Newscaster

The Official Publication of the Winnipeg Amateur Radio Club
The Manitoba Repeater Society
The Winnipeg Seniors Club

mailing address

W.A.R.C.
Attn: Membership
598 St. Mary's Road
Winnipeg, MB
R2M 3L5

APRIL 1993

Home Brew Night

Date: April 12, 1993

Time: 7:30 p.m.

Place: Sturgeon Creek Regional Secondary School

Other Important Dates:

WARC: April 3 WAWA
June Marathon

MRS: April 16 Annual General Meeting

WSC: April 17 Spring Cleaning Day

Warc: Executive for 1992/93
President: Dave Panting - VE4EF
Vice-Pres: Alex Mcllraith - VE4AIM
Secretary: Kay Quin - VE4YF
Ross Hutchins - VE4LDS
Treasurer: Bill Panting - VE4KX
Past Pres: Judy Norton - VE4JBN
Members
@ Large: Scott Marshall - VE4WSM
Pat Giesbrecht - VE4PLG
Jim Ross - VE4AJR
Albert Sousa - VE4LS

Notes from your Editor: by Derek, VE4HAY

Well another month has passed and I' back writing the new issue of the Newscaster. I want to thank all those people who said a few kind words to me about the new look of their favourite club newsletter. It was most appreciated. I would also like to thank Dave VE4DAR for his article on One Year as a HAM. Dave has mentioned that he would like to contribute more articles on his experiences as a new HAM, and I look forward to being able to share these with you. On the same note, while I have had a few people come forward with articles for the Newscaster, I could always use more. So if you have had an notable experiences on the bands or used your radio to help your fellow man one day. or whatever, we want to here from you. While I prefer articles in electronic form I will still take them on paper form. Sorry no dictation. To make it even more convenient for you, there are several ways you can send them to me. On packet VE4HAY@VE4KV.#wpg.mb.ca.noam ,or by e-mail to me on Muddy Waters Computer Society BBS, user Derek Hay ,on the Internet (dwjhay@muug.mb.ca) for those who access the new gateway (145.01). I'm also good in the blue book.

Words from the President of WARC: by Dave, VE4EF

Hello, once again. Since the March meeting I have visited both ends of this country and have returned home just in time to write this message. While I've been away, most of the snow has melted (leaving a lake around my tower), my antenna that I put up in January is still there but who knows if it still works, and the Kingman Reef DXpedition has come and gone without working me. However, the good news is that spring has sprung, the lake around my tower will eventually dry up and on April 18 I can go to the Flea Market and buy more stuff that I don't have time to use. What more could you ask for!

Those of you that couldn't make it to the March meeting missed an excellent presentation on satellites by

Rick VE4AMU and Bruce VE4XOR. I was amazed by the tremendous scope that satellite operations encompass. This field is much larger than I suspected and it is obvious that one could spend a lot of time learning about satellites and their operations. I am very grateful to Rick and Bruce for the effort they put into the presentation. I hope that we can persuade them to give us another episode in the near future.

At the April 12 meeting we will be having Home Brew Night. I encourage everyone to bring to the meeting anything that they have made or assembled at home, pertaining to radio use, to share with the rest of us. (Home Brew does not refer to beverages you consume while operating). As in the past, our blue ribbon panel of judges will be awarding the great prizes that have been organized by Dick VE4HK for the most interesting projects. A short forum on operating procedures will take place at the meeting as well. I hope to see you there.

73 de VE4EF

Winnipeg Senior Citizen's Radio Club.
by Bill, VE4WU President.

A reminder to all Members that the club breakfast will be held on Thursday April 8, 1993 at the Norlander Inn on Pembina Highway From 9:00 to 11:00 a.m.

Saturday April 17, 1993 will be our spring cleaning day, all help will be greatly appreciated.

Membership donations for the 1993 date have been quite good keep it up. Fred Fear VE4NRD was the lucky winner of the 1992 call books.

Next monthly executive meeting will be April 20, 1993 at 10:00 a.m. in the Club rooms.

