

President's Message

By Rory Eikland KG6HCU

CVARC members and friends, 2003 can you believe it!

Newly elected CVARC officers will begin their duties at the club's January 9, 2003 meeting and we will hold our first board meeting Jan 16. I look forward to working with the board and serving club members.

Reflecting back as a CVARC member last year I found the following to be true:

- Take a little more time for family, friends, and myself is good. None of us get more minutes in this life.
- Give back to the community. Participate in something that makes you feel good.
- Learn a new technology.

This last year has been a journey of discovery in ham radio that I am truly excited about. We are exploring new territory as we deal with the 21st century, and it is a challenging expedition for those who are willing, and that includes all of us.

I would like to see all of us have an exciting CVARC year, lets all work together to make that happen. I would enjoy hearing back from you if you have any suggestions for me. Happy New Year. Go forth and prosper, and be proud of our wonderful club.

73,
Rory
KG6HCU

CVARC Program For January

Mr. Bob Williamson, owner of WIL-POWER Battery, will present a program on the care and feeding of batteries for amateur radio use. Mr. Williamson is an outstanding speaker and an expert in battery technology. This is an excellent program that you will not want to miss!

CVARC VE Sessions

By Jeff Reinhardt AA6JR

CVARC hosts FCC License Examinations at 8:30 AM on the second Sunday of even numbered months at

the Ventura County Sheriff's East County Station on Olsen Rd. (near the Reagan Library). CVARC conducts exams for all license classes at each session.

Exam candidates must bring a form of government issued photo I.D., the original AND a photocopy of any existing license or Certificate of Exam Element Completion, a Social Security (or government issued Taxpayer I.D.) number, and \$12 ARRL VE Exam fee (cash is preferred). No advance reservation is necessary, walk-ins are welcome. Advance notice is needed for special circumstances, such as reading the exam to sight-impaired candidates.

If you have any questions, contact CVARC VE Coordinator Jeff Reinhardt at 818-706-3853.

New Amateur Radio Classes

By Karl Moody KE6WVZ

The next CVARC Amateur Radio course for the Technician Class license will start on Tuesday February 4, 2003. The class will run for ten weeks through April 8. This schedule has been selected so that students will be ready to take their Technician Class license test at the CVARC VE Session on Sunday April 13. The classes will run from 7:00 PM to 8:45 PM on each Tuesday evening at the Church of Jesus Christ of Later Day Saints at 3645 Moorpark Road in Thousand Oaks, California. This location is one block East of Olson Road on Moorpark Road. Karl Moody, KE6WVZ, will teach these classes. The cost of this class is \$20.00 which covers the cost of the study manual "Now You're Talking" and all necessary classroom materials.

Understanding Solar Indices

By Ken Larson KJ6RZ

Long distance HF radio communications is made possible by a region of charged particles in the Earth's upper atmosphere, 30 to 200 miles above the Earth's surface. This region is called the ionosphere.

The ionosphere is formed when extreme ultraviolet (EUV) light from the sun strips electrons from the neutral atoms in the Earth's upper atmosphere. The more familiar ultraviolet light has a shorter wavelength than visible light and is more energetic. Extreme ultraviolet light is even more energetic. When a bundle of EUV light (called a photon) hits a neutral atom, such as an oxygen atom, its energy is transferred to an electron in the neutral atom. This additional energy allows the electron to escape from the atom and dart freely around on its own. The neutral atom thereby becomes positively charged, because it has lost a negatively charged electron, and is known as a positive ion. The process in which the photon strips an electron from a neutral atom is known as photoionization. Recombination is the reverse of photoionization. Recombination occurs when a negatively charged electron and positively charged ion combine together again to produce a neutral atom. Recombination occurs continuously 24 hours a day. However, photoionization, caused by the EUV light from the sun, occurs only during day light hours. Thus the level of ionization in the ionosphere increases during the day when EUV light is present and

decreases at night due to the lack of EUV energy and the continuous recombination process.

The ions in the ionosphere are too massive to respond to the rapid oscillations of a radio wave and thus have little effect on radio wave propagation. However, the free electrons are over 20,000 times lighter than the ions and do respond to radio wave oscillations.

Three major bands of ionization (called the D, E, and F layers) occur in ionosphere. The F layer (the highest layer) is the one primarily responsible for long distance HF communications.

