June 2007
Volume 7, Issue 10

ANODE

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Special points of interest:

- Contact details on back page (updated)
- Next Ham-Comp is at 13:00 on the 21st April.

Editor's Comments

Volume 7 Issue 10 - June 2007

Its time to clean your fans
Every winter I hear complaints about how the PC is making "groaning" noises. Its very simple, its cold and things shrink when cold. So the end-play on the bearing or bush of the cpu cooling fan is wobbling. This is a symptom of a slow running fan. Time to blow out the dust and maybe oil the fan. Do this before the cpu over-heats and removes money from your bank account.

Your web page
http://jbcs.dnsalias.net/ham_radio/index.php
Yes, you now have a "web page", dedicated to the West Rand amateur Radio Club. Please email suggestions/amendments etc to brockjk@gmail.com

Club AGM
Its also time to think about what you want from your club in the coming year. See you there on the 7th of July at 13:30.

Notice of Annual General Meeting

This notice in accordance with the Constitution of the West Rand Amateur Radio Club.

Notice is herby given that The West Rand Amateur Radio Club will be holding an Annual General Meeting on the 7th July 2007 at the West Rand Clubhouse. The meeting will start at 13:30 for 14:00.

The chairman will report back on the 2006 - 2007 year. Some awards will be handed out to members that have made a significant contribution to the club or amateur radio in general. The current committee members will step down. A new chairman, secretary, treasurer and other committee members should be elected for the 2007 - 2008 year.

The proceedings will conclude with a braai to which family members of club members are also invited.

Please note that only current paid up members of the club can stand for committee election or vote at the meeting. Membership fees for the new year can be paid to the treasurer between 13:30 and 14:00 just before the start of the AGM.

Members that can't make it to the meeting can hand a signed proxy to any of the current committee members at the Monday General meeting on 11th June 2007, or to the chairman

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Notice of Annual General Meeting

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before the start of the AGM.

Any motions to be discussed and voted on at the AGM must be presented at the Monday General meeting on the 11th June 2007. There will be an agenda item for any such motions to be presented. Such motions will need a motivation by a presenter that is a member in good standing.

73 de David Cloete ZR6AOC

So Why Do They call it Wireless?

Philip Schmitt WA81XE
1940 Howard Street, #455
Kalarnazoo M/ 49008

One easy antenna. Five hot bands. Need we say more?

The centre-fed multiband antenna-a favourite with amateurs in the 30s, 40s, and 50s-is enjoying a rebirth in the 80s. The need for frequency versatility (given today's crowded band conditions, especially on 80 and 40 meters) and a modern, simpler design approach to antenna couplers have been the two predominant factors responsible for the renewed popularity of this antenna.

It is unfortunate, however, that most technical literature on this antenna is outdated. Few amateurs today, for example, couple their balanced-line antennas inductively to the transmitter tank coil or use antenna matching systems that require changing coils or coupling configurations when changing bands. In addition, many of the suppliers of open-wire feed line cited in past literature are no longer in business. Therefore, I have attempted to share in this article a modern design approach to the centre-fed multiband antenna which I have gleaned from a review of literature, catalogue inquiries, experimentation, and discussions with other amateurs.

Antenna Design and Characteristics

Traditionally, the centre-fed multiband antenna is cut at 1/2 wavelength for the lowest desired band. Operation on all higher bands thus will be on multiples of 1/2 wavelength. For example, an antenna cut for 1/2 wavelength on 80 meters will appear as 1 wavelength on 40 meters, *2* wavelengths on *20* meters, 3 wavelengths on 15 meters, and 4 wavelengths on 10 meters. Cutting for 1/2 wavelength at the lowest operating frequency has become accepted practice because the voltage and current distribution, and hence the impedance and radiation patterns, are more easily predicted at multiples of a half wavelength. See Fig. 1 for construction practices and Fig. 2 for radiation patterns and gain characteristics of this antenna for the 80-10-meter amateur bands.'

In limited-space situations where it is not feasible to erect a full 1/2-wavelength antenna, the antenna can be shortened and still be effective as long as the total length of half the antenna plus one feeder wire add up to at least 1/4 wavelength at the lowest frequency. In the case of a shortened antenna, a field-strength meter can be used to obtain an approximation of the radiation pattern. The impedance, of course, need not be calculated as long as the antenna coupling network presents a satisfactory (resistive) load to the transmitter.

