



# Sierra Foothills Amateur Radio Club

<http://www.sf-arc.org/>

MARCH 2010

PO BOX 1005. NEWCASTLE. CA



## At the key of SFARC

### OFFICERS

#### PRESIDENT

Al Martin, NI2U  
amartin4@wavecable.com

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Charles Baker, AE6LR  
ae6lr@yahoo.com

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#### REPORTERS

Satellites: Greg, KO6TH

History: Gary, KQ6RT

Misc Radio: Fred, K6DGW

Sunshine: Richard WA6RWS

rkuepper@ymail.com

916-482-5027

### RESOURCES

#### REPEATERS

145.430 (-0.6 MHz/PL 162.2)

440.575 (+5.0 MHz/PL 94.8)

223.860 (-1.6 MHz/PL 100.0)

#### CLUB NET

Thursdays, 7:30PM, W6EK/R  
145.430

#### CLUB MEETINGS

Second Friday of the month,  
7:30PM at the Library, 350

Nevada St, Auburn CA

#### CLUB BREAKFAST

Last Sat of the month at  
Susie's Café, Cirby at Riversix  
Roseville - 8:00 AM

#### NET CONTROL OPS

Dave Jenkins, WB6RBE

Gary Cunningham, KQ6RT

Norm Medland, W6AFR

Casey McPartland, W7IB

#### NEWSLETTER EDITOR

Matthew Diridoni, KC6RUO

916-749-3032

mattteod@comcast.net

S

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## Calendar of Events

March 12th **SFARC Club Meeting**

April 17<sup>th</sup> **MS Walk, Rocklin, CA  
Operators Needed!  
See page 6**

April 30-May 2 **EMCOMMWEST  
Reno, Nevada  
<http://www.emcommwest.org/>**

May 23 **Sacramento Hamfest NHRC,  
Natomas High School, off  
Truxel Rd.  
<http://svhamfest.org/>**

**June 26 & 27 ARRL Field Days**

For more information and rules on the ARRL activities listed above, go to:  
<http://www.arrl.org/contests/calendar.html?year=2010>

## SFARC CLUB MEETING

**MARCH 12**

**PSK31 VIDEO**

**Don't miss this interesting  
presentation!**

**"Tech Ten" Presentation  
ARRL PROPAGATION REPORT  
Bring a friend  
See you there!**

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## From the Presidents Shack

Al Martin, N1ZU

President's Thoughts

The Board is active and meets prior to the meeting but at The Round Table Pizza located in the Shopping Center off Elm in Auburn. It is near the vacant Gottschalks. The meeting time is 5:30 in a room set aside for parties. All are welcome, especially those who want to volunteer for some of the club activities.

Chuck AE6LR is working hard to have interesting programs; thank-you Chuck.

As reported last month, the repeater committee is chipping away on the work necessary. That will continue. The questions about the pole supporting the antenna remain. George KG6LSB has made some contacts but so far has not secured anyone to replace the pole. George, thank-you for your work

Now for some homework, there are multiple definitions for Life Member. The proposal for the SFARC is that a Life Member be awarded free membership in the SFARC for the remainder of his life. Please bring alternate proposals to the meeting.

The club breakfast at Susie's Creek Side Café on the corner of Cirby and Riverside in Roseville is always a good time. Try to get it on your calendar; it is on the last Saturday of the month.

See you at the meeting on March twelfth.



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## Miscellaneous Radio

### By Fred Jensen, K6DGW *Transmitter Efficiency*

A sizable fraction of my on-air operations these days are in contest situations, but every now and then, I will find someone in the middle of the day for a CW rag chew. Not too long ago, one of these extended QSO's sort of drifted onto the subject of how efficient his rig was. He was running an IC-7800 which is one of those "Tokyo By Night" beasts that weighs a lot and has lots of displays and LED's. Efficiency is not a subject we typically hear much about these days. The power amplifiers in modern transceivers are all linear, solid-state, and generally broadband such that they don't require any tuning. Everything, including receivers, electronic keyers, and filtering is integrated with the transmit portion. They may not be exactly "plug it in, connect the antenna, and get DXCC in two weeks," but they're close. I really have no idea what my K3 at 100 watts PEP output sucks out of PG&E's power grid even if our new "smart meter" does, and I really don't care. But, it has not always been so.

