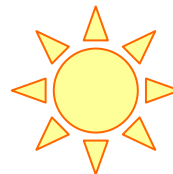


# RF



VOL. LI NO. 8 P.O. Box 3454, Tustin, CA 92781-3454

August 2010

## *The PREZ Says:*



Hello OCARC! I cannot believe we are already in August. Where does the time go!?!? I would love to hear more ideas from the members on what you would like to see. This is an amazing club that is full of knowledge and love for the hobby. So if you are looking for help in a certain area of the hobby or want to learn about something new, ask and I am sure there is someone in this club that can help! I love that we have had show and tell at the meetings. There have been some great inventions as well as favorite equipment shared. Remember to bring something to share to the next meeting. Also, it's time to start cleaning up the shack. We have the auction coming up in October, which is a great time to unload or restock the shack and just have fun! Looking forward to seeing you at the next meeting!

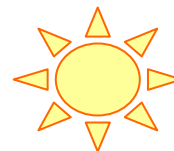
Kristin – K6PEQ

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**THE ORANGE  
COUNTY  
AMATEUR RADIO**



**Club Dues:**

Regular Members...\$20

Family Members\*...\$10

Teenage Members...\$10

Club Badge\*\*...\$3

Dues run from Jan. through Dec. & are prorated for new members.

\* Additional members in a family of a regular member pay family rate up to \$30 per family

\*\* There is a \$1 charge for the badge being mailed to you.

**ORANGE COUNTY AMATEUR RADIO CLUB – W6ZE**

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**2010 Club Appointments:**

**W6ZE Club License Trustee:**

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**OCCARO Delegate:**

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**General Meeting:**

Third Friday of the month  
at 7:00 P.M.

AMERICAN RED CROSS

600 Parkcenter Drive  
(Near Tustin Ave. & 4<sup>th</sup> St.)  
Santa Ana, CA

**Club Breakfast:**

2nd Saturday of the month  
at 8:00 am

Jaugerhaus  
2525 E. Ball Road  
(Ball exit off 57 freeway)  
Anaheim, CA

**Club Nets (W6ZE):**

28.375  $\pm$  MHz USB  
Wednesday 7:30-8:30 p.m.  
Bob AF6C, Net Control

146.55 MHz Simplex FM  
Wednesday 8:30-9:30 p.m.  
Bob, WB6IXN, Net Control

145.400 MHz, 103.5 Hz PL  
N6ME Repeater – 2 Meters FM  
Thursday, 8:00-9:00 p.m.  
Nicholas AF6CF, Net Control

# OCARC Board Meeting Minutes for: July 10, 2010

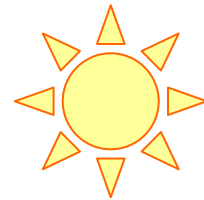
The OCARC Board meeting was held at the JagerHaus Restaurant, 2525 East Ball Road, Anaheim, at 8:15AM Saturday, July 10, 2010. There were a total of 6 directors and 8 visitors –George N6VNI, Diane Konecky, Hank W6HTW, Ron WB6FRV, June KJ6JKB, Kevin KI6SUJ, John KF6TRN. There was a quorum with the directors' present. With sad news, Kristin shared the passing of Dale Piedfort KB7UB now a Silent Key.

## DIRECTOR REPORTS:

- Vice President Paul W6GMU announced that our July speaker will be Chip K7JA
- Treasurer Ken W6HHC absent but Kristin gave report – we are solvent
- Kristine KC6TOD – gave an update in visiting Field Day sites this year
- Dan N6PEQ absent but Kristin gave report the potluck will be in October, our auction is scheduled for October and plans are moving along for the Christmas party.
- Loran AF6PS – Membership is growing.
- Robbie KB6CJZ – brochures are at HRO, eyeball cards to be distributed
- Nicholas AF6CF shared information on a presentation on ION propagation he saw at the Orange County Astronomers meeting, the speaker was from JPL – very interesting.
- Larry K6YUI commented on the success of Field Day and the pizzas for Saturday night did not anticipate the growing boys from the scout troop.