The free electrons in the F layer, 140 to 200 miles above the Earth, interact with radio waves causing them to bent back toward the Earth's surface. The electrons react easier with low frequency radio waves than with higher frequency signals. As a result, a relative thin F layer will bend low frequency radio waves back to Earth. Long distance communications on the amateur radio low frequency 160 meter (1.8 MHz), 80 meter (3.5 MHz) and 40 meter (7 MHz) bands is possible at night when ionization in the F layer is low. The free electrons do not react as easily with the rapid oscillations of higher frequency radio waves. Thus a higher density of free electrons are required to bend radio waves in the 30 meter (10 MHz) and 20 meter (14 MHz) amateur bands back to Earth. Long distance communications on these bands are typically possible during the day and early evening hours when ionization levels in the F layer are high to moderate. Even higher densities of electrons are needed to bend radio waves in the 17 meter (18 MHz), 15 meter (21 MHz), 12 meter (24.9 MHz), and 10 meter (28 MHz) bands back to Earth. Long distance communications is generally possible on these bands only during the day light hours when ionization in the F layer is greatest. Very high levels of ionization are required to bend signals in the 6 meter (50 MHz) band back to Earth. Ionization in the F layer is never high enough to bend 2 meter (144 MHz), 1.25 meter (222 MHz), 70 cm (420 MHz), and higher frequency waves back to Earth. These radio waves travel through the ionosphere and into outer space. Frequencies in the 2 meter and above amateur bands are thus required for Earth satellite communications since they pass through the ionosphere. Terrestrial communications on these bands are confined to line of sight and repeater operation.

Recombination occurs more quickly in the E layer than in the F layer because the atmosphere at the altitude of the E layer (60 to 70 miles above the Earth) is more dense. Thus the E layer typically exists only during the day light hours. The E layer bends low frequency signals, in the 160 through 40 meter amateur bands, back to Earth during the day, providing short range day time communications on these bands. The electron density in the E layer is not sufficient to bend radio waves above 20 meters (14 MHz) back to Earth.

Recombination occurs very quickly in the D layer which is about 30 to 55 miles above the Earth's surface. The D layer only exists during the day and is not sufficiently dense to bend HF radio waves back to Earth. The primary affect of the D layer is to absorb energy from low frequency radio waves, particularly radio waves in the 160 through 40 meter amateur bands. The 160 and 80 meter bands will typically be dead during the day because of D layer absorption.

Small variations occur daily in the ultraviolet energy received from the sun. On days when relatively high energy levels are received, ionization in the F layer will increase and long distance HF communications will improve. Also, the highest usable HF frequency will increase. For example, the 15 meter band (21 MHz) may be usable for communications with Australia. On low energy level days, the F layer is not as heavily ionized, the highest usable HF frequency decreases, and long distance HF communications deteriorates. During a low energy level day the 15 meter band may be dead with 20 meters (14 MHz) being the highest usable frequency band.

In addition to daily variations, the amount of ultraviolet energy received varies over an 11 year cycle in accordance with sunspot activity on the sun's surface. During a sunspot minimum there will be few if any sunspots visible on the sun's surface, ultraviolet energy from the sun will be at its lowest level, and the

20 through 10 meter amateur bands may be unusable for months at a time due to low F layer ionization. Over the following several years sunspots will gradually appear and increase in number reaching a maximum approximately 5 ½ years after the sunspot minimum. At the sunspot maximum over 200 sunspots are typically visible. Ultraviolet energy from the sun will be at its highest level during a sunspot maximum and reliable HF communications on the 160 through 10 meter amateur radio bands will be possible on a regular basis. The sunspots will then begin decreasing, causing a deterioration in long distance HF communications, until the next sunspot minimum is reached.

The amount of energy received from the sun is measured daily in terms of the solar flux. The solar flux can vary from as low as 50 to as high as 300. During a sunspot maximum, solar flux values will typically exceed 200 resulting in excellent long distance HF communications on the 20 through 10 meter amateur bands. Solar flux values will range from 50 to 80 during sunspot minimums yielding poor long distance communications with 40 meters (7 MHz) typically being the highest usable frequency band.

An increase in solar flux values for a period of several days generally indicates an improvement in long distance HF communications during that time period. For example, the highest usable frequency will generally increase and HF communications improve if the solar flux has been running about 110 and then jumps to around 130 for several days. In contrast, the highest usable frequency will decrease and HF communications deteriorate if the solar flux instead falls to 90.

