

Sierra Signals



Sierra Foothills Amateur Radio Club
Auburn, CA
An ARRL Special Service Club

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

JUNE 2009

PO BOX 1005. NEWCASTLE. CA



At the key of SFARC

OFFICERS

PRESIDENT

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norm.linda@surewest.net

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grsim@mindspring.com

Chuck Minton, KG6FFK
chuckminton@wizwire.com

Kurt Hess, N6RS
khess01@comcast.net

REPORTERS

Satellites: Greg, KO6TH

History: Gary, KQ6RT

Misc Radio: Fred, K6DGW

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, K6ARR/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 Riverside,

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

matteod@comcast.net

S

F

A

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C



Calendar of Events

June 13-14 ARRL June VHF QSO Party

June 27-28 2009 Field Day! - Nyack CA
Field Day is a Family Event!
Preliminary plans are for a BBQ
and Dinner. More specific
details will follow. Reserve the
dates.



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June Meeting Program

The program for June will be discussion on the 2009 Field Day. We will go over all aspects of Field Day and what to expect at this family event.

Bring a friend, visitors welcome!
See you all there!

We encourage members to receive Sierra Signals via email to save the Club the cost of reproduction and mailing

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SFARC Membership Meeting

May 8, 2009

The meeting was called to order at 7:32 by Secretary Wayne, W6DT. The president and vice president were both unavailable to attend the meeting. Flag salute was followed by introduction of the Officers, Directors and the members and guests.

It was announced that Joe and Dottie Silva have sold their home and are moving to Sparks, Nevada to be closer to family. Joe and Dottie have been long time members and board members of the club. Their presence will be greatly missed.

Treasurer Leslie, K7NYE, gave the treasurer's report and we are still in the black.

Chuck, KG6FFK, gave an ARES report. The VE report by Casey, K7IB, reported that there were more examiners than test takers, but that the results were good. George, KG6LSB, gave an update on the motorcycle enduro which has been postponed. He also noted that a bicycle ride was being held on June 6, 2009 and volunteers were needed.

Jim, K6ARR, gave an update on the club repeater which has been down for several weeks due to a bad transmitter. Wayne, W6DT, updated the information on the Pave Paws tour for those interested.

The Minton family has been providing the refreshments for the last three years and need to pass on the duty as their girls have many other activities now on Friday nights. Casey K7IB, and Leslie, K7NYE, will start to provide the coffee. The issue of other items was not resolved.

Briton, N6UG, commented to the members about the legacy of MARS and the many positive reactions from people now who were overseas in the military back when and their fond memories of the service provided by the MARS operators.

Richard, WA6RWS, when asked to bring the club up to date on the status of the backup repeater, reported that Dave Fortenberry, NA6DF, owner of Radio Supply in Auburn, had volunteered to install the repeater at Jim Griffith's property. Briton, N6UG, made a motion that we install the backup repeater at the main repeater site instead of at Jim's as the main repeater was down, probably for the count. The motion was seconded by Dave, NO6NO. The motion carried by votes expressed by a show of hands. Discussion

followed about what to do about the repeater. A recommendation was made by Gene, KG6NYH, that a request for funds for a replacement repeater to the Western States Trail Association might be looked upon favorably by that group, as they use the repeater for their event. Gene is a committee member of that group. Debbie, KF6LXN, suggested that this might be the time to think big and outside the scope of just a replacement repeater. We can always scale back if we don't get the necessary funds. Casey, W7IB, offered to put together a quote for a new commercial repeater. It was decided that the repeater committee take up the topic and report back.

Wayne, W6DT, noted that Field day was almost upon us and that while decisions would be made at the June meeting, a show of hands indicated that about 15 members planned to attend to some degree on the last full weekend in June. Leslie, K7NYE, agreed to go ahead and send a letter to the owners of the camp ground at Nyack along with a copy of our insurance policy declaration page.

The main presentation was by Greg, KO6TH. He gave a talk illustrated by a PowerPoint presentation about Satellite communications. He showed the basics and how to get started with minimal equipment up to more sophisticated stations and contacts. The talk was very well done and well thought out. Examples were very good.

After the presentation the drawing was held and the meeting was adjourned at 9:30 PM.