## OLD BUSINESS:

- **RF Newsletter “Rotating” Editors – thank you to all who volunteer!**
  - August – Kristin K6PEQ
  - September – Bob AF6C
  - October – Kristine KC6TOD
  - November- Doug W6FKX
  - December – Nicolas AF6CF
- **2010 Field Day Recap**
  - Tremendous success
  - Expenses were low, donations were larger and offset cost
  - Ken & Bob are preparing a report
  - As usual the Boy Scouts were a wonderful help
  - George sent flowers to the lady at the school district who was so helpful
- **FOR SALE Items** – the items listed will have the descriptions updated for clarity. All the equipment is at the home of the PEQ's. Nicolas has been storing the clubs military masts for four years and would like to purchase one of the four sets. Motion made by Paul W6GMU and seconded by Larry K6YUI for Nicholas to make the purchase.



- **Orange County Fair**
  - Kristin K6PEQ to send out email list of the volunteers.
  - Contact Kristin K6PEQ if you would like to work the booth at the OC Fair

#### **NEW BUSINESS:**

WARA 40 foot Antenna Trailer is for sale – pros and cons discussed (age, tires, storage issue) Discussion to be tabled for next meeting.

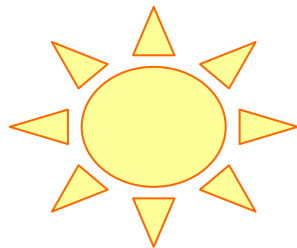
#### **GOOD OF THE CLUB - Nothing at this time...**

Motion made to adjourn meeting by Nicolas AF6CF and seconded by Larry K6YUI. Meeting adjourned 9:10 AM.

Respectfully submitted: Kristine Jacob KC6TOD, Secretary

## **2010 ARRL CONTEST SCHEDULE**

August	21 - 23	ARRL 10 GHz and Up Contest
September	11 - 14	ARRL September VHF QSO Party
	18 - 20	ARRL 10 GHz and Up Contest
November	6 - 9	ARRL November Sweepstakes (CW)
	20 - 23	ARRL November Sweepstakes (Phone)
December	3 - 6	ARRL 160 Meter Contest
	11 - 13	ARRL 10 Meter Contest



## TechTalk 88

### Amplifier Linearization

(AMPLIFIER LINEARIZATION in a DIGITAL WORLD)

by Mike Collis WA6SVT

(drawings by Bob Miller W6KGE)

Reprinted from  
Amateur Television Quarterly (ATVQ)

[Our guest author for TechTalk, Mike Collis WA6SVT, is a technical leader with the local ATV organization called Amateur Television Network (ATN) and works in the commercial television industry as a broadcast engineer for CBS. A big thank you to Mike WA6SVT and Bill WB8ELK of ATVQ for allowing the OCARC to reprint this article from the Spring 2010 ATVQ issue.]

This article is a discussion about the current type of amplifiers most hams have used, their shortcomings and ways to improve them.

For years hams have used SSB capable linear amplifiers for ATV with the power backed down. This worked fairly well with AM ATV but not so well with analog VSB or QPSK digital ATV signals. The three primary shortcomings of the amplifiers are:

1. gain compression,
2. bias and power bypassing and
3. intermodulation distortion (IMD).

Bypassing is the easiest to fix; it is done by adding capacitors to both the bias and collector or drain supplies to stiffen them up during sync or peak signal portions of the modulation. Many ham amplifiers did not provide adequate filtering as needed for complex ATV and QPSK waveforms but some manufacturers made modifications to make them ATV compliant. We can improve most amplifiers by using low ESR (low series resistance) rated capacitors to provide a stiffer supply to the active amplifier devices. RFC choke wire size needs to be large enough to reduce voltage drop to provide the stiff DC supply to the active devices.

Amplifier class is also important for both efficiency and distortion levels. Class A is best for low distortion but has very low efficiency and usually not used for high power final amplifiers. Class AB is much more efficient but distortion at the upper end of the power curve is much higher than class A...class AB is the normal choice for final and driver amplifiers.

