RF

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLIV NO. 12 P.O. BOX 3454, TUSTIN, CA 92861-3454 December 2003

The Prez Sez:

As the year comes to an end, we still have remaining one major function. The Christmas dinner, it is December 14 at 1700 hours, located at Marie Calendars on Euclid St., Anaheim. I hope to see you there.

We had the final Board of Directors meeting Saturday, December 6. But, we were not able to conduct any business because we did not have a quorum. I know that the Flu bug is going around and it was foggy. I will take this forum, to thank each board member, for all of their support and help this year.

Let's congratulate our new Board for 2004 and they are:

President	Steve KB1GZ
Vice President	Ken W6HHC
Secretary	Rich KE6WWK
Treasurer	Bob KD6BWH
Publicity	Matt K6LNX
Technical	Tom WA6PFA
Membership	Chris W6KFW
Activities	Carl WA6BSV
Member at Large	Larry K6LDC
Member at Large	Lowell KQ6JD

Ken needed some time off as the R. F. Editor and Bud WA6VPP will take over, after the first of the Year. Thanks Ken for making the R. F. a top notch publication. And thanks Bud for taking on the task.

I wish to extend to all members and their families a Merry Christmas and a Healthy, Happy and Prosperous New Year.

73's----Lowell-KQ6JD

Upcoming Contests

Here are just a few of the Ham Radio contests that are coming your way. See the ARRL.COM web site for rules and details.

Straight Key Night
January 1, 2004

ARRL VHF Sweepstakes
January 18 - 20

ARRL DX Contest (CW)
February 15 -16

ARRL DX Contest (Phone)
March 1 - 2

No General Meeting

Holiday Dinner Instead

Traditionally, the OCARC does NOT conduct a General Meeting in December. Instead, the OCARC will hold its annual December Holiday Dinner for club members, family, friends, and visitors.

"Christmas Dinner Sunday, Dec 14th"

The dinner will be held at Marie Callender's Restaurant on Euclid Ave in Anaheim beginning at 5 PM. See page 5 of this newsletter for details.

Next OCARC General Meeting will be Friday, Jan 16, 2004.

Don't miss it. All members and visitors are welcome.

The next general meeting will be:

Friday, Jan 16th
@ 7:00 PM

We will be meeting in Anaheim Room in the **east Red Cross B**uilding

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THE ORANGE COUNTY AMATEUR RADIO CLUB, INC.
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Monthly Events:

General Meeting:
Third Friday of the month
at 7:00 PM
Orange Police HQ
1107 N. Batavia
(1 block south of Katella)
Orange, CA

Club Breakfast:
First Saturday of the month
at 8:00 AM
CowGirl's Cafe, Too
2610 S. Harbor Blvd
(just south of Warner)
Santa Ana, CA

Club Nets (Listen for W6ZE):
7.115 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
Rick KF6UEB, Net Control

28.375 ± MHz SSB
Wed- 7:30 PM - 8:30 PM
Bob AF6C, Net Control

146.55 MHz Simplex FM
Wed- 8:30 PM - 9:30 PM
Bob, WB6IXN, Net Control

VISIT OUR WEB SITE

http://www.w6ze.org

for up-to-the-minute club information, the latest membership rosters, special activities, back issues of RF, links to ham-related sites, vendors and manufacturers, pictures of club events and much much more.

Club Dues:
Regular Members ...$20
Family Members* ...$10
Teenage Members ..$10
Club Badge** $3

Dues run from January thru Dec and are prorated for new members.
*Additional members in the family of a regular member pay the family rate up to $30 per family.
**There is a $1 charge if you'd like to have your badge mailed to you.

Tech Talk #36

The Smith Chart – an Overview

By Bob Eckweiler – AF6C

(This is part nine in a series to explore RF impedance, from the antenna…down the feed line…and eventually reach the antenna tuner and transmitter.)

