



RF



ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLII NO. 5

P.O. BOX 3454, TUSTIN, CA 92861-3454

MAY 2001



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.

2001 ARRL Southwest Division Convention Riverside

The ARRL Southwestern Convention will be held September 7-9 at the Riverside Convention Center, Riverside, CA.

For those who receive the RF via email or the web, a separate PDF file containing the convention flyer and application form will be provided. Those who get their RF via regular mail will receive a printed copy of the flyer. You can also get information from their web site:

<http://www.qsl.net/arrl-2001swdc>

The Grand Banquet speaker is Dr. Paul Shuch, N6TX, and "Searching for Life Among the Stars."

ARRL elected officials will include

President Jim Haynie, W5JBP, and the SWD Section Managers-W6BF, NZ6T, W6UBQ, KD6XH, & K6YR. SWD Vice Director Art Goddard will be presenting his SETI program.

From ARRL HQ we will have Ed Hare, W1RFI, Lab Supervisor, and Rosalie White, K1STO, Field & Ed. Services Manager.

Other speakers include KN6EK, K7JA, KC6JTN, WB6NOA, WA-6ITF and KO6ZL.

The DX Breakfast speaker is Ned Stearns, AA7A.

-from WA6WZO

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>

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.

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

**THE ORANGE COUNTY
AMATEUR RADIO CLUB,
INC.**

P.O. Box 3454, Tustin, CA 92781



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Monthly Events:

General Meeting:

Third Friday of the month
at 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.

Observations on the Early History of the *RF* Newsletter

by: Ken Konechy - W6HHC

I would like to thank our club Historian, Bob Evans WB6IXN, for sharing artifacts and sharing so many stories about the early beginnings of the OCARC and the *RF* Newsletter. Last months article about the "Mysterious Birth of the *RF* Newsletter" interested me to put down some of my thoughts about the early history of *RF*. Here are some observations about those early days of the *RF* Newsletter.

- ***RF* - Vol 1, No 1 - Nov 1953**

This issue is really a humble beginning for a newsletter that would last for nearly 50 years. The first *RF* "mystery" editor, Dr. Merinus Conway - W6UPP started with just an idea, a one page paper, a "Calls Heard" section, and some news of the "Amateur Radio License Plate Bill". That was it!! It was just a small step.

- ***RF* - Vol 1, No 2 - Dec 1953**

The newsletter is serving at least 2 separate local ham clubs , OCARC and Fullerton. The first technical article, "Scotchman's Modulator" was submitted by Earl Griffin W6ZE. Yes, Earl Griffin is the original holder of the W6ZE call letters now used by the OCARC!! The paper has grown to 1 1/4 pages. His original technical article has been reprinted on page 7 in this months *RF*.

- ***RF* - Vol 1, No 9 - July 1954**

The *RF* newsletter has grown to a great seven-page monthly newsletter published by the Western Wireless serving at least seven local ham clubs, including the Inglewood ARC. W6UPP is publicly listed as the editor... no more mystery.

- ***RF* - Vol 2, No 1 - Nov 1954**

After a year of struggling to find

money to meet the costs of publishing a great ham radio newsletter, the OCARC takes over the responsibility of publishing the *RF*. The humble beginnings of a year earlier had now grown into a solid informative newsletter with a five person editorial staff, led by W6UPP, and had the support of the OCARC to keep it going for the future!!

- **Any Earlier Newsletters?**

Our Club Historian, Bob Evans WB6IXN, has confirmed that... even though the OCARC club was founded in 1934, no other newsletter existed before the efforts of W6UPP in 1953. It is hard for us today to remember that the "mimeograph" process

did not exist in the 1930's and even in the 1950's the mimeograph process took a lot of labor, patience and time to "retype and redraw" every thing that you wanted to say or show. Today's word processors, optical scanners, XEROX, [a good Editor - Ed.] and e-mail sure make the newsletter effort easier and more effective.

- **Samples of Old *RF* Newsletters**

The OCARC WEB SITE now contains PDF samples of *RF* Newsletters representing the 1950's, 1960's, 1970's, 1980's and 1990's. You can see the club, ham radio, and the *RF* newsletter change over six decades. Enjoy!

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 OO 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."

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.



Gene - KF6TRA, Larry - K6LDC & Larry - K6VDP setup an antenna at Sandy Valley



Dieter Franz - N6ZKD of Cypress and Tom - WA6PFA operate from a Las Vegas motel room.

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 clear.

Why is the FCC suddenly concerned with RF exposure from am-

ateur 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/m^2). 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).

Ohms law says volts times amperes equal watts, so if the two field components are multiplied together you get watts per square meter:

$$\begin{aligned} V/m * A/m &= (V * A) / (m * m) \\ &= (W/m^2) \end{aligned}$$

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 side bar 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.

<u>Bands</u>	<u>Evaluation required if Power* (watts) Exceeds:</u>
160 – 40 m	500 w
30 m	425 w
20 m	225 w
17 m	125 w
15 m	100 w
12 m	75 w
10 – 1.25 m	50 w
70 cm	70 w
33 cm	150 w
23 cm	200 w
13 cm & smaller	250 w

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

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 uncontrolled area. Definitions of these are given in the references listed later in this article. Briefly, controlled 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 different 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 solution would be to calculate the field around your antenna. The

complexity of this solution grows quickly since still and moving obstacles that will reflect energy usually 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 cooperation with the ARRL the FCC OET also published a supplement 'B' to the document, *Additional Information for Amateur Radio Stations*. These bulletins are available on the FCC web site. There is also a supplement 'A', confined to commercial 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 information.

Next month we'll actually evaluate some stations using the FCC and ARRL tables. Before starting on that task here are a few more evaluation criteria that need to be discussed.