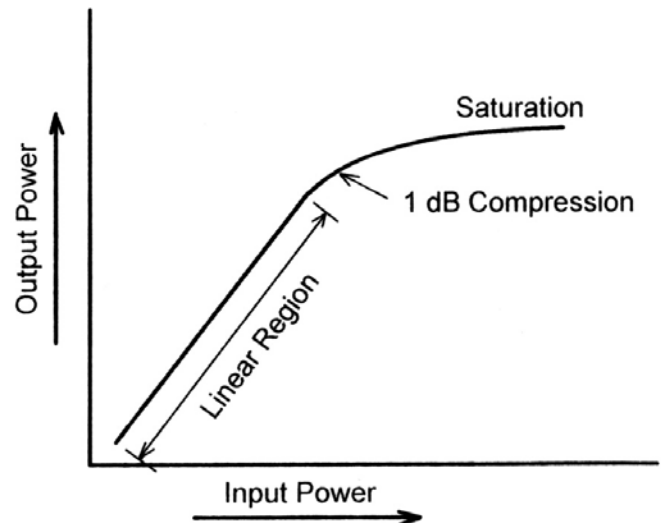


Figure 1 – Amplifier Curve

Amplifiers have a gain curve [Fig 1] that starts out as linear, then the gain reduces, then saturates as RF drive increases. Amplifier power output is usually rated at both the 1 dB compression point and saturated power output. Most typical ham amplifiers are rated at or near the saturated end of the curve. The 1 dB compression point is usually about 60 to 70% of the saturated output. It is best to not drive an amplifier past the 1 dB compression point during sync time for analog and lower than that for digital.

As the RF drive increases, a change in the junction capacitance and internal resistance will occur. This will cause phase shifting (AM/PM) and compression (AM/AM) these are the primary causes of IMD. Two tone testing is one way to test an amplifier for IMD performance.

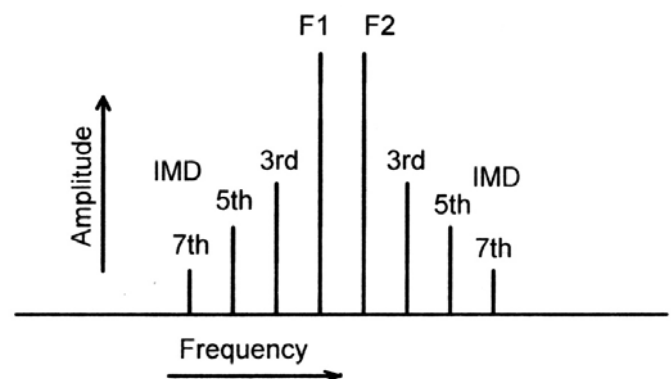


Figure 2 – Analog IMD (two CW carriers, F1 and F2)

The procedure is done with two carriers (F1 and F2) of equal level and a usually a few megahertz separation for testing [see Fig 2]. Looking at analog a VSB signal at the output of the power amplifier you see the effect of

IMD as drive levels are increased, the lower aural carrier starts regenerating and its level is an indicator of the amplifier's IMD distortion performance.

RF amplifiers using 24 volt devices have lower IMD responses than 12 volt devices. LDMOS devices usually have lower IMD responses than bipolar ones. Bias will affect the gain curve; increasing bias will extend the linear portion of the curve at the expense of efficiency and heat. Amplifier tuning especially loading has an effect on IMD as well.

Although most of the amplifier distortion outside the desired signal channel can be filtered out with an external filter, the IMD is also present within the desired channel causing visible beat patterns with AM or VSB analog and will cause the constellation pattern to distort, EVM and signal to noise will worsen with digital signals. As the drive is increased, IMD increases till at some point the signal cannot be demodulated.

ATV operators have for years put up with IMD on AM or VSB analog and some turning up the sync stretcher level and RF drive to allow pushing the amplifier past the 1 dB compression point to get as much power as needed for ATV DX.

We cannot do the same thing with digital and usually amplifiers used for digital ATV have had to be used backed off well below the 1 db compression point, this is the peak of the signal and digital is measured as average power. Average level is 7 to 10 dB below the peak. An amplifier with a CW power output of 100 watts has its 1 dB compression point about 70 watts

(sync in analog ATV) its digital average power is about 15 watts.