Before the advent of SSB [requiring linear amplifiers] and transceivers, the power amplifier stage in most ham transmitters was operated Class C because it is the most efficient, and efficient meant "more output for less input" which in turn meant a smaller, lighter, and less costly power transformer. Plate modulators, which required a fair amount of linearity, generally ran Class B, for the same reason.

Not so for AM broadcast stations. To get the highest linearity and lowest distortion, it was common to modulate at a low level stage [using Class A amplifiers] and then produce the final output with Class A amplification as well. Since the best efficiency you could get from a Class A amplifier is about 25%, the power amplifier stage in a 50 KW broadcast transmitter would operate at about 200 KW plate input, not counting all the preceding stages and the filament power for the final PA. For FM transmitters however, since FM is a constant-envelope modulation system and linearity in the RF stages following the modulator

means nothing, FM broadcast transmitters would commonly run Class C.

The discussion in the QSO reminded me of an episode that occurred on Mt. Wilson [Los Angeles] in the very late 50's. I had had the opportunity to help construct the transmitter site for KPFK-FM [90.7 MHz] one summer. I was already working at the TV station in San Luis Obispo while at Cal Poly, but the CE gave me the summer off thinking it would be good experience for his youngest engineer. The transmitter was literally homebrewed. The power amplifier stage was four Eimac 4-1000A's in parallel running Class C. We were authorized 10 KW output to the 10 dB antenna for 100KW ERP, so at roughly 70% efficiency, we ran at about 4 KV plate voltage at about 3.5 amps. We had a window into the PA compartment, and the plates of the tubes glowed fairly brightly.

I had about a week before going back to San Luis, the site was built, we were on the air, and there really wasn't much for the transmitter engineer to do, and I was moderately bored one warm afternoon. They were going to have to do a commissioning proof-of-performance right after I left which would involve measuring the PA efficiency and the power out. They would do this using a water cooled dummy load they would borrow from KCBS Channel 2. It was on a wheeled base, about 5ft tall and weighed close to a half-ton. I had finished my freshman year, and had my physics and math books there to try and remember what the school assumed I had learned, and I began to wonder if I could measure the efficiency without actually measuring the power output.

The bottom of the PA compartment was sealed and the air handler pressurized the section below the tubes. The air flowed up through the sockets, and between the tube envelopes and the glass chimneys around them, and out the top where the finned plate caps got some of the flow, and then out the top of the cabinet in a vent pipe. We had two thermometers, one in the lower compartment, and one just above the tubes. And just for grins, and because Steve had one, we had a manometer to measure the pressure in the lower compartment. If you've never seen one, it's just a U-shaped glass

tube, one end open, and the other connected by a tube to the compartment. It had water in it and a scale behind it. The difference in the water level in the two arms of the U measured the pressure differential between the compartment and the area at the top of the tubes..

As I said, I was pretty bored, and a little tired of doing physics problems at the back of the chapters, and it occurred to me that I might have enough instrumentation to measure the efficiency. The manometer told me that the pressure differential between the lower and upper compartments wasn't very high – the air entered and blew up by the tubes fairly fast. So I decided to ignore the small differential and assume that the air was heated at constant [atmospheric] pressure. I was also propelled to make this assumption because I didn't know enough physics or calculus to account for a variable pressure. The big question was, “What is the mass of the air blowing by the tubes?”

It finally occurred to me that I knew the power going into the filaments of the four tubes, and for all practical purposes, all of that power was converted to heat – quite a bit. A 4-1000A required 7.2V RMS at 21 A or 150 watts times 4 tubes was 600 watts total and I figured 600 watts would heat the air at least a little. So the next morning I got up a couple of hours early [I was living at the site, it is a couple of hour trip from Los Angeles to Mt. Wilson], turned on the filaments, and waited until the input and output temperatures stabilized. Knowing the filament power, I could calculate the mass of the air flowing past the tubes, or at least so I thought.

Sign-on time came, I put us on the air and again waited for the two temperatures to stabilize and the temperature difference between incoming and outgoing air was a whole lot higher than with just the filaments of course. Based on that, and with my slide rule [pocket calculators hadn't been invented yet] and the mass flow number I had computed, I figured I could calculate how much energy was going up the vent as heat. I knew the plate input power [4KV times 3.5 amps or 14 KW], and the energy going up the vent came from part of that. The rest of the plate input power must be RF heading up the 3 1/8” solid coax. I

finally worked this out and it seemed like we were only putting about 9 KW into the coax. I didn't know if there was something wrong with the transmitter, or if my big run at physics was off track, but I suspected the latter.

