RF

AF6C

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLV NO. 12 P.O. BOX 3454, TUSTIN, CA 92781-3454 DECEMBER 2004

THE PREZ SEZ:

Now that the year is ending and this is the last Prez Sez for 2004, looking back over the year I think we had a good year with interesting speakers, a successful Field Day, an increase of club membership, and a club reunion, to name just a few things.

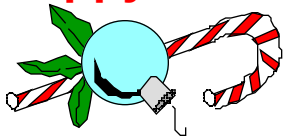
It also looks like the 2005 slate of officers will do a fine job and help grow OCARC. I also look forward to the programs on meeting nights.

Thank you all for the support you gave me and the club and would now wish you all a very nice holiday and a safe healthy New Year.

My comments would be incomplete without saying that I enjoyed being President.

One of the nicest things about being President is getting to choose the recipient of "Good of the Club" award. A few people responded to my request for names and I have made good use of those suggestions I received. Come to the Christmas Dinner, there may be a surprise or two.

Happy New Year!



73,
Steve
N1AB

MEETING NOTES:

Election Results

Club elections were held at the November regular meeting. The 2005 club officers elected are:

Board Officers For 2005

President:	Ken Konechy, W6HHC
Vice Pres:	Willie Peloquin, N8WP
Secretary:	Rich Helmick, KE6WWK
Treasurer:	Cheryl Peloquin, KG6KTT
Membership:	Cindy Hughes, KC6OPI
Activities:	Kristin Dankert, K6PEQ
Technical:	Kenan Reilly, N6CCE
Publicity:	Bob Eckweiler, AF6C
MALs:	Steve Brody, N1AB, Dan Dankert, N6PEQ

Congratulations to our 2005 Board Members!

The meeting also featured Mick Stwertnik, KB6JVT, of NCG who talked on Comet, Maldol and Diawa product for the radio ham.

The club would like to thank Mick for donating a Comet C-767 Dual Band VHF/UHF Antenna to the November raffle. Look on page 3 for pictures of Mick and the meeting. The lucky winner of the Comet antenna was Lowell, KQ6JD.

REMEMBER
THERE WILL BE NO DECEMBER MEETING

NO DECEMBER MEETING:

There will be no regular December meeting. Instead the club held its Holiday Dinner on December 5th.

The next scheduled regular meeting will be on January 21st, 2005. The guest speaker will be Jay Thompson speaking on **Getting Started in Amateur Radio Direction Finding.** Further details will appear in the January issue of *RF*. Meanwhile everyone: Have a:

Happy Holiday Season

The next regular meeting will be:

Friday, Jan. 21st 2005
@ 7:00 PM

We will be meeting on the 2nd floor in the east bldg.

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Next Club Breakfast & Open Board Meeting
Sat. Jan 8th 2004
(Special Date!)

THE ORANGE COUNTY AMATEUR RADIO CLUB, INC.
P.O. Box 3454, Tustin, CA 92781

2004 Board of Directors:

President:
Steve Brody, N1AB
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2004 Club Appointments:

W6ZE Trustee:
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kkonechy@pacbell.net

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kkonechy@pacbell.net

ARRL Awards Appointee:
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k6vdp@aol.com

OCCARO Delegate:
Bob Buss, KD6BWH
(714) 534-2995
kd6bwh@aol.com

Monthly Events:

General Meeting:
Third Friday of the Month
At 7:00 PM
American Red Cross
601 N. Golden Circle Dr.
(near Tustin Ave & 4th St)
Santa Ana, CA

Club Breakfast:
First Saturday of the month at 8:00 AM
CowGirl's Cafe, Too
2001S. Harbor Blvd.
(just south of Warner)
Santa Ana, CA

The January Breakfast will be held a week late, at a different location. Monitor your email for details

Club Nets (Listen for **W6ZE):**

7.086 MHz CW **OCWN**
Sun - 9:00 AM - 10:00 AM
Rick KF6UEB, Net Cntl.

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 December & 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.

