Have you evaluated your station for RF exposure compliance yet? By law, all hams have to evaluate their station to be sure they comply with FCC mandated exposure levels. Depending upon power and frequency this task can be very simple or a little more challenging. When you renew or upgrade your license, the new form requires that you certify your compliance. This month’s Tech Talk, starting on page four, begins a series on evaluating your station for RF Exposure compliance.

The May Program:
The program speaker for the April meeting will be our own Larry Beilin - K6VDP talking on open wire tuners, feedlines for loop antennas, and preventing corrosion and rust on antenna hardware. Larry has written recent antenna articles for RF.

Don’t miss our next meeting on:

Friday, May 18th
@ 7:30 PM

We will meet in the Anaheim Room in the east Red Cross Bldg.

ARRL 6th District QSL Bureau
The new address for the W6 QSL Bureau, as of last August, is:
ARRL Sixth District QSL Bureau
P.O. Box 900069
San Diego, CA 92190-0069

Do you have envelopes on file with the QSL bureau? If you work an occasional DX station or enjoy working the JA pile-ups you probably already do. Others who work the lower bands might consider having a few envelopes on file too. SWLs from foreign countries often will QSL to stations they’ve heard. If you supply 50¢ and a self-sticking label with call and address per envelope, the Bureau does the rest!

Learn more at:
http://www.kq1z.com/qslbureau6.html

Reminder:
JUNE 2nd 2001
Next Club Breakfast and Board Meeting
2001 Board of Directors:

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

Vice President:  
Cory Terando, KE6WIU  
(714) 894-3817  
corymuzk@yahoo.com

Secretary:  
Bob Eckweiler, AF6C  
(714) 639-5074  
af6c@arrl.net

Treasurer:  
Ken Konechy, W6HHC  
(714) 744-0217  
kkonechy@pacbell.net

Membership:  
Dick Young, W6RWY  
(714) 637-7168  
rustyrick@msn.com

Activities:  
Tom Thomas, WA6PFA  
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eelmert@aol.com

Publicity:  
Chris Breller, KJ6ZH  
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kj6zh@earthlink.net

Technical:  
Lowell Burnett, KQ6J D  
(714) 997-0999  
LBur729028@aol.com

Members At Large:  
Larry Hoffman, K6LDC  
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k6ldc@earthlink.net  
Bob Tegel, KD6XO  
(714) 531-8926  
kd6xo@earthlink.net

2001 Club Appointments:

W6ZE Trustee:  
Bob Eckweiler, AF6C  
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af6c@arrl.net

Club Historian:  
Bob Evans, WB6IXN  
(714) 543-9111  
bobev@netzero.net

RF Editor (Acting):  
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(714) 639-5074  
af6c@arrl.net

WEB Master:  
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(714) 744-0217  
kkonechy@pacbell.net

ARRL Assistant Director:  
Ken Konechy, W6HHC  
(714) 744-0217  
kkonechy@pacbell.net

ARRL Awards Appointees:  
Larry Beilin, K6VDP  
(714) 557-7217  
k6vdp@aol.com  
Art Dillon, KE6WOX  
(714) 997-2078

OCCARO Delegate:  
Bob Buss, KD6BWH  
(714) 534-2995  
k6bwh@aol.com

Monthly Events:

General Meeting:  
Third Friday of the month  
7:30 PM  
American Red Cross  
(near Tustin Ave & 4th St)  
Santa Ana, CA

Club Breakfast:  
First Saturday of the month at 8:00 AM  
IHOP  
1001 E. 17th Street  
(west of Lincoln)  
Santa Ana, CA

Club Nets (Listen for W6ZE):  
Wednesday Evenings  
28.375± MHz SSB  
7:30 PM - 8:30 PM  
Bob AF6C, Net Control  
146.55 MHz Simplex FM  
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.
OCARC Supports Baker–to–Vegas Relay Race

The Orange County Amateur Radio Club once again supported communications for the 20 stage Baker to Las Vegas Challenge Cup Relay Race. This year’s race featured competition between 204 law enforcement agencies. Since the race covers 120 miles, ham communications plays an ever increasing role in safety and scoring. Participating for the OCARC were: Larry - K6LDC, Gene - KF6TRA, Dick - W6RWY, Larry - K6VDP, Tom - WA6PFA, Bud - WA6VPP, Cindy - KC6OPI, Pat - KD6FZE, Bob - KD6BWH and Lowell - KQ6JD.