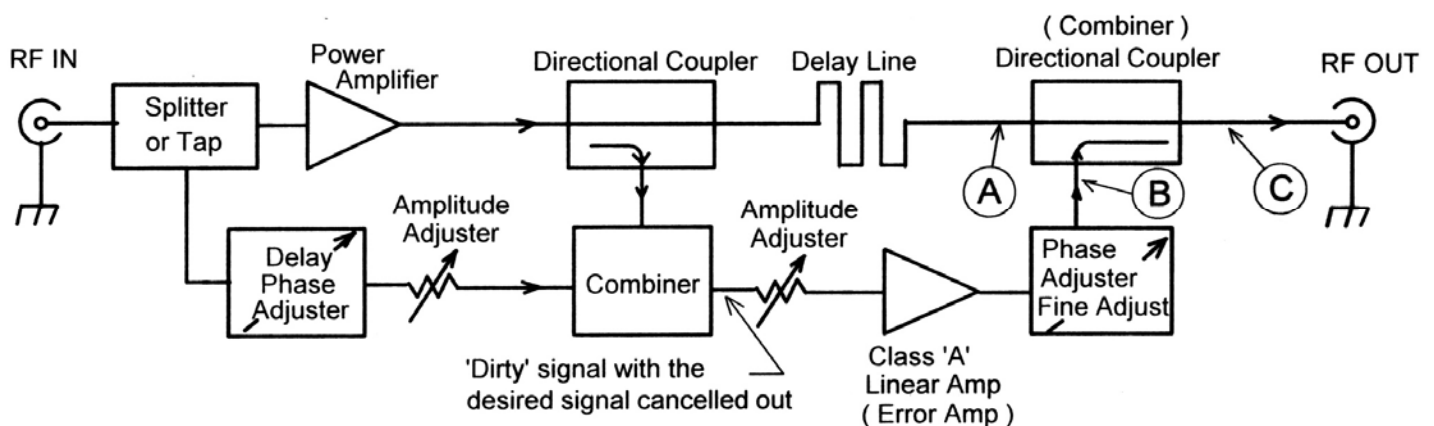
Now that we know the shortcomings, how do we get around them for better analog and robust digital performance? Either pre-distortion or bucking out the distortion [called Feed-Forward] is the answer.

### Feed-Forward Technique

Most [commercial] broadcast transmitters use feed forward techniques. It is done by dividing the drive signal into two paths [see **Fig 3**]; the first is through some delay between the splitter and power amplifier input (coax jumper) and the other path through a variable phase and amplitude adjuster into a combiner. The other combiner input samples the power amplifier's output via a directional coupler.

The combiner's output is first tested with a spectrum analyzer and the phase and amplitude adjusters before the combiner are set so the desired signal is minimized so the IMD (dirty) signal remains. The combiner's output is then connected to a very linear class A (error) amplifier to overcome directional coupler and adjuster losses.

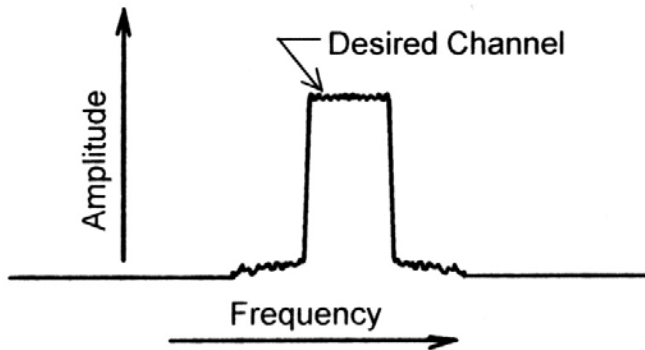
The now amplified IMD is reapplied 180 degrees out of phase and equal level to the IMD level from the power amplifier using a second set of phase and amplitude adjusters to minimize the power amplifier's IMD products by 20 to 30 dB in many good amplifiers [see **Fig 4**] and at least 15 dB with other less performing amplifiers. DSP processing can be used to make the process more dynamic for different power output levels, temperature and power supply changes.



**Figure 3 – Block Diagram for Feed-Forward IMD-cancelling Concept**

The signal with high levels of IMD at (A) is combined with the out of phase “dirty” IMD signal from (B) which cancels the IMD, to produce a desired clean signal with 20 to 30 dB lower IMD at (C)