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 consider the period when the maximum exposure occurs. For example: You transmit two minutes, followed 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 published value for that frequency for continuous exposure.

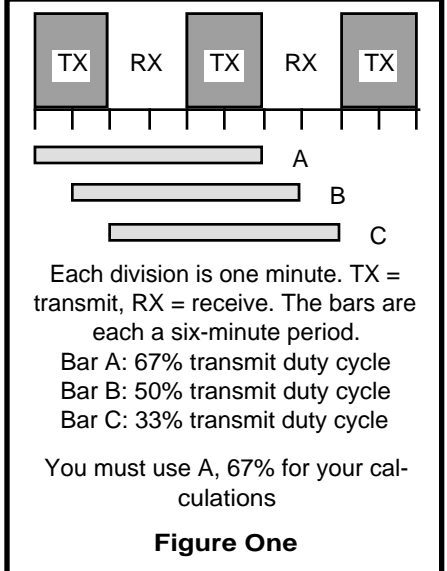
Exposure limits are also depend on the duty cycle of the mode you're operating. FM, SSTV, AFSK have a duty factor of 100%. SSB is between 20% and 40%. CW is 40% and a carrier is 100%. Again you

Please see RF Exposure, Page 8

**The Square Law,
Near and Far Fields**

The energy surrounding a transmitting antenna obeys the principle of the square law. The energy of the field diminishes as the square of the distance from the antenna to the measurement point. This law is true only after you get far enough from the antenna that the antenna's size is small and appears as a point source. Space beyond this distance is referred to as the far field; here the electrical and magnetic fields are perpendicular and the field voltage and current relate to an intrinsic impedance of about 377 ohms (assuming no obstacles are in proximity.) Electromagnetic fields in the far field are known as plane-waves.

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



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:

<http://www.arrl.org/FandES/field/regulations/io/cept-ral.pdf>

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.

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 han-

dling 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.

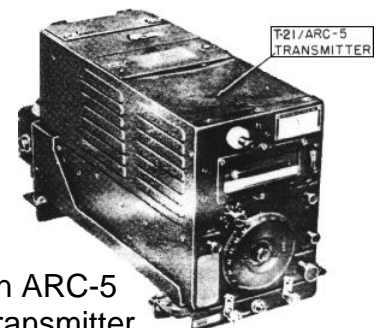
The meeting was adjourned at 9:23 AM.

- Submitted by Bob - AF6C

Burton to serve term in Texas:

FCC sources say that former ham Richard Allen Burton, ex-WB6JAC, 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

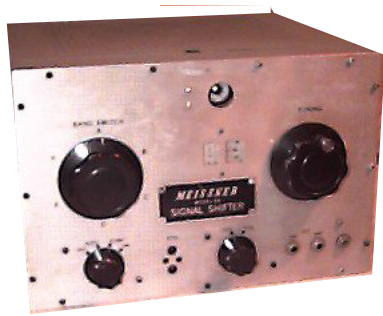


An ARC-5 Transmitter

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.



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

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.



DX-20

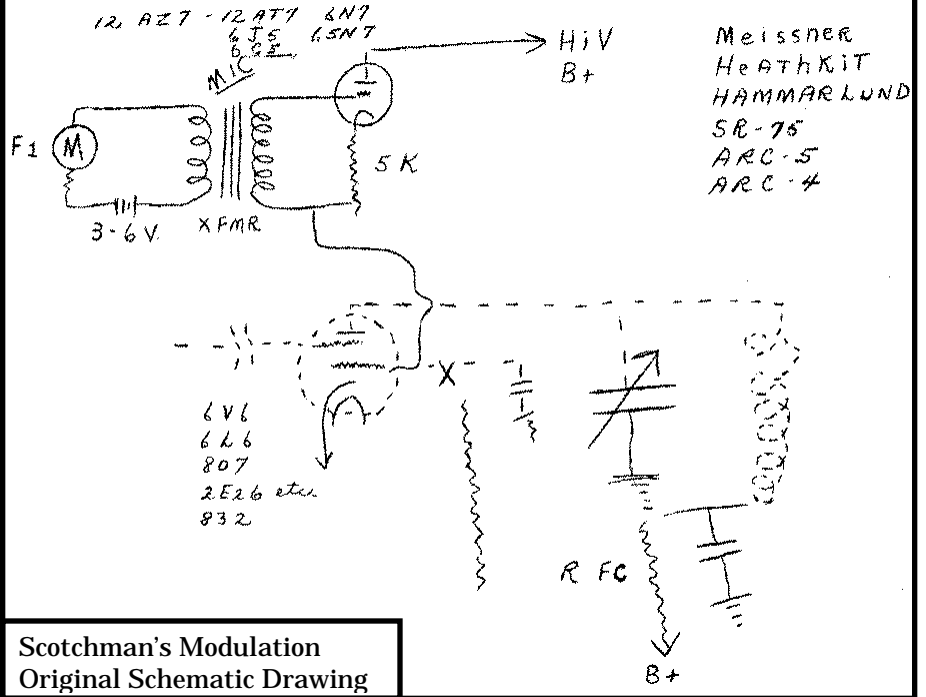
by
Heathkit

"The Scotchman's Modulation" (as told... by W6ZE). Do you have a Meissner Shifter, ARC 5, Millen exciter, Hallicrafters SR-75 or Heathkit Xmtr 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 paralld [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 Xmtr 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.

**Scotchman's Modulation
Original Article Text**



**Scotchman's Modulation
Original Schematic Drawing**

**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

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
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TUSTIN, CA 92781-3454**

First Class Mail

***Time Dated Material.
Please Expedite!!***