Respectfully submitted,

Wayne Stilwell, W6DT
Secretary



Radio Supply Company

We've moved! Now located at:
11846 Atwood Road, Auburn, CA
Telephone (530) 888-8483



Local ARRL Exam Sessions
Courtesy of the ARRL

06-Jun-2009

Sponsor: UNSPONSORED
Time: 8:00AM (Walk-ins allowed)
Contact: LARRY R HODGE
(916)361-2476
Email: LARRYHODGE2000@COMCAST.NET
VEC: ARRL/VEC
Location: RALEY'S COMMUNITY EVENT CENTER
6845 DOUGLAS BLVD
GRANITE BAY, CA 95746

20-Jun-2009

Sponsor: RIVER CITY ARCS
Time: 8:00 AM (Walk-ins allowed)
Contact: KENNETH M HALL
(916)492-6115
Email: WO6J@ARRL.NET
VEC: ARRL/VEC
Location: CARMICHAEL ELKS LODGE-USE EAST ENTRANCE
5631 CYPRESS AVE
CARMICHAEL, CA 95608

18-Jul-2009

Sponsor: RIVER CITY ARCS
Time: 8:00 AM (Walk-ins allowed)
Contact: KENNETH M HALL
(916)492-6115
Email: WO6J@ARRL.NET
VEC: ARRL/VEC
Location: CARMICHAEL ELKS LODGE-USE EAST ENTRANCE
5631 CYPRESS AVE
CARMICHAEL, CA 95608

15-Aug-2009

Sponsor: RIVER CITY ARCS
Time: 8:00 AM (Walk-ins allowed)
Contact: KENNETH M HALL
(916)492-6115
Email: WO6J@ARRL.NET
VEC: ARRL/VEC
Location: CARMICHAEL ELKS LODGE-USE EAST ENTRANCE
5631 CYPRESS AVE
CARMICHAEL, CA 95608

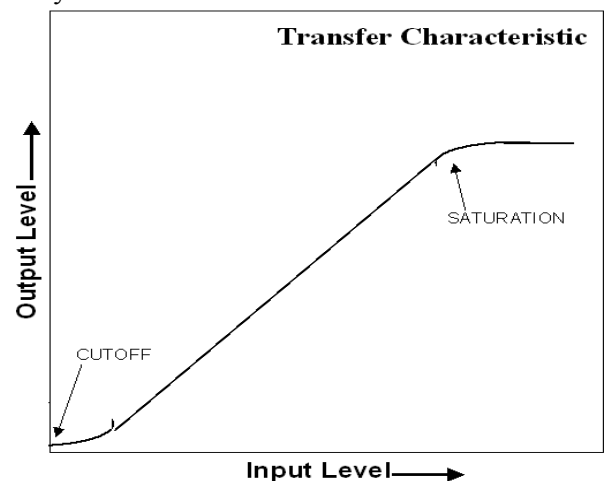
Miscellaneous Radio

By Fred Jensen, K6DGW

Amplifiers

Of all the various electronic circuits there are, amplifiers are ubiquitous [I love that word] just like oscillators, power supplies, and the like. Amplifiers have a basic task ... make something bigger. The "something" can be a voltage, a current, or a combination of the two which we call power. It can be DC, audio, RF, or combinations of them. The primary characteristics for all amplifiers that we care about are, "how much bigger" [gain], "how much power does it take" [efficiency], and "how faithful to the input waveform is the output waveform" [distortion]. And, not all amplifiers are created equal in this regard.

Many years ago, amplifiers used tubes, and some still do. My linear amplifier has a pair of Eimac 3-500Z's in it. But, except for really high power amplifiers, most these days are solid state. Again many years ago, amplifiers were grouped into "Classes" and still are. They are based on a "Transfer Characteristic" which is



simply a plot of the DC output amplitude [Y-axis] vs the DC input amplitude [X-axis]. We call the DC input level "bias." Here's a sort of stylized example applicable to both tubes and transistors.

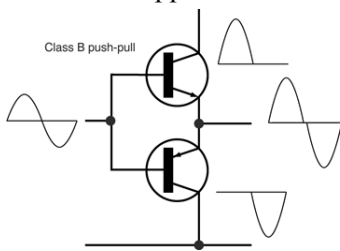
At some bias level, the amplifier does not amplify, marked "CUTOFF" on the plot. As the input level rises, the output begins to follow the input in a linear fashion [the slanted straight line] – that is, doubling the input results in a doubling of the output. Eventually, at high enough input levels, the amplifier can no longer increase its output level and we call that "SATURATION."