Turning to the subject of balanced feed lines for this antenna, there are two popular alternatives. One is to use open-wire line, the other is to use plastic-jacketed twin lead cable. Open-wire line is just that-two parallel exposed wires held apart by ceramic or plastic spacers. It is available in 300- and 450-Ohm impedances.

Four current suppliers of open-wire line are:

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Radiokit, Box 411, Greenville, New Hampshire; Kilo-tec, Box 1001, Oak View, California; Madison Electronics, 1508 McKinney, Houston, Texas; and Texas Towers, 1108 Summit Avenue, Suite 4, Piano, Texas. 4 Plastic-jacketed television twin lead is readily available in almost all electronics stores and is generally acceptable for transmitters with outputs of 250 Watts or less. Belden makes a heavier-duty twin lead specifically for transmission purposes which is rated at 1 kW. Their product number for this twin lead is 8235.

lead. In addition, since the wires are not insulated, care should be taken not to route open-wire line where people could inadvertently come in contact with it. Twin lead, on the other hand, has greater loss, especially when wet. It is easier to route, however, as high-quality, TV-type stand-off s can be used. Also, the heavy-duty twin lead is exceptionally rugged. (I have used the same heavy-duty twin lead at my Michigan QTH for ten years, where it has been exposed to ice, high winds, and low temperatures.)

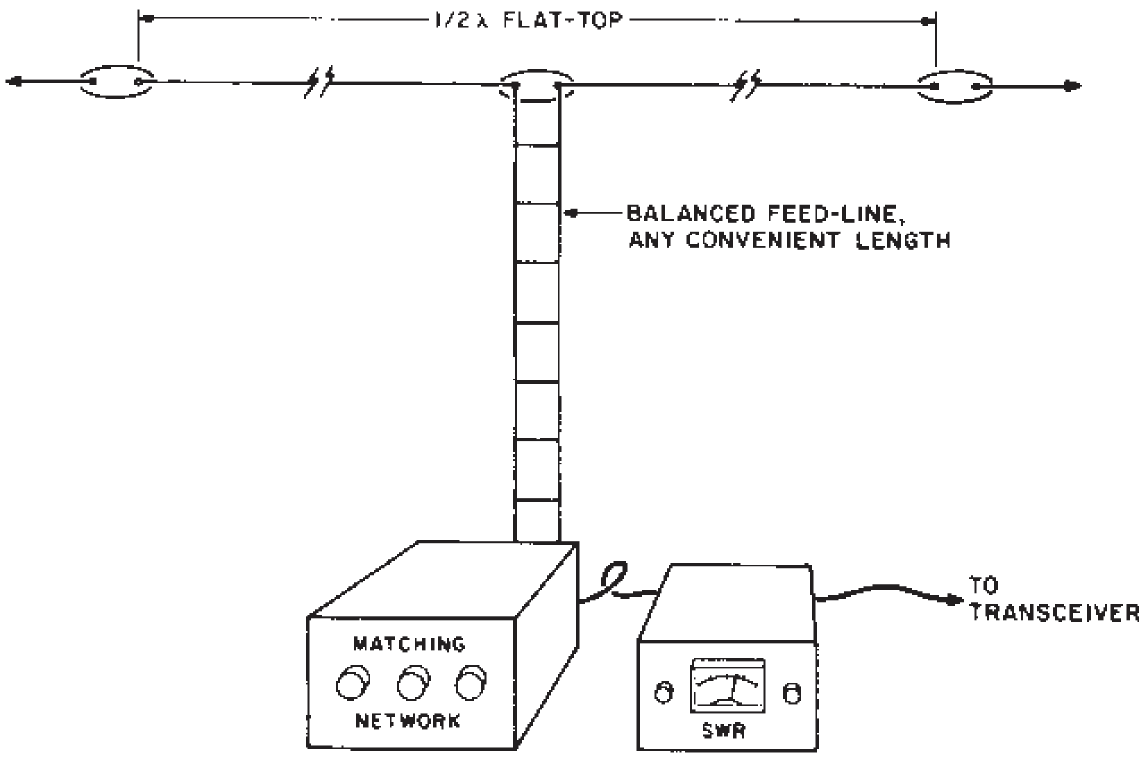

Fig. 1. Full-size version of the centerfed multiband antenna, cut for the lowest band of operation.