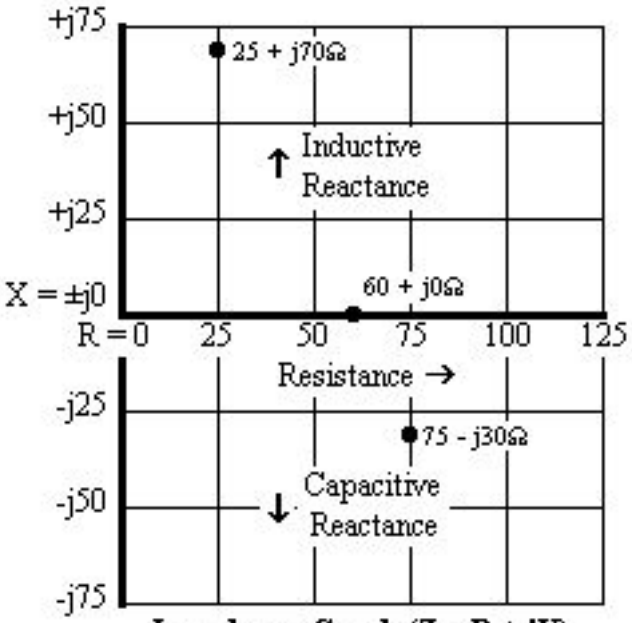
Last month we discussed the RF Noise Bridge, a handy device for measuring impedance. But, if you're interested in the impedance at the antenna and make your measurements at the shack end of the feedline, you must calculate the impedance at the other end of the feedline. These calculations can be tedious unless you have a good programmable calculator or a computer with appropriate software handy. In 1939, way before computers were generally available, Philip H. Smith designed the **Smith Chart**, a graphic tool that allows an easy solution to the problem above, as well as many other feedline and matching problems.

A full discussion of the Smith Chart would overwhelm this newsletter for many months, so I will just try to introduce you to this tool and make its appearance a little less overwhelming. There are some fine articles that have been published on the using Smith Chart. Chapter 28 of the 18th edition of the *ARRL Antenna Handbook* is one. It is an update of the information that appeared in Chapter 3 of the 14th edition. I'm sure it can be found in many other editions too. It is, however, missing from some editions. Another good source is the long article in the November 1970 issue of *Ham Radio* by Jim Fisk– W1HR, (be sure to also read the comments in the December 1971 issue for some corrections by W2DU – the noted author of *Reflections II*.) This article was reprinted (in corrected form) in March 1978 issue of *Ham Radio*. The ARRL also has a two-part article from QST on their website (members-only section).

Before continuing, I suggest you download your own copy of a Smith Chart off the Internet. Lack of space prevents publishing it in RF; besides you can print out as many copies as you want from this 46.6K file. Go to:

http://www.dartmouth.edu/~sullivan/smith.pdf

This chart looks very complicated, but it really isn't! Let's start with something familiar.



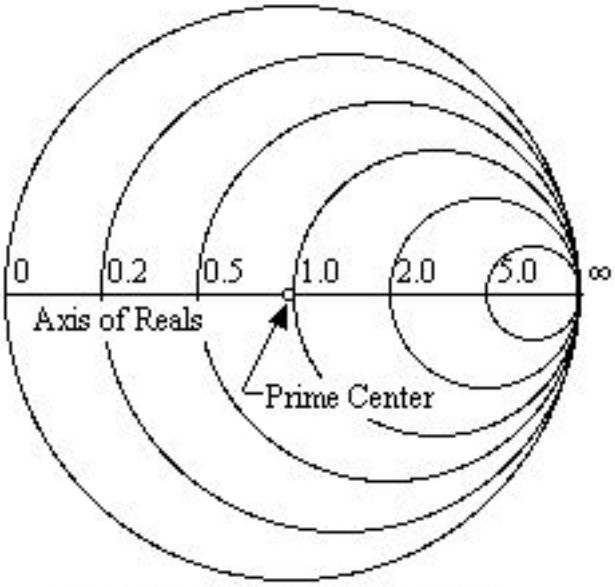
Impedance Graph (Z = R ± jX)
Figure 1

Figure one is a graph similar to the one in the March 2003 TechTalk article. It is a plot of impedance with resistance (R) on the horizontal axis and reactance (jX) on vertical axis. The vertical lines are lines of constant resistance and the horizontal lines are lines of constant reactance. To plot an impedance point such as 25 + j70Ω, locate 25 on the resistance axis; then move vertically along the line representing 25Ω resistance to where the +j70 line of constant reactance would be drawn from the vertical reactance axis.

The Smith Chart also has a resistance and reactance axis. The **Resistance Axis** is the only straight line on the Smith Chart (this line is often called the **Axis of Reals**). The line is marked from zero on the left to infinity on the right. The midpoint of the line, and center of the chart is called the **Prime Center**. It often has the value of one and represents the nominal impedance of the system.