Everything that follows is based on this Transfer Characteristic. Here are the amplifier classes and how they operate:

Class A: If we bias the amplifier so that with no signal, it is operating at the middle of the linear section of the characteristic, we have a Class A amplifier. Impressing the alternating signal [let's assume it's a 40m SSB signal] on that bias voltage, the input will swing back and forth across that linear part and the output will too [only bigger, it's an amplifier]. Since the transfer characteristic is very close to linear, there will be very little distortion. If the size of the input signal is too large, it will swing down near or past cutoff and beyond saturation, the characteristic is not linear there, and the output won't look like a bigger copy of the input. That's distortion, colloquially called "flat topping." It generates a bunch of distortion products and makes your signal much wider ... and very objectionable to your comrades on the band.

In terms of efficiency [i.e. output power produced divided by total power consumed], Class A amplifiers are at the bottom of the heap. The reason is that the amplifier element is conducting [i.e. consuming power] all the time, even when there's no input. Class A efficiencies generally run around 25% at best, but so long as it isn't overdriven, the distortion is very low. Class A amplifiers were the workhorse of high quality sound systems.

Class B: Suppose we bias the amplifier right at cutoff.



Now the part of the input signal that is positive will produce a more or less faithful copy at the output. The negative excursions of the input signal will produce

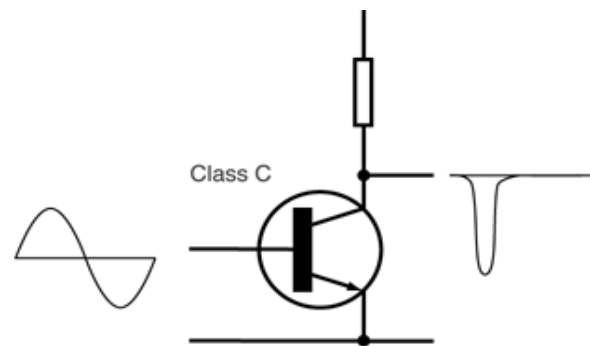
nothing. This is a huge amount of distortion, but if we combine two amplifier elements and have one conduct on the positive excursions, the other on the negative excursions, and then combine the two outputs, we get a lot closer to our original signal waveform. So long as it isn't overdriven, the residual distortion results from the fact that the transfer characteristic isn't linear right down near zero. We call this crossover distortion.

In the AM days in ham radio, it was common to plate modulate your transmitter final stage with a push-pull pair of tubes operating Class B. You can see the crossover distortion in the combined output where the two halves don't exactly match up. For efficiency,

Class B beats out Class A by quite a bit since with no input, neither amplifier element is conducting. 50% is common.

Class AB: It turns out that if you bias the amplifier down near but not quite to cutoff, you can reduce the crossover distortion some since the two halves line up a little better. You give up a little efficiency [i.e. there is some small current being drawn even with no input], but the reduction in distortion is nearly always worth it. Most higher power vacuum tube linear amplifiers operate Class AB.

Class C: We don't find too many Class C amplifiers around ham equipment anymore, but there was a time when they were the amplifier class-of-choice for your CW or AM transmitter. Assume for a moment that it's 1955, you are building a CW transmitter, and you have never heard of SSB before. For Class C, we bias the amplifier way beyond cutoff. Now, only the tops of the positive excursions of the input waveform drive the amplifier into conduction. The output waveform is a series of pulses, and the distortion is beyond huge. Like square waves, those pulses are a combination of



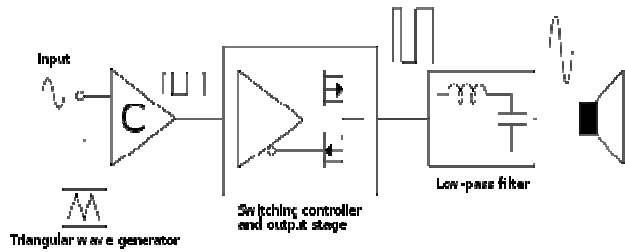
many harmonics of the fundamental frequency and are thus very wide band.

However, the RF amplifier fed the high powered pulses into a "tank circuit" comprising an inductor and one or more capacitors. The tank is tuned to your operating frequency and it acts as a band-pass filter ... It passes the fundamental frequency, but attenuates the harmonics [or so we hoped when the neighbor was receiving TV on rabbit ears ☺]. An alternate way of thinking about the action of the tank circuit was that if "banged" with pulses at it's natural frequency, it will "ring" like a bell, and smooth out the pulses into a sine wave [or close].

In the days of vacuum tube amplifiers, that was about it. Class AB was sometimes divided into two variants: AB₁ in which the grid was never driven positive, it never drew current, so the power input requirements were very low; and AB₂ where the grid was driven positive and did draw current. For a variety of

reasons, AB₂ was slightly more efficient, but also produced slightly more distortion.