The Editor Retires:

This is the last issue of RF I'll be editing (at least for a while.) It's been fun and rewarding, but on top of making the badges and certificates, helping Ken with the web site and writing the *TechTalk* column (which by itself takes up a lot of time), editing RF is just cutting too much into my free time. This was at least the fourth time I've edited the paper for a full year. (2001 being the previous year.) I've also filled in numerous times, an issue at a time.

Thank you all for the kind words you've said about RF this year. I've tried to make it look professional and fill it with information that enjoys and will make us all better hams. A quality paper, prepared with care, is an important attribute to a radio club.

This year, until someone takes over full-time, we will be rotating the editorship on a monthly basis. Please consider taking on this task for just one month and see how you like it. We already have editors for the January and February issues. March through December are open.

SK de Bob Eckweiler, AF6C

USA HAM POPULATION
As of November 1, 2004:

Class	Population	Change*
Novice:	30,061	(19,268)
Technician:	264,149	58,757
Tech. Plus:	55,582	(73,278)
General:	138,482	25,805
Advanced:	78,344	(21,438)
Extra:	105,867	27,117
Total. Tech & Tech. Plus:	319,731	14,523
Total All Classes:	672,485	(2,307)

*Change since November of last year.

Thanks to N1AB

Pictures From The November Meeting

Members gather and socialize prior to the start of the meeting. Can you find: W7KTS, K6VDP, KE6WWK, WA6VKZ, WA6VPP, KQ6JD, WA6PFA, N6PEQ, and K6PEQ?

Our guest speaker Mick Stwertnik, KB6JVT, of NCG shows off a compact multiband mobile antenna. Mick's company represents Comet, Diawa, and Maldol amateur products.

During the break: (L) Frank, WA6VKZ, Lee Evans and Lowell, KQ6JD make use of the break room for some coffee and stories.
(R) Mick, KB6JVT, chats with our President Steve, N1AB and his wife Doris, WB1CDD about Comet antennas.

Bob's *TechTalk* #34
by: Bob Eckweiler, AF6C

This month we're going to look at a complementary Class B Audio Amplifier to drive our code practice oscillator's speaker. However, before we start, perhaps a discussion of amplifier 'Class' is in order. In amateur radio the four primary classes of amplifiers are designated A, B, AB and C. There are also designations for D and above, but these are digital and we won't discuss them – at least not at this time.

Amplifier class is determined by the way the active device (tube, transistor, etc.) is biased. Biasing determines the static condition of the active device: the no-signal plate current of a tube or the no-signal collector current of a transistor. This current is determined by the grid voltage on a tube or the base current on a transistor. Let's look at a vacuum tube (Figure 1). The plate current is controlled by the voltage (V_G) applied to the control grid of the tube. If the voltage is significantly negative with respect to the cathode, no plate current will flow and the tube is said to be in *cutoff*. As the grid voltage becomes less negative current flows between the cathode and plate. The plate circuit normally contains a load of some sort. In figure one it is a resistor, R_L. As the grid voltage increases the plate current increases. Since this current flows through R_L a voltage drop appears across R_L. When the current reaches the point where all the available voltage is dropped across R_L the tube is said to be in *saturation*; no higher plate current can flow. Note also that no grid current flows until the grid is driven positive.

Biasing is just setting the initial point of the grid voltage that lets a certain plate current flow. When a signal is coupled to the grid it will cause the plate current to rise and lower in response to its voltage. This change in current causes the voltage across R_L to vary. The variation across R_L is generally much larger than the change in grid voltage, and this results in an amplified signal.