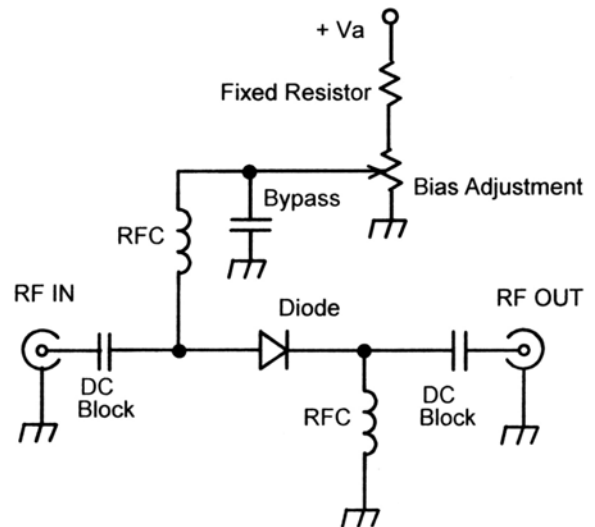




**Figure 4 – Clean Digital Modulation Signal After Feed Forward Compensated Amplifier**

### Pre-distortion Technique

Pre-distortion is usually used in small hand held digital units. A simple version can be done with a diode in series with the RF path prior to the driver amplifier and is slightly biased and its parameters chosen to compliment the drive levels used [see **Fig 5**]. The bias current is adjustable to allow optimizing the pre-distortion; this method can give about a 6 dB improvement in lowering IMD.



**Figure 5 – Series-Diode Pre-Distortion (for Low Pwr)  
About 6dB Improvement in Lowering IMD**

**ATVQ**

## Success on KI6DHT Antenna Party

On July 31st an antenna "tuning party" was held at the home of Michael Tutt, KI6DHT. Present were Jeff (W6UX), Arnie (N6HC), Doug (K6FKX), and Phil (KI6VEN). Earlier this year a multi-band vertical antenna was installed to replace Michael's loop antenna, but parts needed to install a 6 meter stub were missing and we ran out of time before we could finish the tuning process.

We had to take the antenna down and re-raise it at least 6 or 7 times (and it's a good thing we had four people to help because the antenna could get a bit unwieldy very quickly). Each time we tuned a different band using Arnie's MFJ-259B antenna analyzer. We also replaced the bright yellow guy ropes with black dacron ropes to reduce the antenna's visibility. A barrel adapter was also installed to allow the coax feed line to pass through the shack's 2nd-story window. [ continued on page 13]



**Arnie N6HC working on the coax**



**Doug and Phil awaiting directions**



**Arnie and Mike trying out the antenna.....sounding good!**

## Antenna Party (cont.)

[...from Page 7] As Mike KI6DHT reports "...So many thanks to all of you for your assistance on Saturday, needless to say you did a splendid job in getting the antenna wired and tuned up. Granted there is a little left to do on the tuning front before I can go shopping for an ALS 600 solid state amplifier but that does not detract in the least from the sterling success of your efforts.

After the crew left, Susan went out to get us some dinner and then I sneaked the opportunity to test the radio and antenna. I worked Art K7ART (Northern AZ) on 40 m with a 5/9 QSB to 5/7 report.

After my walk the following morning I worked JA3NDG on 40m at around 05.30 with a 5/9 report.

Later yesterday afternoon I worked several 17m stations on the East Coast including Maine, a new State for me. So it appears that the antenna is working absolutely fine.

I did a short comparative test against the pre-existing dipole and the results cast doubt on whether the dipole is working correctly. There is a gain of between 3 to 4 S-points in every situation tested so far between the vertical and the dipole, and very substantially less noise. I am led to think that perhaps the dipole is only "working" on the open wire feeder portion of it, but I might just be wrong about that and it is genuinely THAT lousy!

Anyhow, I just thought you'd like to hear my preliminary findings and, once again, I am grateful to you all for giving up your Saturday and working so hard to help me complete the antenna project."