Class D: With the advent of solid-state devices, some



new innovative amplifier classes arose. Class D brought in the concept of a switching amplifier and the block diagram looks more complex than it really is. The triangle marked “C” is just a converter that turns the input sine wave into a series of rectangular pulses. The pulses get wider as the sine wave goes up in amplitude. These pulses are used to switch the supply power on and off. The harmonics in the rectangular output pulses are filtered out and we’re left with the original sine wave, only much bigger.

Since the switching transistors [usually FET’s] are either off [not conducting at all] or fully on in saturation [very little voltage drop across them so very little wasted power], the efficiency can be very high. With good filter design, the distortion can be kept very low and, since you are directly switching the supply power, you can get very high power gain from a single stage.

There are others [creatively named E, F, G, ...] that are all “wrinkles” on the Class D design to tweak efficiency and/or distortion even more. But, that’s pretty much it. Incidentally, the “D” in Class D does not stand for “digital.” The pulse train is not a binary encoded digital stream, it’s pulse width modulation.

73,

Fred K6DGW

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Fifty Years Ago at SFARC



RE-PRINT CQ MAGAZINE FEBRUARY 1956

Slightly “radio active” are the Metke Family of Roseville, Calif. L to R are Doc, K6HLO, OM Bob, W6SUP. Janet and Jerri, K6GKR. We will bet it won't be long before Janet is trading in that doll for an 807 too!

Editors Note: Janet did become a Ham (KC6LIX) as well as her husband Greg Huttula, KC6LOE. Bob is now a Silent Key, Doc is living in the Roseville area, and Janet, Greg and Jerri are living in New Hampshire and doing well. The Metke's were long time members of SFARC and still receive the SFARC Newsletter.

DON'T FORGET TO CHECK OUT OUR WEB PAGE

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

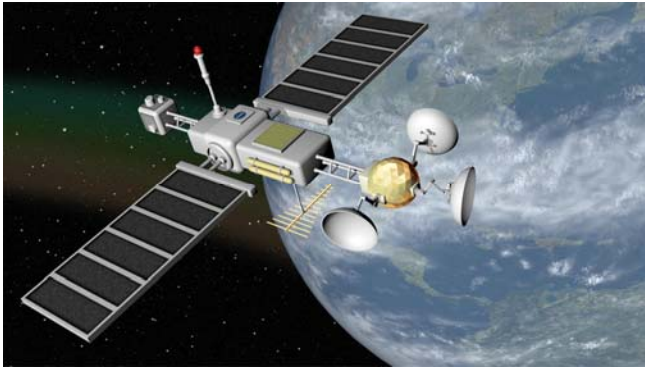


HOME Meetings Breakfast Repeaters Nets Officers Newsletters Member Application

Welcome to the Sierra Foothills Amateur Radio Club's Website

Please use the navigation buttons above to view our [site](http://www.sf-arc.org/)





SFARC SATELLITE REPORT

GREG DOLKAS, KO6TH
Four Micro Satellites Launched

On May 19th, 2009, the US Air Force launched TacSat-3, an imaging demonstration satellite for the U.S. Military. The satellite has a "unique bus architecture" that allows for the rapid integration of payload components, which I presume to mean that they can assemble and launch purpose-specific satellites quickly in the future. That's nice, but it's not the subject of this article.

Tucked along side TacSat-3 on the launch vehicle were four little satellites, sharing the ride into space. As with a large portion of the "cubesat" class of satellite, these had a distinctively scientific focus. The first, PharmaSat-1, is a 4 x 4 x 12 inch follow-on to the GeneSat-1 satellite which was launched in December of 2006 by NASA and several universities. That satellite, also about the size of a Presto fireplace log, demonstrated an automated life support and analysis laboratory for doing genetic research on E. Coli bacteria in the spaceflight environment. PharmaSat-1 builds on that success with a miniature laboratory to study the effects of microgravity on a yeast's resistance to an antifungal agent. Sure sounds impressive. With an amateur radio downlink in the 70cm band, you can listen in on the action on 437.465 (plus or minus the Doppler shift!), using normal 1200bps AFSK Packet radio. The command team encourages everyone to capture and submit telemetry from both of the satellites (GeneSat-1 is still operating) on their website: <http://www.pharmasat.org>. They also have a form where you can request the archived beacon data to be sent to you.