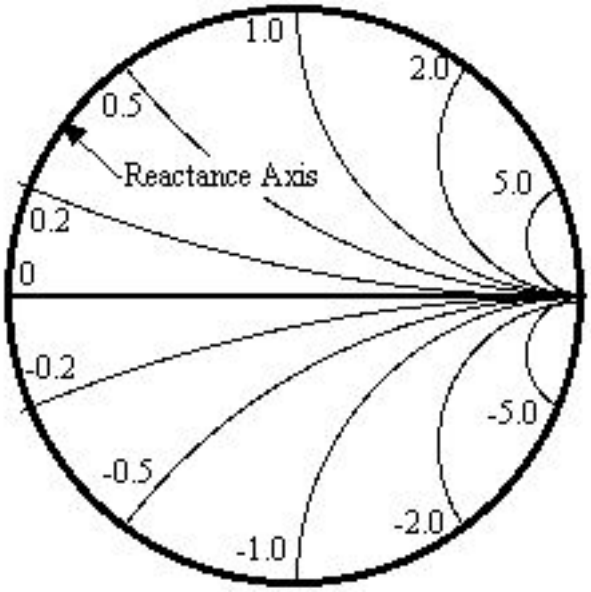
-- See **TechTalk** cont'd on page 4 –

Instead of vertical lines of constant resistance the Smith Chart has circles of constant resistance as shown in Figure two.



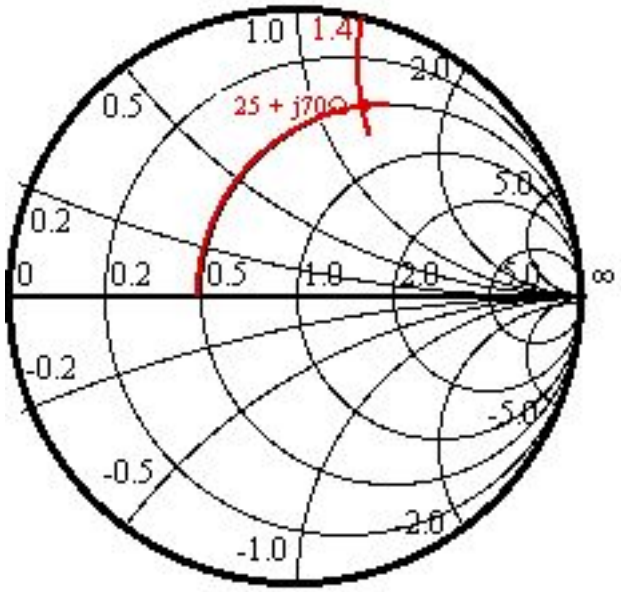
Circles of Constant Resistance
Figure 2

The **Reactance Axis** is the outside circle of the Smith Chart and its lines of constant reactance are segments of circles that meet the reactance axis as shown in Figure three. Notice that like the graph of Figure one, the reactance above the resistance axis is inductive (positive jX) and the reactance below is capacitive (negative jX).



Curves of Constant Reactance
Figure 3

Figure four shows a very basic Smith Chart that combines figures two and three. The points where the resistance and reactance axes meet represent a short (where R = 0) and an open (where R = infinity).



Smith Chart - Combining Figs. 2 & 3
(with 25 + j70Ω plotted after being normalized to 0.5 + j1.4Ω)
Figure 4

Normalization:

The prime center of the Smith Chart represents the nominal impedance of the system (or feedline). Depending on which type of feedline we're using, this point can represent the nominal impedance of 50 ohm coax, 75 ohm coax, 600 ohm open-wire feed, etc. To make a specific chart for each feedline impedance would be impractical, so most Smith Charts are **normalized**. They are designed so that the center point represents 1 + j0 Ω. Before plotting your values on such a Smith Chart, you must normalize all your data by dividing the resistance and reactance values by the nominal impedance. For example, say we are working with 50 ohm coax and want to plot 75 - j100Ω. We divide each part by 50 and plot 1.5 - j2Ω. Similarly, when reading from the chart we **denormalize** the data by multiplying both parts by 50.