That night after sign-off and getting into my sleeping bag, it hit me ... I hadn't accounted for the 600+ watts of filament power. All four filaments were certainly on when we were on the air and still contributing all that heat to the total. Next morning, I repeated the measurements, but this time I subtracted the heat equivalent of 600 watts from my calculation of the energy heading up the vent.

I was leaving to head back to Cal Poly that night after sign-off, and I left a note for Gary who was coming up early in the AM to replace me: "Gary, I think the PA is running at 71% efficiency, and at 4 KV and 3.5 amps, we're stuffing 9.90 KW up the coax. Please call me and leave a message at the TV station and let me know what the commissioning tests say.

I got back to school, went in for my first shift at the TV station, and found a message waiting for me from Gary. "Fred: We measured 10.09 KW output for an efficiency of 71.93%." I decided it had been a good day for physics.

Cycle 24 sunspots are appearing, things are looking up! Very up!!

73,

Fred K6DGW



## SFARC OFFICER MEETING MINUTES February 12, 2010

Meeting was held at the Round Table Pizza in the Elm Ave Shopping Center.

Present were President Al NI2U, Vice President Chuck AE6LR, Secretary Bill W6WEM, Treasurer Bob KD6WTY, and Director Frank N6GP, Director Kurt N6RS. Absent was Director George KG6LSB, Newsletter Matt KC66RUO. Also present was Richard WA6RWS, Mary Anne KE6EST, and Eldred KD6ZSL.

A discussion was held on the By-Law revisions and typos. This will be a several month process. Al NI2U will post the changes in the newsletter for club members to look at and comment.

Richard explained the Auto patch feature for the repeater. Also Richard is looking into finding someone to evaluate the pole the antennas are mounted on.

Chuck AE6LR needs topic for the Tech ten.

Kurt expressed safety concerns at the repeater site. Kurt also regretfully resigned his Officer seat.

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# SFARC CLUB MEETING MINUTES

February 12, 2010



Local ARRL Exam Sessions  
Courtesy of the ARRL

President Al NI2U called meeting to order at 1930 hours followed by the pledge of allegiance, Club Officer introductions, member and visitor introductions.

Secretary Report – Bill W6WEM summarized the Officer's meeting.

Treasurer Report - Bob KD6WTY reported \$1854.66 as of 2/12/10

Gary KQ6RT Volunteered for Kurt's vacant Officer's position. (Jim KI6AZH initially volunteered for the position, however, Jim was unsure he was eligible.)

VE Report - Casey W7IB reported 3 exams were taken

Richard WA6RWS handed out cards with the codes for the Auto Patch feature on the repeater and explained how the features work. Some discussion was raised about dialing 911 and what dispatcher the call is handled by. 900 and directory assistance numbers will be blocked.

Sunshine Report- Richard WA6RWS reported he met with Joe KF6OQY and Doty K6DMS for lunch and told them that they were voted by the club membership as Lifetime Members. Joe was moved by the news.

Tech –Ten – Al NI2U continued his discussion on RF Exposure. Handed out material on compliance distances.

Old Business – Al NI2U reported the work on the By-Laws revisions and that they will be posted in the Newsletter for membership review and comment.

Guest Speaker – Sonya Vargas, Community Service Coordinator for Calstar.

An informative presentation on the history, services and membership programs that are available.