FCC’s Hollingsworth on OOs

Extracted from The ARRL Letter
Vol 20 No.13

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth offered high praise for the work of the volunteer ARRL Amateur Auxiliary’s corps of Official Observers. Long a strong supporter of the OOs, Hollingsworth’s most recent burst of appreciation was inspired by investigative footwork done by an OOs team that's assisting the FCC in an enforcement inquiry.

“It makes me realize that if it weren’t for the OOs over the past 10 years, Amateur Radio would probably have imploded long ago and disintegrated from its own chaos,” Hollingsworth said. “We really thank them very much for their work here.”
Tech Talk
by Bob, AF6C

RF Exposure Evaluation:

Since 1998 all radio amateurs are required to evaluate their stations for RF exposure. When you apply for or renew your license you must sign an RF Safety certification that is part of the application / renewal form. Over the next few months Tech Talk will be discussing RF exposure as it affects your operations and how to evaluate your station. In order to do the evaluation effectively a rudimentary understanding of power levels and decibels is necessary. If you’ve followed the past four Tech Talk columns you should have no problems!

Guidelines to RF exposure have been around for many years in the commercial radio world where power levels are high and directional aperture antennas can increase effective power many thousand-fold. As the guidelines became tighter and public concern grew; the FCC saw a need to have radio hams comply along with the commercial concerns. Some hams thought the requirement would blow a death knell to ham radio, but as you’ll see, the evaluation of a station need not be that difficult. Actually there is one good thing that may come out of this; current antenna restrictions often lead to antenna placements that expose nearby occupants much more than they would be from an antenna up in the dear.

Why is the FCC suddenly concerned with RF exposure from amateur radio? During the past decade possible health hazards caused by exposure to electrical and magnetic fields have been brought to the attention of the public in numerous high profile articles. One, in The New Yorker magazine, looked into a possible correlation between a high rate of cancer and living near high tension power lines, and was widely read. The jury is still out on health problems created from electrical and magnetic fields at lower levels; studies vary almost as regularly as the “what foods are good and bad for you this week” articles. However, it is already known that at higher levels, RF fields are damaging to the human body due to heating of internal organs. An extreme example would be sticking your hand in an operating microwave oven. The big question is; at what levels do these fields become a health hazard? It is even more complex than that. The frequency of the energy is also important because certain parts of the body are like tuned circuits and are resonant at a particular frequency. There is also a question of the effects of long time exposure. The primary effect of the fields is a heating of organs, but other accumulative effects may also cause damage over long periods. The FCC, in conjunction with health and safety organizations, has published maximum permissible exposure (MPE) levels. Keeping electromagnetic exposure at or below the conservative MPE levels significantly reduces any health risks.

There are three separate but related MPE level criteria. Above 30 MHz there is a maximum field power density measured in watts per square meter (W/m²). Below 30 MHz the two components that make up a field must be considered separately, and each must be below the given MPE for the frequency in question. The magnetic field is measured in amperes per meter and the electrical field is measured in volts per meter (V/m).

The reason the field components are measured separately at lower frequencies is because their longer wavelengths make the near field around the antenna more apt to be accessible by humans. (See sidebar on The Square Law).

The immediate question is; “How do I know if I have to evaluate my station?” The first place to look is in a table published by the FCC, and partially reproduced here as Table 1. If the power level into the antenna is equal or greater than published in the table for your band of operation then you must do an evaluation. However, even if the power level is below that published you are still responsible for meeting the exposure criteria. Unless your station is unusual, you probably will. Special consideration needs to be given if you’re using a high-gain antenna, a room or attic antenna, or if your antenna is mounted immediately adjacent to a neighbor’s or public property.

The power you should use is the output power of your rig or power amplifier, (keyed on CW, FM and digital modes. PEP on SSB and AM) corrected for any feedline or tuner losses. To be conservative, these losses can be assumed to be zero.