-- See **TechTalk** cont'd on page 6 –

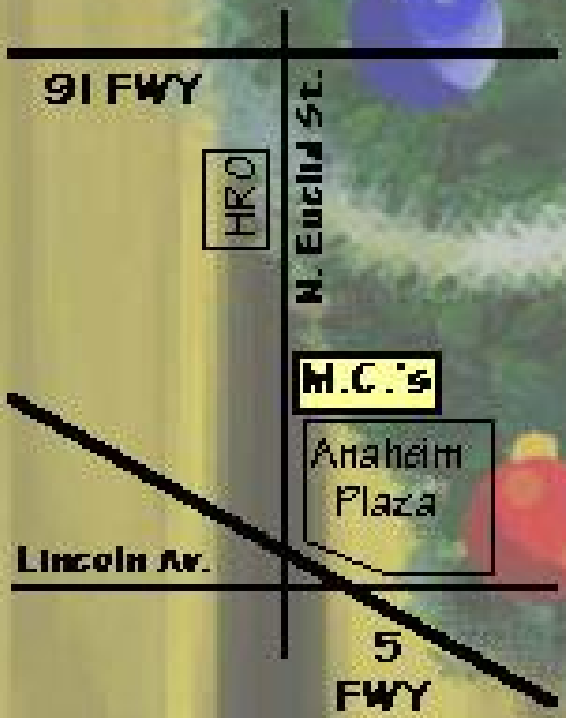
The Annual O.C.A.R.C.

Christmas Dinner

SUNDAY December 14th, 2003
5:00 PM - 8:00 PM

Marie Callender's Restaurant
540 N. Euclid St.,
Anaheim, CA (714) 774-1832

For more information, the menu, or to RSVP
contact: Steve Brody, KB1GZ, (714) 974-0338
stevegbrody@msn.com



de AF6C

TechTalk -- cont'd from page 4

Let's plot 25 + j70Ω as we did on the previous chart. First we normalize for a 50 ohm system by dividing the resistance and the reactance terms by 50, getting: 0.5 + j1.4. Find 0.5 on the resistance axis and move up the circular line till you intercept where the 1.4 line would be on reactance axis (outside circle). This point is shown on Figure 4. Try this on your full-sized Smith Chart.

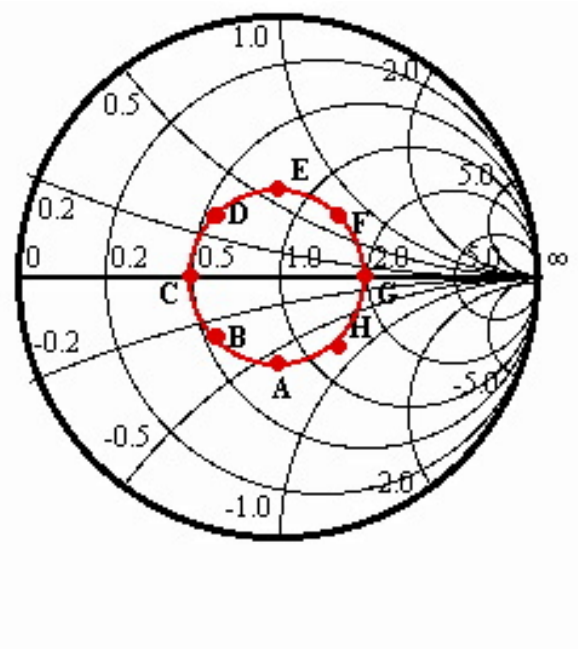
In the June 2003 of TechTalk we listed the impedance at various places along a length of lossless 72 ohm coax in steps of one-eight wavelength from an antenna with a feedpoint impedance of 57.6 - j43.2 ohms (Which represents an SWR of 2.0:1). It is repeated here as Table One, with additional steps at one-sixteenth of a wavelength added. The normalized impedances are also shown in the right-hand column.

Distance in Wave-lengths from Antenna	Impedance at this Point for loss-less 72Ω coaxial cable	POINTS	Normalized Impedance at this Point
0	57.6 - j43.2	A	0.80 - j0.60
1/16	40.4 - j21.4	B	0.56 - j0.30
1/8	36.0 + j0.00	C	0.50 + j0.00
3/16	40.4 + j21.4	D	0.56 + j0.30
1/4	57.6 + j43.2	E	0.80 + j0.60
5/16	100.0 + j53.0	F	1.39 + j0.74
3/8	144.0 + j0.00	G	2.00 + j0.00
7/16	100.0 - j53.0	H	1.39 - j0.74
1/2	57.6 - j43.2	A	0.80 - j0.60