The decision to employ open-wire line or twin lead should be made after considering the relative advantages and disadvantages of each. Open-wire line has the lowest loss but is less rugged and more difficult to support than twin

The Antenna-Coupling Network

Prior to about 1970, most amateurs either coupled their transmitters to balanced lines through

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pi-network output stages and air wound coil baluns or used various switchable series and parallel antenna-coupling networks. Today, with the advent of solid-state transceivers which require a nominal 50-Ohm resistive load for the antenna, an external antenna-coupling network is necessary to couple to 300- or 450-Ohm balanced lines.

by amateurs.) An experimental T-network coupler that 1 assembled from surplus parts is shown in Fig. 3.' Various modifications of this design are used in most kit or assembled "antenna tuners." (The term "antenna tuner" was not used in this article as it is actually a misnomer. A more accurate term for this device would be an "antenna-coupling network,," since its primary purpose is to couple or match the line/antenna to

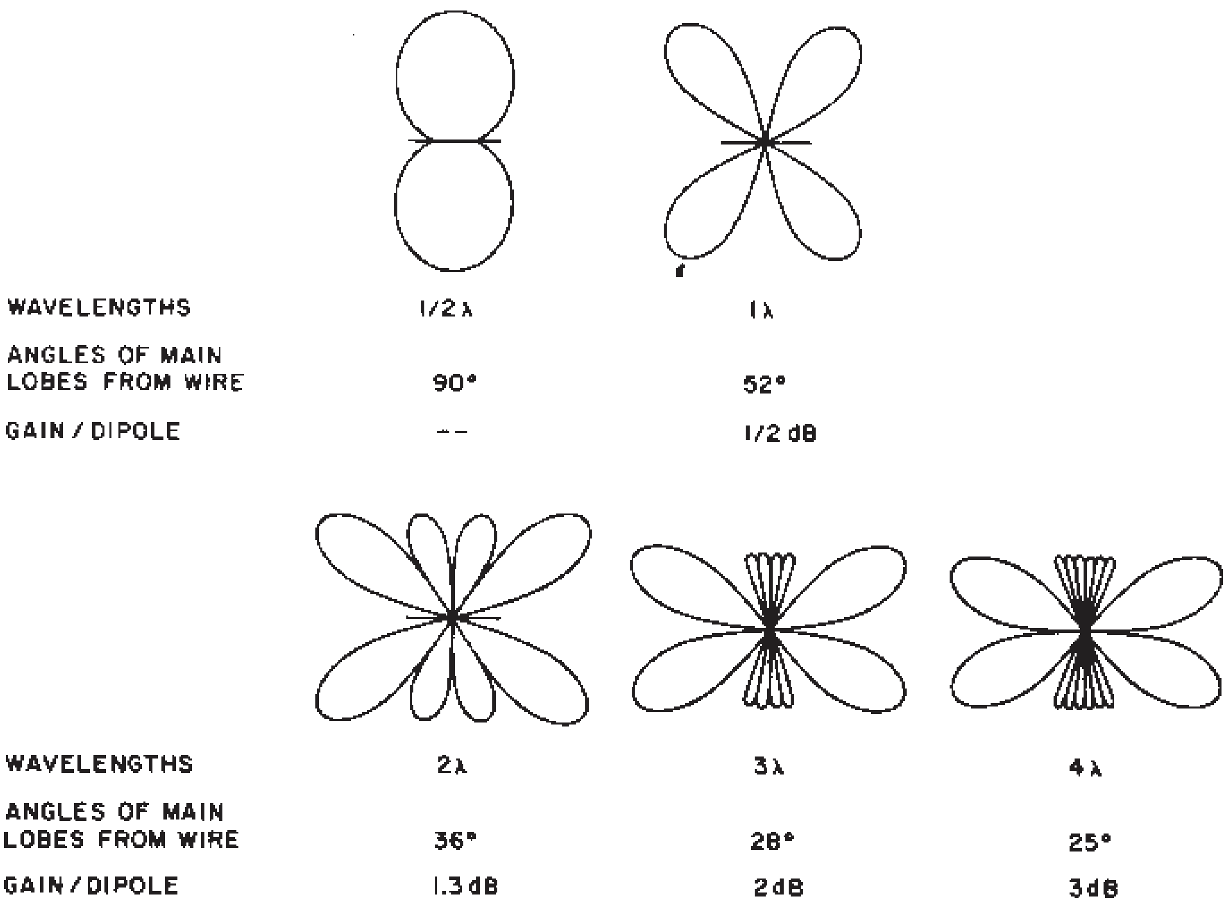

Fig. 2. Characteristics of the antenna.