Mobile and portable stations are exempt. However, that should not stop you from doing an evaluation if you are running high power in your mobile. Poor antenna placement, fiberglass bodied cars, and high power can lead to exposure above the MPE to the passengers in the car.
Exceeds:
RX

field around your antenna. The solution would be to calculate the and expensive. A more difficult so-
equipment to do this is complex
operation. Unfortunately, current
make actual measurements while
ly, the easiest solution would be to
So where do you begin? Theoretical-
area being the more stringent.

antennas. The two areas have dif-
public property adjacent to your
neighbor's property, sidewalks and
home. Uncontrolled areas are your
have immediate control over and
controlled areas are spaces that you
have property and the inside of your
have property and the inside of your
that task here are a few more eval-
ARRL tables. Before starting on
some stations using the FCC and
ARRL tables. Before starting on
that task here are a few more eval-
uation criteria that need to be dis-
Exposure limits are also depend on
the duty cycle of the mode you're
operating: FM, SSTV, AFSK have a
duty factor of 100%. SSB is be-
between 20% and 40%. CW is 40%
and a carrier is 100%. Again you

Table One

My suggestion is you evaluate each
transmitter / antenna combination
for each band even if your power
limit is below the published table
and evaluate what the safe power
level is for each antenna / band
combination. That way you won’t
have to reevaluate should you
change radios and increase your
power level.

When doing your evaluation there
are two types of area that must be
considered: controlled and uncon-
trolled area. Definitions of these
are given in the references listed
later in this article. Briefly, con-
trolled areas are spaces that you
have immediate control over and
can limit access – such as your
property and the inside of your
home. Uncontrolled areas are your
neighbor's property, sidewalks and
public property adjacent to your
antennas. The two areas have dif-
ferent MPE limits, the uncontrolled
area being the more stringent.

So where do you begin? Theoretically,
the easiest solution would be to
make actual measurements while
in operation. Unfortunately, current
equipment to do this is complex
and expensive. A more difficult so-
lution would be to calculate the
field around your antenna. The

complexity of this solution grows
quickly since still and moving ob-
stances that will reflect energy usu-
ally surround the antenna. A much
simpler solution is to use tables
published by the FCC and ARRL.

The original document published
by the FCC Office of Engineering
and Technology (OET) is titled
Evaluating Compliance with FCC
Guidelines for Human Exposure to
Radiofrequency Electromagnetic
Fields (Edition 97-01). In coopera-
tion with the ARRL the FCC OET
also published a supplement ‘B’ to
the document, Additional Informa-
tion for Amateur Radio Stations.
These bulletins are available on
the FCC web site. There is also a
supplement ‘A’, confined to com-
mercial broadcast radio. The ARRL
has published a manual titled RF
Exposure and You which includes
copies of the two FCC documents
listed above, additional tables and
lots of useful articles and informa-
tion.

Next month we’ll actually evaluate
some stations using the FCC and
ARRL tables. Before starting on
that task here are a few more eval-
uation criteria that need to be dis-

Exposure limits are based on time
averaging. In a controlled area the
average is taken over a six-minute
period. In an uncontrolled area the
average is taken over a 30 minute
period. In either case you must con-
sider the period when the max-
imum exposure occurs. For example:
You transmit two minutes, fol-
lowed by two minutes receiving and
repeat this numerous times. Over
any six minute period you would be
transmitting between two and four
minutes, depending when you start
the time measurement. You must
use the largest number, four
minutes. See Figure one. Since you
are transmitting only a maximum
of four out of six minutes, the MPE
can safely be 1.5 times the pub-
lished value for that frequency for
continuous exposure.

The near field is the field close
to the antenna. Here field intens-
ities are complex and can vary
greatly. Hot spots are possible
especially if signals are reflected
off nearby conductors.

The Square Law,
Near and Far Fields

The energy surrounding a trans-
mittting antenna obeys the prin-
ciple of the square law. The en-
ergy of the field diminishes as
the square of the distance from
the antenna to the measure-
ment point. This law is true
only after you get far enough from
the antenna that the ant-
enna's size is small and ap-
pears as a point source. Space
beyond this distance is referred
to as the far field; here the elec-
trical and magnetic fields are
perpendicular and the field vol-
tage and current relate to an in-
trinsic impedance of about 377
ohms (assuming no obstacles
are in proximity.) Electromag-
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known as plane-waves.

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<table>
<thead>
<tr>
<th>Bands</th>
<th>Exceeds:</th>
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<tbody>
<tr>
<td>160 - 40 m</td>
<td>500 w</td>
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<tr>
<td>30 m</td>
<td>425 w</td>
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<tr>
<td>20 m</td>
<td>225 w</td>
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<tr>
<td>17 m</td>
<td>125 w</td>
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<tr>
<td>15 m</td>
<td>100 w</td>
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<tr>
<td>12 m</td>
<td>75 w</td>
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<tr>
<td>10 - 1.25 m</td>
<td>50 w</td>
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<tr>
<td>70 cm</td>
<td>70 w</td>
</tr>
<tr>
<td>33 cm</td>
<td>150 w</td>
</tr>
<tr>
<td>23 cm</td>
<td>200 w</td>
</tr>
<tr>
<td>13 cm &amp; smaller</td>
<td>250 w</td>
</tr>
</tbody>
</table>

*PEP input to the antenna.
(Repeater rules differ.)