Table One - Impedance Along Our Coax

Figure Five shows these points plotted on our crude Smith Chart. Notice that the points form a circle with the prime center as its center, and fall in a clockwise direction. This circle is called an **SWR Circle**. Its diameter represents the magnitude of the SWR. Notice also that the points form a complete revolution around the SWR circle. On a normalized Smith Chart you can directly read the SWR where the circle crosses the axis of reals to the right of the prime center. One revolution is equal to one-half wavelength – remember that the impedance repeats every half-wavelength along a length of lossless feedline. A Smith chart has scales marked around its circumference (see the downloaded Smith Chart). Two of interest are marked from zero to 0.50 wavelength for the complete circle. One is in the clockwise direction and is marked **Wavelengths Towards Generator**. The other is in the counterclockwise direction and is marked **Wavelengths Towards Load**. (Think of Transmitter as the generator and Antenna as the load).

Figure 5 - Plot of Table One: Constant SWR Circle Plot



Should the coax have losses, then the SWR circle would be a spiral of decreasing diameter towards the center of the chart. The higher the losses the steeper would be the inward spiral. This logically corresponds with the fact that, due to losses, the SWR appears lower when measured at the transmitter end than when measured at the antenna.

There are so many problems you can solve with a Smith Chart. Let's say your feedline is 2.33 wavelengths long (electrically - don't forget to correct for propagation velocity) at your favorite operating frequency. You measure the impedance at the shack end of your 50Ω coax as 45 - j10Ω (using your noise bridge). Do you have to lengthen or shorten your dipole to bring it to resonance? Since the impedance repeats (ignoring losses) every half wavelength you can subtract multiple half-wavelengths from the length of your feedline until it becomes less than a half-wavelength; you will end up with 0.33 wavelengths. Next, normalize and plot the measured point on the Smith Chart (0.9 - j0.2Ω). With a compass, draw an SWR circle through this point with the prime center as the center of the circle.

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OCARC General Meeting Minutes

November 21, 2003

The November General Meeting of the Orange County Amateur Radio Club was held at the Red Cross East Building. The meeting was called to order by Pres. Lowell KQ6JD at 7:00 PM. Welcome to the following visitors: Gabriel KO6N; Barry K6ADZ and Bill K6WIL.

Program:
Vice Pres. Steve KB1GZ introduced our speaker: Sue Gilford N6OWT who gave an interesting travelogue on sailing the Pacific with Ham Radio. Following our speaker Pres Lowell presented to the club a letter and certificate from the ARRL thanking OCARC for the clubs donation to the BPL Defense Fund.

The business meeting was called to order at 8:20 PM by Pres. Lowell. Roll call revealed the following Officer absences: Bob KD6BWH; Cory AE6GW and Frank WA6VKZ. A quorum was present.

VP Report:
Steve KB1GZ stated 18-20 people have signed to attend the Christmas Dinner at Marie Callender's.

Treas Report.
Steve KG6QVY announced the club has $2626.87 in the bank: $601.47 in checking and $2025.40 in savings.

Secretary: Nothing to report
Technical: Nothing to report

Publicity Report:
Auction was successful. Club made approx. $135.00

Annual Elections:
The following individuals were each elected by unanimous voice vote to comprise the slate of officers and directors for 2004:

President: Steve Brody KB1GZ
Vice Pres: Ken Konechy W6HHC
Secretary: Rich Helmick KE6WWK
Treasurer: Bob Buss KD6BWH
Activities: Carl Schmid WA6BSV
Membership: Chris Winter W6KFW
Publicity: Matt McKenzie K6LNX
Technical: Tom Thomas WA6PFA
Mbr at Large: Larry Hoffman K6LDC
Mbr at Large: Lowell Burnett KQ6JD-whose election is automatic as immediate Past President.

RF Newsletter:
Lowell announced that a new editor is needed. Bud Barkhurst WA6VPP volunteered to take over this position.

-- See **Gen'l Meeting** cont'd on page 9 –

OCARC Board Meeting

December 6, 2003

The December Board Meeting of the Orange County Amateur Radio Club was held at the Cowgirls Too Restaurant. The meeting was called to order at 8:30am by Pres Lowell KQ6JD. Roll call revealed there was not a quorum with the following absent: Steve KG6QVY; Matt K6LNX, Bob AF6C, Cory AE6GW, Frank WA6VKZ. A total of 10 members and visitors were present. The meeting was adjourned.