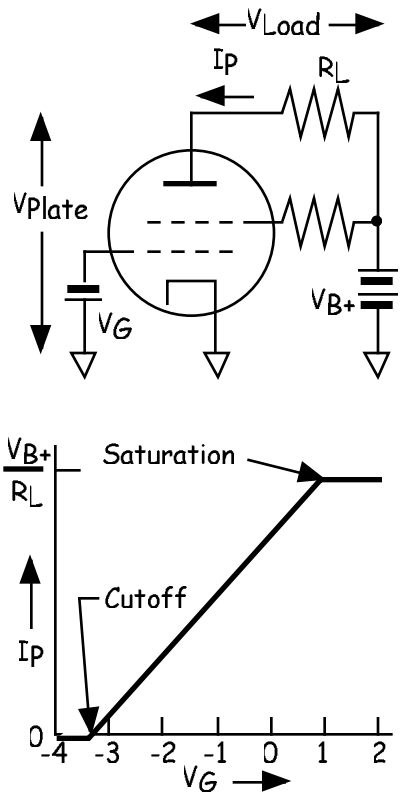

Figure 1 - Biasing of a typical vacuum tube amplifier showing grid voltage vs. Plate current.

Class A: In a class A amplifier there is always plate current flowing (Figure 2a). For low level signals the plate current is usually set where the plate current is small, but where the signal will not cause the tube to reach cutoff. The output signal is a good replica of the input signal and gain can be high with high R_L. Most low-level signal amplifiers in radios are class A. High-level class A amplifiers are also in use. Many low power audio amplifiers are class A, like those that drive a speaker in older tube communications receivers. High-level class A amplifiers are biased so that their resting current is halfway between cutoff and saturation. This allows the highest signal output without significant distortion since if either excess is reached distortion results. High level class A amplifiers are not very efficient, generally under 25% and never over 50%. A one-watt audio output amplifier can require over 4 watts of DC power. You generally won't find class A amplifiers used at power levels more than a few watts. Low-level linearity is good, but at higher power distortion levels increase.

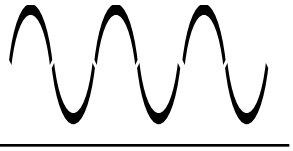

Figure 2a - Class A - The grid voltage never reaches cutoff and plate current flows for 100% of a cycle.

Class B: The bias of a class B amplifier is set right at the tube's cutoff point (Figure 2b). No current flows without a signal. The amplifier only amplifies one half the signal; however, it does it quite efficiently. Audio class B amplifiers are normally in pairs. Each handling one half of the signal, which is then recombined. *Push-pull* is the terminology used to describe these circuits. Class B is used in AM modulator circuits and high power audio amplifiers. If not operated in push-pull, class B amplifiers will introduce audio distortion. Class B amplifiers can be up to 78.5% efficient with over 70% common.

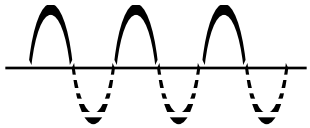

Figure 2b - Class B - The grid voltage reaches cutoff and plate current flows for 50% of a cycle.

Class C: The bias of a class C amplifier is set far beyond cutoff, and the driving signal only causes the tube to conduct for a short period of its cycle Figure 2c). Distortion is high, but when the output contains a resonant circuit good RF amplification is obtained. If the RF being amplified contains modulation however, the modulation will be highly distorted. Class C is used to amplify CW and unmodulated RF. Class C amplifiers can be modulat-

ed themselves and are normally the amplifiers used in AM transmitters. Class C is the most efficient of the three classes of amplifiers with efficiency approaching 100%. Typical efficiency is 80% - 85%.

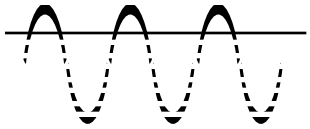

Figure 2c - Class C - The grid voltage reaches cutoff and plate current flows for > 0% and < 50% of a cycle.

Class AB: When the bias point is set so that the tube is conducting with no signal but cuts off during part, or most, of the negative peaks, the amplifier class is called AB (Figure 2d).

Figure 2d - Class AB - The grid voltage reaches cutoff and plate current flows for > 50% and < 100% of a cycle.

