale on the 30th of September, don't worry there's another on November the 25th.

The Snyder Antenna

(Continued from page 6)

As in any antenna, Snyder elements may be made from any suitable conductors, insulated or not. By far, the most convenient arrangement of the two-conductor portions of the elements is in coaxial relationship. This has led to the mistaken view that this design is related to older coaxial antenna designs like the "double bazooka" that aroused some controversy decades ago. An examination of the electrical diagram disproves this, and performance differences are vast.



The left side of the chart represents centre frequency, or resonance, for any fundamental dipole or monopole. The top of the vertical co-ordinate is 100 percent efficiency. Readings across the chart reflect the change in efficiency through a frequency shift of plus or minus 8 percent (conventional antenna SWR = 9:1). At this extreme, the conventional antenna loses 64 percent of its ability to effectively process signals. In the receiving mode the rejected 64 percent of applied RF energy is simply lost; in the transmitting mode it is reflected back to the transmitter.

Using The Snyder Antenna

In its simplest form, the dipole and the monopole, the Snyder design merely produces a new form of antenna that directly replaces conventional types whose centre frequencies are the same. Using them is simpler because resonance shifts are not nearly as critical as in ordinary antennas. They are cut to basic quarter wavelengths or multiples to suit frequency band requirements, they possess fundamental harmonic characteristics, and provide conventional radiation resistance values. Off-shoot designs, such as simple and complex beams, multi-antenna and multi-band arrays, as well as others, can use Snyder antennas as elements in much the same way ordinary elements are used. Present development of the Snyder antenna has carried the design to the range of frequency response previously described. Commercial models are mostly for transceiver and receiver use in the range of frequencies from 1 to 150 MHz. Most are used in communication sys-

(Continued on page 8)

Antenna Efficiency

Completely aside from the consideration of the antenna as a circuit component, it must also be looked upon as a free-standing system segment. Theoretically, the antenna is 100 percent efficient when operated at resonance and the SWR in the antenna system is 1:1. As the antenna is shifted from resonance, efficiency drops. Chart shows how efficiency changes with shift from resonance

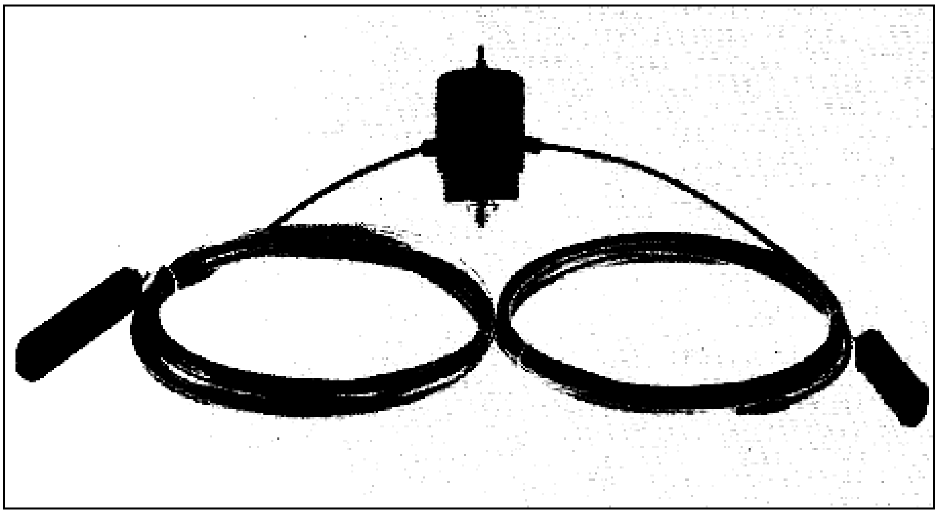
The Snyder Antenna

(Continued from page 7)

tems in the Western Hemisphere; the remainder are used in Europe and Asia. Only a small amount of experimentation has been conducted in antenna arrays, but the subject is worthy of general discussion.

The vast majority of array designs have three popular requirements. They are: directivity, power gain and front-to-back ratio. It is not always overlooked, but a fourth dimension is just as important that of bandwidth. The reason bandwidth must be included is simple if band width is very narrow, the antenna is susceptible to resonance and operating frequency, shifts which result in higher SWRS. As SWRs rise, directivity, power gain and front-to-back ratios degrade. Resonance shifts and non-resonant operation are not solely responsible for in creased SWRs in array designs. Element lengths, element diameters and spacings between elements all change the interrelationships between driven and parasitic antenna components, individually and collectively, to increase reactance, diminish the values of desired characteristics and to elevate SWR. The use of elements with greater tolerance to frequency and resonance shifts will not erase all the fundamental problems in array designs, but can give the designer a basic component for new designs with far more forgiving characteristics than those available before.

Whether used in arrays or in their simple forms, the Snyder antenna designs are fundamental. Frequency limits are therefore closely matched to Hertzian dipoles and Marconi monopoles, and application ground rules are quite similar. Costs of Snyder dipoles and monopoles, in reasonable quantities, are only marginally higher than conventional units, the extra cost being in the use of a second conductor in each element. Arrays, on the other hand, particularly those designed for broad response and/or signal gain, can cost less because of the reduced requirement for the number-of elements and size of the antenna structure. Electrically, the balun is an integral part of the Snyder design and is therefore integral to its mechanical structure.



Product Availability

Snyder Antenna Corporation., the exclusive patent licensee, presently manufactures dipoles for a limited frequency range. Transceiver antennas are available for frequencies from 1.8 MHz to 31 MHz, and receive-only antennas to 150MHz. These are wire antennas whose two-conductor sections are arranged in Coaxial configuration, and they are "ruggedised' for use in environments that might range from mild to extreme. Companies that may want to use the Snyder design for other antenna configurations and designs Should contact the company in Costa Mesa., California.

Figure 3 is a photograph of a 7 MHz Snyder dipole with elements coiled; it shows how conventional this design appears in physical form. When extended, the elements span 66 feet, with the two-conductor portions occupying about 45 feet of that length. The two conductor portions are .180" in diameter, the size being dictated by power rating (5 KW) and the weight of the span they must support.

The West Rand Amateur Radio Club

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Bulletins (Sundays at …)
11h15 Start call in of stations
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West Rand members input - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

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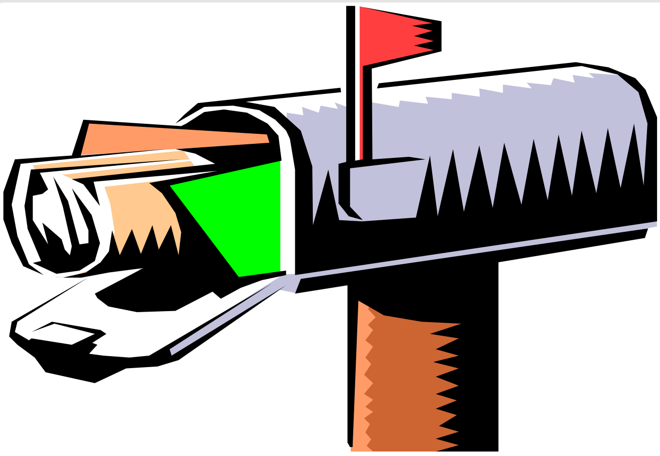

Have you contributed to the Christmas Tree fund yet?

We need your input! Email us articles, comments and suggestions please.
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