Please see RF Exposure, Page 8

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Operating in Europe With Your U.S. Ham License

by Phil Anderson, N7PA

At the March meeting I raised the question, “Does anyone know the procedure to obtain privileges to operate an amateur radio in Europe? No takers! Fried - WA6WZO, our ARRL S.W.D. Director had e-mailed me the night before, when I raised that same question, to check in QST on page 10. So I did. I sent an e-mail to ARRL HQ. Return e-mail advised me:

To operate from many European countries, no paperwork is needed. All that you need to do is carry with you your FCC license, proof of your citizenship and a copy of the FCC CEPT [European Conference of Postal and Telecommunications Administration—Ed.] Public Notice. You must also put the ITU prefix of the country before your call, separated by a slant bar. See:

http://www.arrl.org/FandES/field/regulations/io/#us

73, John, N1KB

Not one to write more than necessary to tell the story: THERE IT IS!

The FCC CEPT Public Notice can be downloaded at:


Participating CEPT countries as of October 25, 1999, are: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France*, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, Netherland Antilles, Norway, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom**.

* Participating for France, Corsica, Guadeloupe, Guiana, Martinique, St. Bartholomew, St. Pierre / Mi-
quelon, St. Martin, and Reunion / Dependencies.

** Participating for Great Britain, Northern Ireland, the Channel Islands, and the Isle of Man.

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Minutes of the May 2001 Breakfast Board Meeting:

The May club breakfast and board meeting was held Saturday, May 5th at IHOP. Ten souls attended. After breakfast, at 8:45 the board meeting was called to order by Vice President Cory – KE6WIU, who was sitting in for the President. Six of the ten officers were present. Other officers present were Secretary, Bob – AF6C; Treasurer, Ken – W6HHC; Activities, Tom – WA6PFA; TVI, Lowell – KQ6JD and MAL, Bob – KD6XO.

Cory reported on this month’s guest speaker, our own Larry – K6VDP. Ken – W6HHC suggested a future program on Fuel-Cells. He has a lead on a speaker.

The treasurer reported our treasury balance at $2,059 and change. He recommended we collect donations from members to help with Field Day expenses.

The Secretary reported receiving a letter from the ARRL requesting we update our club information on their web site. It will be done.

Early Bird registration is over for the Riverside Convention this fall.

Field Day was discussed under old business. Ken – W6HHC will be FD chairman this year. Band captains are: for 15M AF6C & for 10M N/T WA6PFA. Ken will be contacting others for the remaining bands. CORE and the local Red Cross will be invited to join us for this year’s FD operation. A plan is being devised to help baffle the noise from the generator since we will be operating close to residences. This year the club will try for the extra points for traffic handling. W6HHC will talk to our traffic handling expert, Bob – KD6BWH about this. W6HHC will also contact our Publicity Chairman, Chris – KJ6ZH about contacting OCN and The Register to cover our FD participation.

A proposal has been brought before the board to change the 10 meter net to 15 meters. This may alleviate some TVI problems and allow more DX visitor check-ins. It will be discussed further at the membership meeting.

The meeting was adjourned at 9:23 AM.

— Submitted by Bob - AF6C

Burton to serve term in Texas:

FCC sources say that former ham Richard Allen Burton, ex-W86J AC, who was convicted of unlicensed operation, will spend his three months in jail in a federal detention facility in Ft Worth, Texas. Burton also was sentenced earlier this year to one year’s probation and must undergo psychological treatment. The sentence resulted from a plea agreement. Originally set to begin serving his term in late February, Burton was allowed another couple of weeks to report to the federal prison in Ft. Worth on his own, instead of being transported there in the company of US marshals. He’s scheduled to report to begin serving his term March 19.

Burton, who has a long history of alleged unlicensed operation, has been free on $20,000 bond since his arrest last August.

Via The ARRL Letter Vol. 20, No. 10

An ARC-5 Transmitter
Editor's Note:
"Electron gate modulation", more commonly known as grid modulation, was a boon to low-cost AM transmitters from the mid-fifties until SSB replaced most of the AM signals on the HF band. The other common form of modulation for AM was plate modulation. It required an audio signal at a power level of half of the RF power of the final amplifier and a heavy, well insulated modulation transformer. To produce 250 watts of plate modulated AM the final amplifier would have to be running at 250 watts of continuous power and the audio modulating the signal at 125 watts. For the 350 watts of input each sideband was the equivalent of about 50 watts of output.