Vacuum tube amplifiers often have a designator of 1 or 2 after the AB. For class AB_1 the grid is never driven positive so no grid current flows. This affords a fairly constant load for the driver, and high power gain, but lower efficiency (typically 50%). With class AB_2 the grid is driven into the positive range giving higher efficiency (typically 60%) but results in higher power requirements for the driver. The driver also sees a varying load over each cycle, which must be compensated for. Some push-pull class B amplifiers actually are biased slightly towards class AB_1 to improve linearity. This is particularly true of transistor amplifiers that must overcome the 0.7 volt base voltage drop before conduction. Class AB_1 and AB_2 are good for single ended (i.e. not push-pull) RF linear amplifiers Though only one-half of the envelope is actually amplified by the tube, the flywheel effect of the tuned output circuit reproduces the other half – modulation and all.

Figure 3 shows the circuit for a class B complementary amplifier. D_1 and D_2 are identical transistors to Q_1 and Q_2 respectively, with their base and collector tied together (see TechTalk #34). From our study last month, this circuit is just two current mirrors in series. R_1 and R_2 have identical values. With no input signal, the current $\boldsymbol{i}_1$ flowing through D_1 and D_2 is:

$$i_1 = \frac{V_{CC} - 2 \cdot V_{BE}}{R_1 + R_2} = \frac{V_{CC} - 2 \cdot V_{BE}}{2R}$$

Where Vcc is the supply voltage (9V) and Vbe is the drop across one of the diodes (~0.7V).

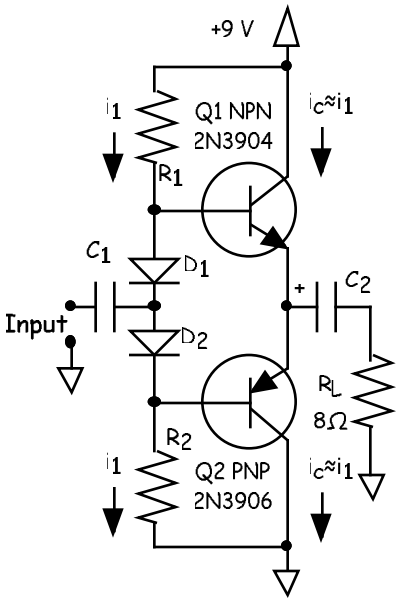

Figure 3: Complementary Transistor Class 'B' Audio Power Amplifier

Since we are dealing with current mirrors, $\boldsymbol{i}_1$ is also the current that flows in the transistors. Ideally a class B amplifier's transistor is at cutoff when no signal is flowing. However, the signal must overcome the V_{be} voltage before the transistor starts to conduct. This 1.3 volt dead-band will cause unwanted crossover distortion. The solution is to run the amplifier with a slight current flowing making it almost a class AB_1 amplifier. If you do a good job of matching the diode and transistor properties, as we discussed last month, this circuit is easy to bias. Just select R to give you the resting current you want, using the equation above.

This circuit is very simple. It needs to be driven by a high level of voltage as each of the current mirrors are also followers and have a gain slightly less than one. The output capacitor C_2 charges to about 1/2 the supply voltage in the absence of an input signal. When an audio signal is applied and the signal is positive the top transistor conducts more and the bottom transistor turns off charging C_2 and sending current to flow in the speaker. Likewise, when the signal is negative the bottom transistor conducts more and the top transistor turns off, discharging C_2 and causing current to flow in the speaker in the opposite direction. The circuit can drive a low impedance, such as an 8-ohm speaker directly. This saves using a heavy expensive audio transformer and provides good frequency response. Circuit efficiency is up to 78.5%, and each transistor only dissipates one-fifth of the output power delivered to the load.