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Next draw a straight line from the center of the chart, through the plotted point and out to the scales at the circumference. Chose the "Wavelengths Towards Load" scale (The antenna is the Load) and read the scale: 0.096 wavelengths. Add to this the 0.330 wavelengths to get 0.426 wavelengths and find that value on the "Wavelengths Towards Load scale". Draw a line from this point to the center of the chart. Where this line intercepts the SWR circle that you drew earlier read the normalized impedance at the antenna: 0.85 + j 0.16. You can denormalize this value to 42.5 + j 8.0Ω. This is the reactance at the antenna terminals. Since the reactive term (j8.0) is positive, the antenna is inductive and needs to be shortened. We ignored losses in this example because it didn't affect our problem, however if you know your feedline loss, you can take it easily into account utilizing one of the auxiliary scales that are part of the Smith Chart. This is covered well in the sources listed earlier.

There is much more you can do with a Smith Chart. The articles mentioned above are good starting points. If you don't have access to back issues of Ham Radio, I'd be glad to share the Smith Chart article with you.

Next month starts a new year. I'm looking for new ideas for this column.

73, and Season's Greetings,

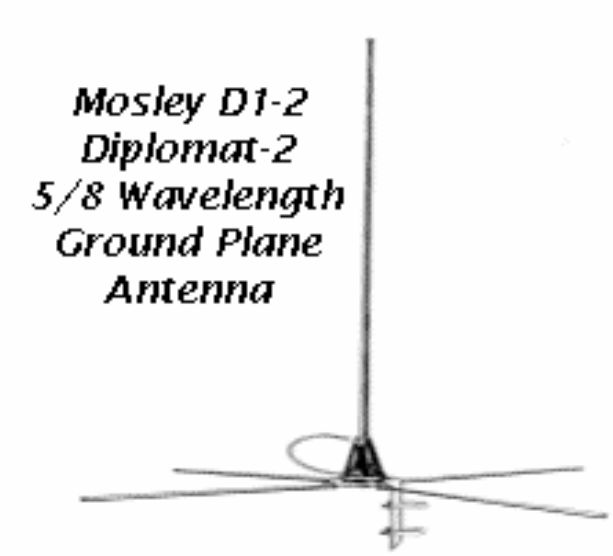
Bob, AF6C

Review: Mosley Diplomat-2 VHF Antenna
by Bob, AF6C

In the sixties, **Mosley** was a big name in amateur antennas. Their ***TA-33*** and ***TA-33JR*** tri-band beams were widely used and admired in the ham community. Around the mid-eighties **Mosley** seemed to all but disappear from the amateur market; their ads no longer appeared in ham journals and their products no longer were listed in ham catalogs. However, they didn't disappear entirely; and while working on the Ham Radio Supplier web page I came across the **Mosley** website. They are still in business and still sell amateur antennas. They even sell an updated version of the ***TA-33*** and ***TA-33JR*** tri-band beam antennas.

Back in the early seventies I purchased and installed a **Mosley *Diplomat-2*** 5/8 wavelength ground plane vertical on my roof for 2-meters*. This antenna has survived thirty years of Santa Ana winds, California smog, weather and ultra-violet radiation. It still works as well now as when I first installed it. This antenna is the one I normally use on the W6ZE two meter net. So imagine my surprise when I found that **Mosley** still sells the ***Diplomat-2*** antenna after all these years. It evidently is popular in commercial circles as the antenna can be easily cut for frequencies up to 175 MHz. Ten-meter and 6-meter versions of the ***Diplomat*** antenna are also available.

These antennas claims a 3.4 dB gain over a 1/4 wave ground plane (perhaps a bit high?); are capable of handling the legal ham power limit on all modes; and are designed to mount to a vertical mast up to 1-1/2" O.D. The ***Diplomat-2*** antenna is about 4' high and it weighs less than 2 lbs. An SO-239 UHF connector is standard, and the antenna uses **Mosley's** *Induct–O–Match* matching system.



To check out **Mosley** antennas go to the OCARC Ham-Related-Suppliers WEB site at **http://www.w6ze.org/HR_Suppliers** and click on the **Mosley** link in the "Antennas and Accessories" section. Pricing for these antennas were not available at the time of writing this review. If you're having trouble finding the ***Diplomat***, click on UHF VHF Beams and a link to Vertical Ground Planes will appear (There's evidently a bug in their website).