Solar Flux	Expected Band Conditions
50 - 70	Bands above 40 meters unusable
70 - 90	Poor to fair propagation on 20 meters and below
90 - 120	Fair conditions up through 15 meters
120 - 150	Fair to good conditions on all bands up through 10 meters
150 - 200	Excellent conditions through 10 meters with openings on 6 meters
> 200	Reliable communications on all bands through 6 meters

The sun is continuously ejecting large quantities of charged particles (atoms stripped of their electrons) into space. Some of these particles eventually arrive at the Earth and interact with the Earth's geomagnetic field. The amount of charged particles ejected by the sun varies from day to day and also with the 11 year sunspot cycle. The amount of particles arriving from the sun increases as the cycle approaches the sunspot maximum. Small numbers of particles arriving from the sun have relatively little effect on the Earth's geomagnetic field. Under these conditions the geomagnetic field is considered to be quiet. Large numbers of charged particles can cause considerable disturbances in the geomagnetic field. A disturbed geomagnetic field is called a geomagnetic storm.

For any given solar flux value, HF communications will improve when the geomagnetic field is quiet, and worsen during a geomagnetic storm. A geomagnetic storm cause the F layer to become unstable, fragment, and even seem to disappear. Storm conditions are more severe in the regions around the Earth

the magnet poles since the charged particles from the sun are drawn to the poles by the Earth's magnetic field. As a result, signal paths that traverse the polar regions will be more affected by a geomagnetic storm than signal paths that cross the equator.

The condition of the geomagnetic field is measured in terms of A and K values in accordance with the following table:

A	K	Geomagnetic Field	A	K	Geomagnetic Field
0 - 3	0	Quiet	48 - 79	5	Minor storm
4 - 6	1	Quiet to unsettled	80 - 131	6	Major storm
7 - 14	2	Unsettled	132 - 207	7	Severe storm
15 - 47	3 - 4	Active	208 - 400	8 - 9	Very major storm

The occurrences of solar flares also increases with increasing sunspot activity. A solar flare creates a burst of additional EUV energy and also ejects large quantities of charged particles into space. The EUV energy reaches the Earth in about 8 minutes creating what is known as a Sudden Ionospheric Disturbance (SID). The burst of EUV increases the ionization levels in the D, E, and F layers. The increased F layer ionization may help the propagation of high frequency signals (15 meters and above). However, the increased ionization in the D and E levels may result in the complete absorption of radio signals in the 160 through 40 meter bands and seriously degrade propagation at 30 and 20 meters. A SID may last from a few minutes to several hours, with conditions gradually returning to normal. The charged particles from the flare will arrive at the Earth in 20 to 40 hours. The particles will generally create a geomagnetic storm on their arrival.

Improved HF band conditions are thus indicated by higher than normal solar flux values and low A and K values.

Mid latitude solar indices (solar flux, A, and K values) are broadcast at 20 minutes after the hour by radio station WWV on 5, 10, 15, and 20 MHz. They are also available on the Internet at www.qrz.com and in the K7VVV Solar Updates that are posted regularly on the ARRLWeb at www.arrl.org. The K7VVV updates are very good and provide links to other web sites for more information on solar indices and HF propagation. A good discussion of solar indices is also provided in the September 2002 QST magazine.

K7VVV reports that the solar flux mean for December 26 through January 1 was 117.1 while the planetary A index mean was 17.1. The average daily solar flux for the past six year is shown in the table below:

Year	1997	1998	1999	2000	2001	2002

Solar Flux	81	117.9	153.7	179.6	181.6	179.5
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This is an interesting chart since it indicates that the current sunspot maximum, as measured by solar flux values, was reached in 2001. Moreover, solar activity has remained near this peak for the last 3 years!

Holiday Party Prize Winners

Grand Prize: Jordan, KG6DGP

First Prize: Noel, K6NVS

Second Prize: Jonnathan, KC6QOQ

Third Prize: Don, KG6KZE

Fourth Prize: Don, K6CAB

Red Ticket Winner: Tom, W0UFC

Event Calendar

Date	Event	Comments
Jan. 9	CVARC Meeting	Care and feeding of batteries
Feb. 4	CVARC Radio Class	CVARC amatuer radio class begins
Feb. 8	On foot fox hunt	On foot transmitter hunt in Santa Barbara
Feb. 9	CVARC VE Session	License exams given at sheriff station
Feb. 13	Student Radio Class	Technician class for students
Feb. 13	CVARC Meeting	Old Time Ham Radio
Feb. 20-23	Coyote 4 Play	Communications Support
Feb. 24	ARES/RACES Training	ARES/RACES Training class at sherrif's station