CP-6 was another passenger on the ride to space. The sixth of a series of small 4 inch cube satellites from Cal Poly, CP-6 is intended to experiment with a system to control the orientation of the satellite in space by a technique called "Magentorquing". This uses small electromagnets built into the faces of the cube to push against the Earth's magnetic field, causing the cube to rotate in the opposite direction. By carefully timing the electric current pulses going

through the panels, the cube can be made to rotate in any direction.

You can listen in on CP-6 on 437.365 using normal 1200bps AFSK Packet radio. Web information is available.

<http://polysat.calpoly.edu/CP6.php>

Not much is known about the next satellite, HawkSat-1. Their web site,

<http://www.hawkspace.org/projects.html>, only describes the mission as "providing a platform for experimental research funded by a major aerospace firm." A frequency of 437.345 has been posted elsewhere on the Web, with unknown modulation. They also seem very proud to have done this entirely on the East Coast. So? I guess I didn't realize that this was a problem...

The final satellite is AeroCube-3, a non-amateur radio satellite. The primary mission is listed as a demonstration of a 2-axis Solar tracker, and an Earth tracker, both of which are used in spacecraft guidance systems. Also on board is an inflatable 2-foot balloon, which will be used to accelerate the spacecraft's orbital decay after the mission is over by acting somewhat like a small cosmic parachute.

So, there you have it; several new satellites in orbit, using Amateur Radio to relay their scientific discoveries back down to Earth. Enjoy the new birds!

Greg, KO6TH

BACKUP REPEATER INSTALLED IN ORIGINAL SITE VAULT IN AUBURN.

The backup repeater was installed May 25th by Dave Fortenberry. He is an expert technician and doing work for the club for absolutely no charge. The building where the repeater is located is small and interior space is limited.

Mr. Fortenberry suggested we build a wooden equipment rack that is more convenient and accessible for equipment such as the 220 repeater and has found volunteer help to make the racks.

If you have any questions or suggestions about the repeater, contact Richard Kuepper, WA6RWS. Richard is the repeater committee chairman.

The repeater sounds good and has a CW identification with the SFARC club call of **W6EK**.



Sponsored by the Lincoln Rotary Club and presented by these Sacramento Valley Amateur Radio Clubs:

- River City ARCS – www.n6na.org
- Western Placer ARC – www.wparc.org
- Yuba Sutter ARC – www.ysarc.org

For information, contact:

- Steve, KT6Z – kt6z@arrl.net
- Andy, W6AWS – w6aws@arrl.net

Talk-in frequencies:

- W6SAR/R [-] 146.64/156.7 PL
- WD6AXM/R [+] 146.085/127.3

Proceeds to go to charity

Second Annual Sacramento Valley Hamfest

Sept. 12, 2008

07:00 – Noon

*Lincoln High School
Lincoln, CA*

- Raffle Drawings
- VE Session
Registration – 8:00 prompt, Test – 9:00
- Food Vendor On Site

Buy & Sell

Ham Radio Related Stuff Only

No general merchandise, food for sale, or computer equipment (except directly related to amateur radio)

PLEASE

\$10 per space

Approx. 10'x10'

- Seller Gates open 6:00 A.M.
- Bring your own tables
- Buyer Gates open 7:00 A.M.

Per vendors' request

See www.svhamfest.org for directions and other information



ITEM FOR SALE TOWER

ROHN 25 tower in 5 sections for sale.
Contact Scott Vogelsang, WA6YNE, to make
an offer. 916-212-0400.



From Auburn, take I-80 east toward Reno, exit at Nyack. Field day location is across the street from the Burger King. You can't miss it.

SIERRA FOOTHILLS AMATEUR
 RADIO CLUB
 P.O. Box 1005
 Newcastle, CA 95658

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**SIERRA FOOTHILLS AMATEUR RADIO CLUB
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Please Print

Name: _____ Call: _____ Class: _____ e-mail: _____

Address: _____ City: _____ State: _____ Zip: _____

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.

Membership: (P)	\$22.00	Name Badge: (R)	\$7.00
Associate: (Q)	\$ 7.00	Repeater Donation: (S)	\$ _____
Auto Patch Donation: (T)	\$ _____	Newsletter Booster: (V)	\$ _____
Misc. Donation: (X)	\$ _____	Christmas Donation: (W)	\$ _____
TOTAL: (Y)		\$ _____	

OFFICE USE ONLY:		DO NOT WRITE BELOW THIS LINE	
Date: _____	Treasurer: _____	Secretary: _____	Roster: _____
Payment: _____	Check Number: _____	Cash: _____	