The matching network almost universally used today is the T-match with a 4:1 toroidal balun. (it was largely the availability of the compact toroidal balun, which can easily be enclosed in the antenna-coupler chassis box, that led to the wide acceptance of this design

the nominal 50-Ohm load requirements of the transceiver.)

To use the T-network coupler, first set both variable capacitors to a half-open position. Then; us-

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ing low transmit power (5 or 10 Watts in the "tune"' position), tap the inductor a winding at a

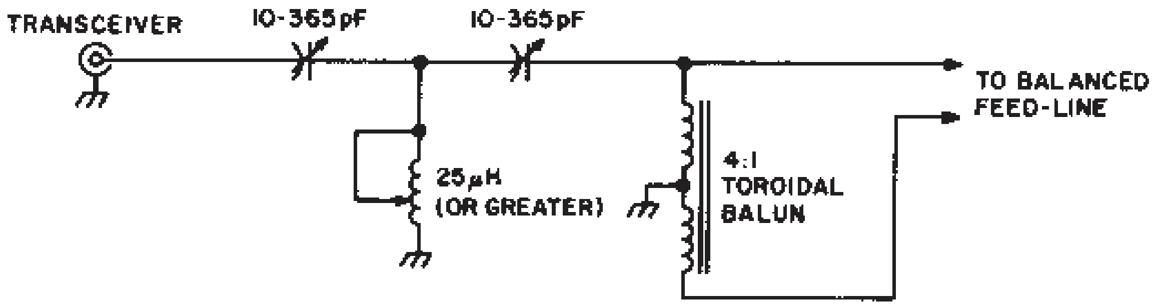

Fig. 3. A T-network with a 4:1 toroidal balun for use in coupling modern transceivers to balanced feedlines.

time until a dip in swr is indicated. After the proper coil winding is tapped, alternately adjust the two capacitors for the lowest swr. If the swr is less than 1.51, apply full power to the coupler since the tuning process is now complete.

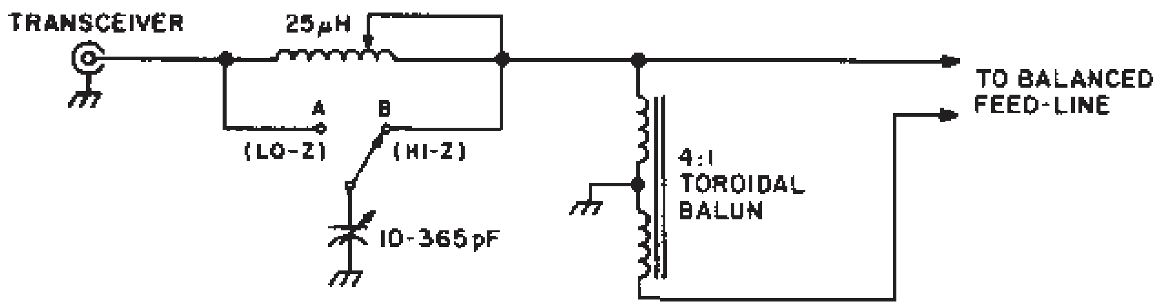

Fig. 4. An L-network coupler for use with balanced feeders.

An Alternate Coupling Network

The reversible L-network, with the addition of a 4:1 toroidal balun, can also be used to match 300 or 450 Ohm balanced lines. The L-network requires only one variable capacitor, unlike the T-network which requires two. The trade-off in using the L-network over the T-network is that the Q of the L-network is less uniform over the coupling range. This presents little problem, however, if harmonic attenuation of the transmitter is sufficient. (Transmitters and transceivers marketed in 1979 or later generally have sufficient harmonic attenuation, as federal law mandated stricter emission and radiation standards about this time.) An experimental L-network that I built is shown in Fig. 4.