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* - The antenna is mounted at the QTH of AF6C on a six-foot water pipe mast clamped to a bathroom vent pipe using a standard one-piece vent pipe clamp available at TV and hardware stores. The total height of the antenna is about 22 feet above ground. It is fed with about 35 feet of mini RG-8 coax.

Next **RF** Deadline: Jan 3rd

A special thank you went to Ken Konechy W6HHC for the outstanding job he has done as RF Editor for 2 Years. Thank you Ken.

President Lowell mentioned that the Civil Air Patrol is looking for Amateur Radio Communicators. Call the CAP at 714-744-7524 if you are interested.

Amendments to Club Bylaws-
The following 4 proposed changes were read to the club by Ken W6HHC:

Item 1) Article VI-D.1 DUAL CHECK SIGNATURES
Is: Checks for $100 or less may bear the signature of the Treasurer alone. Checks for higher amounts must also bear the signature of the President or the Vice President.

Proposed: Checks for $250 or less or for normal expenses [Note: "normal expenses" are expenses that tend to recur from year to year] may bear one authorized signature. Checks for expenses of over $250, that are not for normal expenses, shall have either the approval of the board or the approval of the club membership at a general meeting.

Item 2) Article II-B REMOVAL OF AMOUNT OF DUES FROM BYLAWS
Is: The amount of dues shall be:
1. For members 20 years of age or older: $12 per year.
2. For members 19 years of age or younger: $6 per year.

[Amended 1999 to read:
1. Dues are raised to $20/year, for members 20 years of age or older
2. Dues for members 19 years or younger, will become 50% of base rate]

Proposed: The base rate amount of yearly dues shall be determined by the board of directors for the coming year, no later than the November board meeting preceding the beginning the beginning of the coming year. If no action is taken by the board, then the base rate will not change in the coming year.
1. Dues for members 20 years of age or older, are 100% of base rate.
2. Dues for members 19 years or younger, are 50% of base rate.

Item 3) Article II-C and Article VI-D-3 ELIMINATE OCARC MEMBERSHIP CARDS
Is: Each member after admission shall receive a membership card and a dues receipt signed by the Treasurer.

Proposed Each member after admission shall receive a dues receipt signed by the Treasurer.
…also…Issue dues receipts as required.

Item 4) Article I-D CLARIFICATION
Is: To participate in all types of activities involving amateur radio.

Proposed: To participate in activities involving or for amateur radio.

Motion :By Ken W6HHC to accept the changes to the bylaws as proposed. Seconded by Larry K6LDC. Vote by raised hands showed YES 17 and NO 1.
The proposed changes pass and these amendments will be incorporated into the bylaws.

New Business
Audit committee was appointed by Pres Lowell. Those appointed to the committee are Lowell KQ6JD; Bob AF6C and both the outgoing and incoming treasurers.

Good of the Club
Field Day - The December QST reported that out of a total of 112 clubs submitting FD results in Class 4A, the OCARC score achieved 4th place in California and 34th place in the nation.

A motion to adjourn was made by Bob AF6C and seconded by Larry K6LDC and passed unanimously. Meeting adjourned at 9:04PM.

Respectfully Submitted by David Mofford W7KTS, Secretary

ARLS016: International Space Station Marks Five Years in Space

The International Space Station has been in space five years and has had Amateur Radio and a permanent crew onboard for three years as of this month. Since attaining orbit, the ISS has grown from a lone, uninhabited module into a continuously staffed, house-sized research facility.

The Amateur Radio on the International Space Station (ARISS) program has been a part of the ISS since November 2000. The US, Russia, Canada, Japan and Europe have cooperated in making the ISS a reality as well as with making ARISS a success.

The ARISS initial station gear went into space in September 2000. A month later, the FCC granted vanity call signs **NA1SS** and **NN1SS** to the International Space Station Amateur Radio Club for US ARISS operations. Russia has issued the call signs **RZ3DZR** and **RS0ISS** for ISS use.

The capabilities of NA1SS also are slated to expand in the near future. Already on board is a Kenwood TM-D700E VHF/UHF transceiver. The unit will mean a significant boost to the power output of the ARISS initial station gear--from 5 W to 25 W. Additional gear, including SSTV hardware, tentatively is set for transport in January, 2004.

[Reprinted from the ARRL.ORG WEB Site]

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TUSTIN, CA 92781-3454

First Class Mail

Time Dated Material.
Please Expedite!!