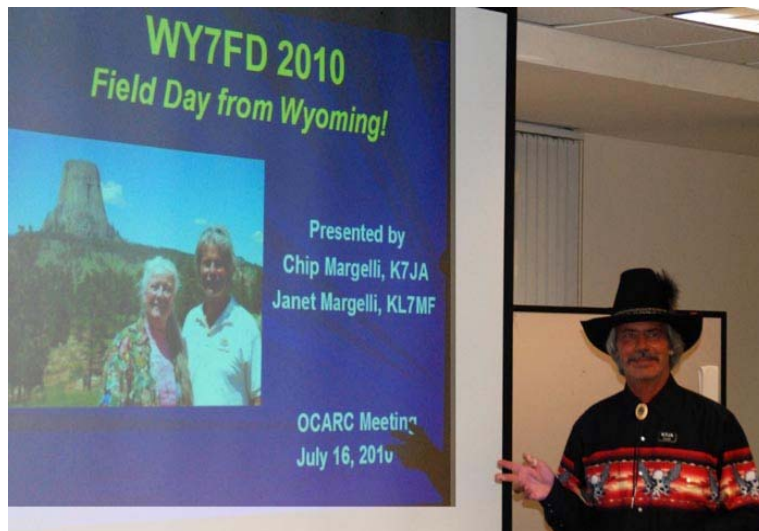
## OCARC General Meeting Minutes

### July 16, 2010

The OCARC February General Meeting was held at the Red Cross complex in Santa Ana at 7:05 pm on Friday evening, July 16th, 2010. There were a total of 38 members and visitors present. Roll call had all directors present for a quorum.

Kristin K6PEQ started the meeting with the Pledge of Allegiance. It was with great sadness, Kristin announced a very dear friend who became a Silent Key – KB7UB Dale Piedfort. Dale was a tremendous individual, many knew him as the crusty gentleman who worked at HRO ...but Dale beneath his exterior was a very kind and great person.

Kristin introduced our guest speaker, known to all “Chip Margelli” K7JA. Chip’s presentation “WY7FD Field Day 2010 from Wyoming” with his wife, Janet KL7MF, Janet’s Mom, Margaret KA7RYG (who flew in from Seattle), as well as two other friends from Upland, California – Bill W1HIJ and his wife Emily KF6SGV, their destination Warren Peak (Devils Tower). Janet and Chip joined their friends Katie WY7KRA and Dwayne Allen WY7FD.



**Fig 1 – Chip K7JA presented a terrific “slide show” on the 2010 FD efforts at WY7FD**

Chip started with a little remembrance of Dale KB7UB (SK). For those of you not at the meeting, Dale was a good friend to all and will be sorely missed.

Chip explained a little about himself and that Field Day is his #1 Priority, he loves to build antennas and after 45 years of doing so his interest has never faded. He commented that you can always get something out of Field Day no matter what!

“Field Day 2010 in Wyoming” was in the Northeast corner of Wyoming, the site was Warren Peak 6400 feet to the east and looking down at Devils Tower. Months of preparation and logistics made

## General Meeting Minutes (cont.)

the effort of this group a 100% success. Coax and antennas were shipped from California in preparation of Field Day. Antennas were assembled at the home of WY7FD and transported up the mountain to the site. One of the antennas crafted by Chip was a six element Yagi for 50 MHz using fiberglass fishing poles supporting #14 wire for the elements. Who would have thought to use a fishing pole!

The weather elements offered real challenges – heat, cold, lightning, fog and high winds. A tip Chip shared because the fog managed to get everything damp was to use WD-40 on the connectors to keep the moisture out. Now that is a clever idea, need to add that item along the duck tape and super glue!

The eight operators achieved great success with 1,789 CW QSO's and 2,012 Phone QSO's including bonus points the final score was 12,430! The pictures were fantastic! Thanks again Chip for a great presentation.

\*\*\*\*\*

Moving on to announcements, Ken W6HHC asked for volunteers to help Mike KI6DHT put up an antenna. By postponing the antenna building a week or two, he did have volunteers to help.

Kristin asked for additional help to fill a shift at the Orange County Fair on Wednesday July 21<sup>st</sup>. Chuck AE6YJ volunteered. Thanks to all for helping at the OC Fair.

We had a few new faces, Paul KB6OZZ from Whittier, Brett W6BAC from Redondo Beach – the scout master for the troop who worked with Field Day (12-13 scouts achieved their merit badge at Field Day). Speaking of a small world Ron WB6FRE was at Fort Bliss in the 60's and taught Radar with Robbie KB6CJZ. Art K6MIV joined the club, he is a familiar face at HRO (behind the counter) Art is a musician and normally has a gig going in the evening but was able to attend our meeting this evening. Welcome to each of these gentlemen.

Kris KC6TOD shared the news of one of the local hams Robert Ziegler KE6EVX, a familiar voice on many of the local repeaters – Robert was the victim of a hit and run driver and is currently in UCI in critical condition and will need months of rehabilitation.

FIELD DAY report – Ken W6HHC said that Field Day was a tremendous success, great participation for the entire weekend. He thanked all who participated, please look at the July newsletter for the complete results of Field Day 2010.