Respectfully Submitted By,  
Bill Mahl W6WEM, Secretary

20-Mar-2010

**Sponsor:** RIVER CITY ARCS

**Time:** 7:00AM (Walk-ins allowed)

**Contact:** KENNETH M HALL

(916)492-6115

**Email:** [W06J@ARRL.NET](mailto:W06J@ARRL.NET)

**VEC:** ARRL/VEC

**Location:** CARMICHAEL ELKS LODGE-USE EAST ENTRANCE

5631 CYPRESS AVE

CARMICHAEL, CA 95608

03-Apr-2010

**Sponsor:** UNSPONSORED

**Time:** 8:00AM (Walk-ins allowed)

**Contact:** LARRY R HODGE

(916)361-2476

**Email:** [LARRYHODGE2000@COMCAST.NET](mailto:LARRYHODGE2000@COMCAST.NET)

**VEC:** ARRL/VEC

**Location:** RALEY'S COMMUNITY EVENT CENTER

6845 DOUGLAS BLVD

GRANITE BAY, CA 95746

17-Apr-2010

**Sponsor:** RIVER CITY ARCS

**Time:** 7:00AM (Walk-ins allowed)

**Contact:** KENNETH M HALL

(916)492-6115

**Email:** [W06J@ARRL.NET](mailto:W06J@ARRL.NET)

**VEC:** ARRL/VEC

**Location:** CARMICHAEL ELKS LODGE-USE EAST ENTRANCE

5631 CYPRESS AVE

CARMICHAEL, CA 95608

01-May-2010

**Sponsor:** UNSPONSORED

**Time:** 8:00AM (Walk-ins allowed)

**Contact:** LARRY R HODGE

(916)361-2476 (916)361-2476

**Email:** [LARRYHODGE2000@COMCAST.NET](mailto:LARRYHODGE2000@COMCAST.NET)

**VEC:** ARRL/VEC

**Location:** RALEY'S COMMUNITY EVENT CENTER

6845 DOUGLAS BLVD

GRANITE BAY, CA 95746

15-May-2010

**Sponsor:** RIVER CITY ARCS

**Time:** 7:00AM (Walk-ins allowed)

**Contact:** KENNETH M HALL

(916)492-6115 **Email:** [W06J@ARRL.NET](mailto:W06J@ARRL.NET)

**VEC:** ARRL/VEC

**Location:** CARMICHAEL ELKS LODGE-USE EAST ENTRANCE

5631 CYPRESS AVE

CARMICHAEL, CA 95608

**RADIO OPERATORS NEEDED FOR  
2010 MS WALK IN ROCKLIN, CA  
APRIL 17<sup>TH</sup> 2010.**

Sierra Foothills ARC has been asked to support the annual MS walk in Rocklin on Saturday April 17 2010 2010.

I'm looking for volunteers for about 4 and 1/2 hours that day. We need a total of 6 people all with handhelds. The walk is held in Rocklin at the Sunrise Adventure Church on Stanford Ranch Rd and we need to be there about 0830 and stay until about 1200.

Contact me at [grsim@mindspring.com](mailto:grsim@mindspring.com) with any questions and to volunteer.

George KG6LSB

**Fifty Years Ago at SFARC  
By Gary Cunningham, KQ6RT  
March 3, 1960**

The regular stated meeting of March 3, 1960 was called to order sometime after 8 pm by President James Carman. Visitors at this meeting were: Paul Traub, Jack Schrawder, Mrs. Walt Randall, George Randall, and Bob Hicks. Nine members were also present.

The minutes of the previous meeting were read by Secretary Walt Dowdy and approved. Frank Carman moved that election of last meeting be voided. Motion was seconded and passed. A new motion was made and seconded that nominations be made for officers of the club for balance of this year.

Nominated were:

For President: James Carman.

For VP: Mike Bauman and Sage Otow.

For Secretary-Treasurer: Walt Dowdy and Dick Lund.

For Activities Manager: Bob Davis and Walt Randall.

Results: President: James Carman (Unanimous)

VP: Mike Bauman (5 to 4)

Secretary-Treasurer: Dick Lund (5 to 3)

Activities Manager: Bob Davis (7 to 2)

After the election Frank Carman led a discussion of the MARS Net.

Frank Carman suggested a TVI committee. Discussion followed. Moved and seconded that the activities manager and his assistant investigate angles involved. Bob Davis, Jim Carman and Frank Carman were chosen to be the committee to investigate.

The treasurer reported a balance of \$75.60. Lynn Hunter paid \$1.50, Mike Bauman \$2.00 and Walt Randall \$2.00, so the balance now is \$81.10

Respectfully submitted,  
Dick Lund  
Secretary-Treasurer

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<http://www.sf-arc.org/>



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Associate Name: \_\_\_\_\_ Call: \_\_\_\_\_ Class: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Application: (Circle One) New Renewal

Member Dues: Circle Amounts That Apply. Applications (for new members only) received in the middle of the year will be pro rated. Contact the President or Treasurer for exact rate.

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Associate: (Q)	\$ 7.00	Repeater Donation: (S)	\$ _____
Auto Patch Donation: (T)	\$ _____	Newsletter Booster: (V)	\$ _____
Misc. Donation: (X)	\$ _____	Christmas Donation: (W)	\$ _____
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