While the voltage gain is less than one, the power gain is high. The input impedance of the amplifier is approximately one-half of R in parallel with $\beta(R_L + R'_e)$ or:

$$R_{IN} = \frac{R\beta(R_L + R'_e)}{R + 2\beta(R_L + R'_e)}$$

The AC resistance of a forward biased diode is small and can be neglected. We haven't said much about R'_e. It is the large signal AC emitter resistance and can be found from the transistor's transfer characteristic given on the data sheet (usually in graphic form):

$$R'_e \cong \frac{\Delta V_{BE}}{\Delta i_e}$$

Here are some key reminders for making this circuit successful:

See: **TechTalk** on Page 8

OCARC 2004 HOLIDAY DINNER:

Thirty-one members and guests attended the Holiday dinner on Dec. 5th. Outgoing President Steve, N1AB, awarded co-Good of the Club Awards, to KD6BWH and AF6C. He then turned the gavel over to the new President, Ken, W6HHC.

After the club ate a hardy dinner, Kristin, K6PEQ, held a special raffle. Charmaine, KF6YOL, won the special XYL prize (fine tableware) and John, N6RUI, won the grand prize, a two-band handheld.

More pictures will appear on the club web page soon.

DX stations know Dapper Dan, N6PEQ always has strong signals!

Dan awards John, N6RUI the grand raffle prize - a two band handheld!

For the first time, the club had co-winners for The Good of the Club Award. Out-going President Steve Brody, N1AB, presents GOC plaques to (Left) Bob Buss, KD6BWH, and (Right) Bob Eckweiler, AF6C.

Hungry people study the menu. Prime Rib seemed a favorite; the seafood and chicken was popular and everyone appeared to have a good time.

The in-coming President Ken, W6HHC, is passed the gavel by out-going President Steve, N1AB. Ken then presented Steve with the 2004 Presidential Plaque.

Regular Meeting Minutes:

November 19, 2004

President Steve, N1AB, called the meeting to order at 7:00 PM. After the pledge of allegiance, Board Member roll call was taken. Board members not in attendance were: Carl Schmid, WA6BSV; Chris Winters W6KFW; Matt McKenzie, K6LNX, and Larry Hoffman, K6LDC. A total of 25 members and visitors were present.

The meeting was turned over to the Vice President. Ken, W6HHC, who gave a background picture of the Broadband over Power lines (BPL) problem currently facing the ham community. The Board had decided, at the November board meeting, to ask members to support the *ARRL Spectrum Defense Fund* that is fighting BPL. The Board also had decided to match member's donations up to $250.00. A "kitty" was passed while BPL concerns were discussed. $144.00 was collected at the meeting. The club is hoping to collect more through members contributions mailed to the PO Box and made at the upcoming Holiday dinner.

Ken then introduced the guest speaker, Mick, KB6JVT from NGC. Mick gave a program on the ham related products his company handles including Diawa, Maldon and Comet antennas. Those who would like can access Comet's web site at www.cometantenna.com.

After the break President Steve convened the business meeting.

Treasurer's report: Bob Buss, KD6BWH, reported that there was **$2,662.49** in the club accounts.

Old Business: Bob, AF6C, is still looking for an Editor for *RF* for next year. He suggested we ask for volunteer editors to try it for a month. Kenan, N6CCE, and Kristin, K6PEQ volunteered to edit the January and February 2005 issues respectively.

The Christmas party is fast approaching. Members can bring guests. A Christmas party raffle with special prizes will be held for attendees.

Billy Hall, N6EDY, thanked Willie, N8WP, and his wife Cheryl, KG6KTT, for their help with the Veterans Day parade held in Tustin, Ca.

New Business: Correspondence: A letter from Louise West was read thanking club members who helped her with her husband Charles', KB6TWA, shack and antenna equipment after his death. Larry Beilin, K6VDP, was also recognized by the club for his continuing efforts to assist the relatives of silent keys with disposing of their radio equipment.

Good of the Club: Billy N6EDY informed the group that veterans could obtain admission for themselves and 5 others to Knott's by showing the proper paperwork.

Ken, W6HHC, announced that Dick Norton N6AA had been elected Director of the ARRL Southwestern Division, replacing retiring Art Goddard, W6XD.

Billy, N6EDY, informed the club of the need for more poll workers during the local elections. He asked that club members volunteer for this event.

Elections were held for the 2005 OCARC Board. Ken, W6HHC, chaired the elections. The results are listed below:

Kristin, K6PEQ was recognized for the fine work she did in getting people to run for board positions.