SHOW and TELL – Nicolas AF6CCF shared a CPO – code practice oscillator. The last couple of meetings Nicolas has had some interesting things to share. Thank you, Nicolas.

## General Meeting Minutes (cont.)

Chip K6JA demonstrated the antenna stand below using some simple items from your local hardware store, very inexpensive and clever.



**Fig 2 – During Show-n-Tell”, Chip K7JA demonstrated a home made tool to put-up “military mast without spaghetti”**

**(The white pipe is two sections of “military mast”)**

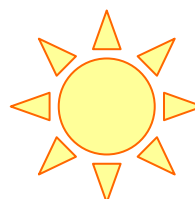
Remember if you have something for the Show and Tell bring it to the next meeting on August 20th, 2010.

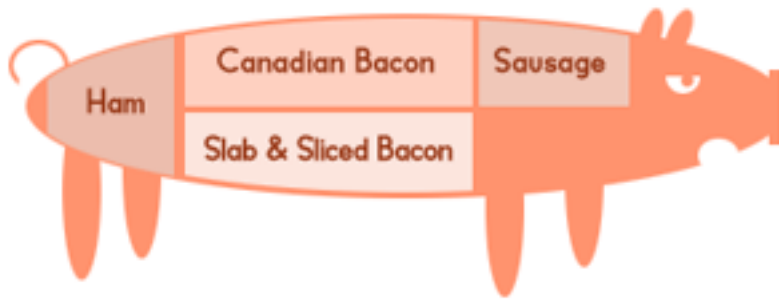
Just a reminder that the ORARC Board Meetings will now be held on the second Saturday of each month at 8:15 AM at the Jagerhaus Restaurant, 2525 East Ball Road Anaheim. Visitors are welcome.

The W6ZE will have an additional net on Thursday evenings on the WARA 2 meter repeater 145.400 at 8:00 PM; Nicolas AF6CF will be the net coordinator. Please check in and say hello.

Motion to adjourn at 9:15 pm by Larry K6YUI, seconded by Paul W6GMU.

Submitted by: Kristine Jacob KC6TOD, OCARC Secretary





## Ham Cuisine

*by Kristin, K6PEQ*

### Asian-style Pork Balls

#### Ingredients:

1 pound ground pork  
3 tablespoons cracker crumbs  
1/4 cup finely chopped onion  
1 egg  
1/2 teaspoon salt  
Dash black pepper  
2 cups sliced celery  
2 cups sliced fresh mushrooms  
2 tablespoons Worcestershire sauce  
1 8-ounce can water chestnuts, drained and chopped  
1 8-ounce can bamboo shoots, drained  
1 6-ounce package frozen pea pods, blanched and drained  
1/2 teaspoon salt

#### Cooking Directions:

Combine ground pork, cracker crumbs, onion, egg, 1/2 teaspoon salt and pepper; mix well. Shape mixture into 24 balls (approximately 1 tablespoon each). Cook pork balls in large skillet until browned. Remove, and keep warm. Drain drippings. Add celery and cook over medium heat 3-4 minutes, stirring occasionally. Add mushrooms and Worcestershire sauce and continue cooking 1 minute, stirring constantly. Add water chestnuts, bamboo shoots and pea pods. Reduce heat to low; cover and cook 3-4 minutes. Sprinkle vegetables with 1/2 teaspoon salt, stirring to combine. Return pork balls to pan and cook until mixture is heated through, stirring gently.

Serves 4

## Two OCARC Members Invited Back to Talk at ARRL TAPR Digital Communication Conference on Digital-ATV

Every September TAPR (a world wide organization of hams advancing the technology of digital ham communications) holds a Digital Communications Conference. Ken-W6HHC and Robbie-KB6CJZ have been invited back to make another presentation on Digital-ATV at the 2010 ARRL TAPR DCC conference that will be held in Portland, OR in September.

Rather than fly to Portland, Ken and Robbie will be making the presentation remotely. They plan to use Skype and WebEx to narrate a PowerPoint presentation from the comfort of their homes....and then spend the travel-money on ham radio gear, instead.