To use the L-network, select tap A for low impedances and tap B for high impedances. Next, select the coil tap that indicates minimum swr; then fine-tune the variable capacitor for the lowest swr. If the swr is less than 1.51, switch the transceiver f from tune to f u 11 power since the tuning process is now complete.

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Antenna-Coupler Construction Practices

For the amateur who has not constructed antenna coupling units before, a few words about the subject are in order.

First of all, it might be helpful to know that complete information on winding toroidal baluns (along with a list of parts suppliers) can be found in almost any late edition of the ARRL handbook.' The appropriate section of the book will be listed in the index under "baluns."

To construct the air wound coils required by the two antenna couplers, it is important to know the required coil radius, the coil length, and the number of coil turns for a given inductance. A formula to approximate the inductance of air core coils is:

L = a^2 * n^2 /(9a + 10b) where L = inductance in microhenrys, a = coil radius in inches, b = coil length in inches, and n = number of turns.

Regarding the selection of variable capacitors for the T- and L-networks, I found that the common air dielectric variable capacitors used in older broadcast band superhets, work well in antenna couplers if the transmitter power output is less than 50 Watts. For higher-power transmitting applications, air variables with wider plate spacings are needed. These transmitter type variables usually can be found at hamfests or can be purchased from larger amateur-radio supply houses.

A formula that can be used to calculate the capacitance of an unknown variable capacitor is:

C = .224KA / d * (n -1) where C = capacitance in pF, K = dielectric constant of material between plates (use 1.0 for air), A = area of one side of one plate in square inches, d = separation of plate surfaces in inches, and n = number of plates.

Breakdown ratings for common air-gap variable capacitors can be easily calculated, since the breakdown voltage for air-dielectric capacitors is given as from 19.8 to 22.8 volts per mil (.001 inch). 8 This information is obviously useful when tube-type linears are used ahead of the antenna tuner.

References

1. Sentz, Robert E., *Modern Communications Electronics,* San Francisco, Rinehart Press, 1971, Chapter 8.

2. The ARRL Antenna Book, Thirteenth Edition, American Radio Relay League, 1977, Chapter *2.*

3. Understanding Amateur Radio, Second Edition, American Radio Relay League, 1976, Chapter 15.

4.Welsh, Bill, "Novice," CQ, March, 1983.

5.Schultz, John, "Using a T-Network," CQ, May, 1968.

6. *The Radio Amateur's Handbook,* Fifty-third Edition, American Radio Relay League, 1976, p. 581.

7. *Ibid., p.* 26. *8. Ibid., p.* 24.

From
73 for Radio Amateurs * **March, 1985**

The West Rand Amateur Radio Club
26.14122 South - 27.91870 East

P.O. Box 562
Roodepoort
1725

Phone: +27 11 475 0566
Email: **zs6wrmail@mweb.co.za**

Bulletins (Sundays at …)
11h15 Start of call in of stations
11h30 Main bulletin start

Frequencies
439.000MHz 7.6MHz split
Input: 431.4MHz (West Rand Repeater)
145,625 MHz (West Rand Repeater)
10,135 MHz (HF Relay)

Radio Amateurs do it with more frequency!

Chairman/Treasurer	Dave	ZR6AOC	475 0566 (H)	zr6aoc@mweb.co.za
Vice Chairman	Ron	ZR6RON		zr6ron@webmail.co.za
Member	Keith	ZS6AGF	675 1604 (H)	zs6agf@polka.co.za
Secretary	John	ZS6FJ	672 4359 (A/H)	
Digital Communications	Stuart	ZS6OUN	082 573 3359	sbaynes@iafrica.com
Technical	Phillip	ZS6PVT	083 267 3835	phillipvt@sse.co.za
Member (Anode)	John	'PieRat'	011 768 1626(H)	brockjk@gmail.com
Member	Craig	ZS6CRW	795 1550 (H)	craig.woods@absamail.co.za
Member	Willem	ZS6WWJ	082 890 6775	marie.w@absamail.co.za

West Rand members - 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.

Please send plain text with no formatting to the email address below.

In July 2003, we re-published an Anode Compendium on CD. It has the issues from July 2000 until June 2005. This included the new Adobe reader. It has been updated, check with the chairman for details.

We need your input! Email us articles, comments and suggestions please. brockjk@gmail.com