The meeting was adjourned at 8:55 PM, followed by the club raffle. Our guest speaker, Mick, KB6JVT, donated a Comet mobile antenna to the club raffle.

Election Results: Seven of the nine board positions had only one candidate running. Additional nominations were solicited from the membership before each position was voted on or acclaimed. The current President filled one of the member-at-large positions per our Bylaws. Two positions required voting by ballot. Running for Publicity Chairman were: Bob Eckweiler, AF6C and Matt McKenzie, K6LNX; running for the second member-at-large were: Dan Dankert, N6PEQ; Billy Hall, N6EDY; and Frank Smith, WA6VKZ.

The 2005 Board Members are:

President:
Ken Konechy, W6HHC

Vice President:
Willie Peloquin, N8WP

Secretary:
Rich Helmick, KE6WWK

Treasurer:
Cheryl Peloquin, KG6KTT

Membership Chairman:
Cindy Hughes, KC6OPI

Activities Chairman:
Kristin Dankert, K6PEQ

Technical Chairman:
Kenan Reilly, N6CCE

Publicity Chairman:
Bob Eckweiler, AF6C

Member-At-Large:
Steve Brody, N1AB

Member-At-Large:
Dan Dankert, N6PEQ

Respectfully submitted:
Rich Helmick,
KE6WWK, Secretary.

January Amateur Radio Class:

C.A.R.E.S. is offering a class to help people get their Technician Ham license. The three-day 20+ hour class will be held over the Jan 21-23 weekend. The FCC exam will follow on Sunday at 4 PM. Cost is $50.

Teachers include two OCARC members, Dave, W7KTS and Ken, W6KOS.

For full details contact Dave at:

Res: 714 508-6434
Ofc: 714 665-8000
Cell: 714 785-1760

December Board Meeting:

December 4, 2004

The meeting was called to order at 8:30 AM. Six board members were present. Absent were: WA6BSV, K6LDC, K6LNX & WA6PFA. The previous board meeting minutes were approved.

TREASURER'S REPORT: $2,357 on account. HRO and the 2005 club insurance bills have been paid.

OLD BUSINESS: Ken, W6HHC reported on the upcoming Holiday Dinner. Ken also gave an update on the ARRL BPL fight. An additional $80 was collected at the meeting to support the ARRL Spectrum Defense Fund.

NEW BUSINESS: Bob, AF6C, asked for, and got volunteers to print a few RF first pages in color for the holiday issue. An audit committee was appointed to review the year's books: Committee members are: AF6C, K6PEQ, KG6KTT and KD6BWH. Due to a conflict with New Year's Day, the next board meeting was moved to January 8th 2005. Ken will confirm the location to members. Bank signature cards will be updated right after the January board meeting.

GOOD OF THE CLUB: Dan, N6PEQ gave a timely DX update. Ken, W6HHC, reported that World Radio has an article on Digital Voice Modulation for low bands. Bob, AF6C, reminded everyone that Kenan, N6CCE, will be editing the January RF.
Bob, AF6C, commended the President for doing a great job this year keeping the meetings on track and timely.
Rich, KE6WWK, reported that ICOM day at HRO is Dec. 18, 2004.

Meeting adjourned at 8:56 AM. There were 16 Board members and visitors in attendance.

Respectfully Submitted
Rich Helmick, KE6WWK
Secretary

TechTalk: from Page 5

- The transistors must be complementary (have identical characteristics except for polarity.)
- The diodes must have identical forward characteristics to their associated transistor.
- C2 is a large electrolytic capacitor with low Xc at audio frequencies.

Next month we'll begin putting all these parts we've been discussing together into a complete code practice oscillator.

Next RF Deadline: Jan. 10th

ORANGE COUNTY AMATEUR RADIO CLUB, INC
P.O. BOX 3454
TUSTIN, CA 92781-3454

First Class Mail

Time Dated Material.
Please Expedite!!