### 2010 ARRL TAPR Digital Comm Conference



### Testing a DATV Station using DVB-S

by

• Ken Konechy

[W6HHC@ARRL.net](mailto:W6HHC@ARRL.net)

W6HHC

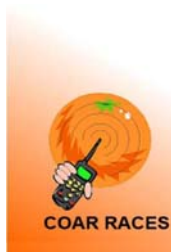
OCARC & COAR RACES

• Robbie Robinson

[KB6CJZ@ARRL.net](mailto:KB6CJZ@ARRL.net)

KB6CJZ

OCARC & COAR RACES





# ***OC Fair 2010 W6ZE Days!***









You don't need to write like William "Bill" Shakespeare in order to write an article for the RF Newsletter. In fact, we prefer articles without the words "Thy", "Whilst", "'Tis" and "Oft".



Do you have an idea for a newsletter article? Maybe you have acquired a new piece of equipment, designed or constructed a new antenna, took a trip focused around ham radio, want to share an amateur radio related experience or discuss a technical topic. Why not write an article for the monthly RF newsletter? The article can be short or long, simple or elaborate, and can even include pictures!

The RF newsletter relies on articles from our members. So why not give it try? Write an article and send it to the newsletter editor. It's fun, and at the same time, your contribution helps support our club and hobby!

If you want you can also try your hand as the newsletter editor. We have a rotating editor monthly and would love to have someone new give it a try. There is a template and it is easy and fun!!

# 2010 ARRL Southwestern Division Amateur Radio Convention September 17, 18 & 19 San Diego, California



Four Points, By Sheraton Hotel San Diego

<http://www.sandarc.org/>

8110 Aero Drive, San Diego CA 92123 Phone: (858) 277-8888

## Registration Form

*Please list additional Attendees – ALL ATTENDEES MUST BE REGISTERED*

*No charge for Children 16 or under when Accompanied by a Registered Adult*

How did you find out about the Convention?

☐ Radio ☐ Web search ☐ Ham Club ☐ News Paper ☐ Other \_\_\_\_\_

Call Sign: \_\_\_\_\_ Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_ E-mail: \_\_\_\_\_

Kids / Adults Call Sign Name (please print)

\_\_\_\_\_  
\_\_\_\_\_

Early Bird Dated before May 31, 2010	\$15.00 @ _____	ea. = \$ _____
Convention Pins Included (Limited Supplies)		
Pre Registration June 1, to Aug. 22, 2010	\$18.00 @ _____	ea. = \$ _____
At Door Registration	\$20.00 @ _____	ea. = \$ _____
Accompanied kids under 16 years Free		
DX Breakfast	\$23.00 @ _____	ea. = \$ _____
Banquet Tickets Dinner <input type="checkbox"/> Beef <input type="checkbox"/> Chicken <input type="checkbox"/> Vegetable	\$43.00 @ _____	ea. = \$ _____
Banquet Speaker: <i>To Be Announced</i>		
Convention Lunch	\$25.00 @ _____	ea. = \$ _____
Lunch Speaker:		
2010 Convention Pins	\$ 5.00 @ _____	ea. = \$ _____
2006 Convention Pins	\$ 3.00 @ _____	ea. = \$ _____
2002 Convention Pins	\$ 3.00 @ _____	ea. = \$ _____
QSL Card Checking		
Make Checks payable to:		

## SANDARC Convention

C/O R. Boehme W2IRI  
10340 Everell Pl.  
Santee, CA 92071

Web Form ver 1.03

### Staff Use Only

Registration \_\_\_\_\_  
Date \_\_\_\_\_  
Amount \_\_\_\_\_  
Check # \_\_\_\_\_  
# Pins given \_\_\_\_\_  
Receipt \_\_\_\_\_  
Signed up \_\_\_\_\_  
Other \_\_\_\_\_





## Attention Members!!!

Do you know a fellow ham that would be interested in joining OCARC? Do you have a friend that is curious about ham radio and wants to learn more about our hobby? Why not invite him or her to one of our exciting monthly meetings?!?! The meetings are fun, informative and entertaining. Check out the website to see the exciting speakers we have lined up for the next couple of months. Don't forget about the great raffle prizes too. So bring a visitor to one of our meetings, and help **your** club expand!

Make sure to inform your friends of our club's website, which is always kept up to date. Information on club meetings, activities and our newsletter archive make it a worthwhile site to surf! <http://www.w6ze.org>

\*\*\*Editors Note - We have had a lot of great feedback on our website and how helpful and informative it is. A special thanks to Bob, AF6C, and Ken, W6HHC, for all of their time and effort in updating and maintaining our great club website! Make sure you let them know what you think the next time you see them!