The high power of audio required made these rigs more expensive. Rigs like the popular Heathkit DX-100 and TX-1 Apache were plate modulated. Lower priced rigs like the DX-35, DX-40 and DX-60 used the less expensive grid modulation that required only a watt or so of audio power. Audio quality was generally superior using plate modulation.

The Scotchman's Modulation
On page three the article by W6HHC talks about the second issue of RF and the first technical article published. Here is a reproduction of that article with the original hand-drawn schematic. Also shown are some rigs of the time that could take advantage of this modification.

"The Scotchman's Modulation" (as told... by W6ZE).
Do you have a Meissner Shifter, ARC 5, Millen exciter, Hallicrafters SR-75 or Heathkit Xmttr around? If so, here is a simple application of "electron-gate" modulation that requires few parts and no change in tank circuit or coupling. The gate tube may be a 6J5, 6C5, 6N7, 6SN7, 12AU7, or 12AT7, the latter of which is preferable for higher gain. The dual triode sections may be paralleled [sic] or half tube may be used. The RF tube to be modulated may be a 6L6, 6V6, 6F6, 2E26, 50L6, 807, 832, or any similar screen grid tubes.

The most important thing is to use the highest B voltage available in the Xmttr to supply the screen through the gate tube. Advantages are simplicity, economy, and lowered power requirements from supply (especially nice for mobiles) and 100% modulation. Be sure the transformer has good pri. to sec.insulation. Any good surplus unit will do.

In future issues: Notes on 813 "electron-gated" and Xtal mike application. Your questions invited - a card to "RF" [obsolete address omitted - ed.] Newport Beach, will be answered in next issue.

Meissner “Shifter” CW Transmitter

Heathkit AT-1
Heathkit's first Ham Transmitter
Up to 35 W. 80,40,20,15,11 & 10 m
Three tubes - 5U4G 6AG7, 6L6
16 lbs. $29.50 in 1956
Minutes of the April 2001 General Meeting:

The April 2001 general club meeting was held on Friday, Apr 20th @ 7:30 PM. Malcolm Levy – KO6SY - of the Western States Weak Signal Society (WSWSS) was the guest speaker. He talked on weak signal operations on the VHF and UHF bands, including communications using moonbounce, meteor shower and aurora. The presentation included audio clips of actual QSOs. If you missed the meeting you can find out more on the WSWSS web site: http://www.wswss.org

The program was well received by our members and guests. Meeting attendance was 28 souls.

A short business meeting was held after the break. All board members were present except Chris - KJ6ZH, Larry - K6LDC who is on an extended vacation and Bob - KD6XO who had to leave early.

The Field Day meeting with the city of Santa Ana was discussed. The requirements for our use of Portola Park was covered in last months issue of RF. Ken - W6HHC stated that the paperwork from the City has not yet been received.

We do not have a Field Day chairman. Ken - W6HHC will ask Chris - KJ6ZH if he’d like to do it. If not, Ken will take the position.

Bob - KD6BWH reported on the Baker-to-Vegas race. He also reported on the trials of not replacing your fuel filter for 100K plus miles!

The Orange County Fair ham radio booth will be manned by our club on July 18th (The first Wednesday of the fair.) See Bob - KD6BWH for a shift time. He has last year’s list.

Cindy is looking for volunteers to help with the Red Cross Disaster Preparedness Academy to be held on May 30th at Cal State Fullerton. Volunteers get to attend sessions free after their work shift. Contact Cindy - KC6OPI for more details.

The VP, Cory - KE6WIU announced that our own Larry - K6VDP will present the May program on antennas.

The Treasurer, Ken - W6HHC reported our current balance at $2,184.37

Membership Chairman Dick - W6RWY reports the membership is at 51.

A motion to adjourn was made by Lowell and seconded by Cory at 9:28 PM.

– Submitted by Bob - AF6C

RF Exposure - from page 5

You can find the duty cycle for your mode in tables provided by the FCC and ARRL.

Next month, when we begin evaluating station antennas, we’ll look at these criteria in more depth. Meanwhile, I strongly suggest you obtain a copy of the ARRL book RF Exposure and You ($15). The ARRL has done a good job expanding on the FCC tables and even converts the table distances from meters to feet for easier use.

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

First Class Mail

Time Dated Material.
Please Expedite!!