March 9	CLU MS Walk	CROP Walk
March 12-14	IWCE	North America's largest wireless technology show
March 13	CVARC Meeting	Radio Direction Finding
March 22	Arbor Earth Day	Civic Arts Plaza from 11 AM to 4 PM
April 6	Westlake Street Fair	Fair is open from 10 AM to 5 PM
April 6	Simi Valley MS Walk	Tentative date
April 10	CVARC Meeting	General Meeting
April 12-13	Baker to Vegas Run	Supporting Ventura County Sheriff Dept.
April 13	CVARC VE Session	License exams given at sheriff station
April 19	ARES/RACES Packet	Packet workshop at East County Sheriff Station
May 10	Crusin Conejo Bike Ride	A major CVARC event supporting Conejo Valley Cyclist
May 17	Sea To Summit Bike Ride	Major Ventura County ARES/RACES event
June 8	CVARC VE Session	License exams given at sheriff station
June 28-29	Field Day	CVARC annual field day event, you don't want to miss it!
July 3	Moorpark Fireworks	Comm. support for Moorpark's 4th of July Fireworks
Aug 10	CVARC VE Session	License exams given at sheriff station
Sept	Country Days	Fun event supporting Moorpark Country Days Parade
Oct	SET	Simulated Emergency Test
Oct 12	CVARC VE Session	License exams given at sheriff station
Nov	State Hospital Drill	A very important annual emergency communications drill

Dec 13	Camarillo Parade	Big annual event for Ventura County ARES
Dec 14	CVARC VE Session	License exams given at sheriff station

Radio Amateur Civil Emergency Service

Ventura County Area 2 R.A.C.E.S. members are encouraged to check in every Tuesday night at 7:00 pm on the Area 2 Check-in Net. Specific ARES/RACES times and frequencies are as follows:

ARES/RACES Times And Frequencies

Area	Time	Mode	Frequency	PI	Repeater
County	7:30-8 pm	Voice	146.880 -	127.3	WA6ZTT
County	7:30-8 pm	Voice	224.020 -	127.3	WB6ZTR
County	Before 6:30 pm	Packet	145.710	No pl	Hospital Net
County	RACES Simplex	Voice	147.570	No pl	_____
Area 1	7:00-7:30 pm	Voice	147.930 -	127.3	WB6WEY
Area 2	7:00-7:30 pm	Voice	147.885 -	127.3	N6JMI
Area 2	Simplex	Voice	147.555	No pl	_____
Area 2	Backup Repeater	Voice	146.850 -	94.8	K6AER
Area 2	Amgen Repeater	Voice	449.440 -	131.8	KE6SWS
Area 3	7:15-7:30 pm	Voice	147.150 +	127.3	WB6ZTQ
Area 4	7:15-7:30 pm	Voice	146.970 -	127.3	WB6YQN
Area 5	7:00-7:30 pm	Voice	145.400 -	No pl	N6FL
Area 6	7:00-7:30 pm	Voice	147.975 -	127.3	N6AHI
Area 7	7:00-7:30 pm	Voice	146.985 -	127.3	WB6ZTX

Area 8	7:00-7:30 pm	Voice	145.280 -	100	WB2WIK
6 Meter	6:45-7:00 pm	Voice	052.980 -	082.5	K6SMR

The Net Controller's script for the Area 2 weekly RACES check-in net is on the CVARC website, in printable form. Every member is encouraged to periodically serve as net controller. RACES members should remember that their RACES card is issued for only two years. When your card is due to expire call Jackie at the Office of Emergency Services in Ventura for an appointment to renew your card. Call (805) 654-2551 or toll free from the east half of the county at (800) 660-5474. For packet, call coordinator Dan Dicke KE6NYT (805) 983-1401. To register for Red Cross Disaster Services Classes, call (805) 339-2234 ext 0 Ventura County ARES/RACES web site: <http://home1.gte.net/res19999/>

2003 CVARC OFFICERS

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Member-at-Large	Hugh Bosma	KF6HHS	(805) 498-1987	hrbcrb@aol.com

SPECIAL INTEREST GROUPS

Races (Area2)	Greg Lane	K7SDW	(805)498-0454	k7sdw@juno.com
Races (Area8)	Richard Tate	KQ6NO	(805)529-3934	kq6no@arrl.net
DCS	Brad Ormsby	WA6GLE	(805)495-2298	_____
VE	Jeff Reinhardt	AA6JR	(818)706-3853	aa6jr@arrl.net

ARRL

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ARRL VUCC (VHF/UHF Century Club) Certification:	Peter Heins, N6ZE	(805)496-1315 n6ze@aol.com

The Conejo Valley Amateur Radio Club is an ARRL affiliated Special Service Club. Meetings are held on the second Thursday of each month, unless otherwise noted. Meeting location is at the Elks Lodge, 158 Conejo School Rd., Thousand Oaks, CA. Meetings start at 7:30 pm. with a pre-meeting social and technical assistance session, for those who are interested at 7:15 pm. Meetings are open to the public, and members are encouraged to bring their friends.

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Editors: Ken and Paula Larson