Manitoba Repeater Society
by Derek, VE4HAY

The Annual General Meeting of the Manitoba Repeater Society will be help April 16, 1993 at the St. James Collegiate, 1900 Portage Avenue in the auditorium 7:30 p.m. No Smoking in the building or on school grounds.

The technical guys are very busy these days getting the finishing touches done on the new controller. This is the first of three controller to be installed this year. They are busy tuning the rigs and setting up the various codes that will be used to controller the system. By the time you read this newsletter they should be about ready to pull the VE4MAN repeater off the tower. It is hoped that this will only be for 3 weeks (if all goes well). We need to modify the outdoor weather proof cabinet, so that it can house the new radio's power supplies, and controller. Once this is down the VE4NEP site will be next. For those of you who want to here the new equipment, tune into 145.21 - (future VE4MIL). We have set up the controller for testing and encourage all users to try it out. The more use it gets now the less chance of a breakdown later when it is mounted on the tower. While the current set-up is not the most optimum, it is all we can do. The receiving antenna is a J-pole at 20 ' and the transmitting antenna is a 18 element beam (11db) and about 40' While we have a SRL210-C4 to use we have yet to have someone answer our plea to borrow a set of duplexers.

News from the Dauphin Amateur Radio Club is that they have now released the codes for the link between their system and the MRS system. This system consists of a HOT-LINK from Lundar to Swan River

.

The system can be access from the MRS side with the following codes. 497* on and 497# off. You would then travel through an intermediate link at Woodlands to Lundar (VE4LDR) and then to Spearhill VE4SHR, Baldy Mountain (VE4BMR) and finally to Thunder Hill (VE4RR). This last link will be installed shortly. While this link system has just been established, it will be short lived as when the new controllers are installed We will not be able to keep this connection. But plans are being made to re-establish it as soon as we have the funds to purchase an additional duplexed radio and controller card.

Flea Market
by Pat, VE4PLG

The Spring Flea Market will be held on April 18th at the Waverly Heights Community Club, 1885 Chancellor. The cost for the tables will be $5.00 each and $2.50 for half a table. Set-up 7:00 - 9:00 am. Please contact VE4PLG for a spot. Also if power is required please book early and bring an extension cord. Doors will open at 9:00 am sharp, . Enclosed with this NEWSCASTER you will find a FREE Admission Ticket for the Fleamarket. Please present this ticket at the door for the door prize draws. **** WITHOUT THIS TICKET, you will be required to pay the $1.00 Admission Charge - So don't forget to bring it with you! Seniors who are not members of WARC or MRS must pick up their tickets at the Seniors Club. FOR SELLERS - You must pay for your table(s) when you arrive and obtain an Identification Ribbon to allow you entrance before the 9:00 a.m. Entrance time. Please adhere to these rules as they will result in an orderly sale and make it easier to control the admissions desk and keep buyers out during set-up. Have a fun sale day!

FOR FURTHER INFORMATION CONTACT PAT - VE4PLG AT 338-0511 If anyone would like to help Pat take this rather large task please give her a call.

ARES - What is it ?
by VE6AFO

(Submitted by Rod, VE4TM)

The question of what is the Amateur Radio Emergency Service (ARES) has come up at some meetings. The recent radio amateur hears the acronym from time to time and can not associate to how and where this fits into ham radio.

The ARES has a very long history dating back to before the war, 1935, when ham operators become involved helping with communications during natural disasters. It was found that ham radio seemed to have the flexibility to communicate more effectively than the commercial services that were laid out to do specific point to point or regional communications. As more communities and agencies realized our potential the ARES gained recognition and respect from municipalities, provincial and federal agencies. The ARES is just not a loosely knit group going off in many directions.

The Amateur Radio Emergency Service is organized under the auspices of the Canadian Radio Relay League (CRRL). Before the CRRL became completely autonomous in 1988 the guide-lines that were originally established by the American Radio Relay League were followed here in Canada. The ARES program then is nothing more than organized and coordinated efforts to bring about communications for various agencies during emergencies. How then are these efforts organized throughout Canada? Organization takes place under the Field Services Program sponsored by the Canadian Radio Relay League.

To familiarize you with the hierarchy of the "Field Services" program I will try to explain the frame work of its structure. First of all the Canadian Radio Relay League has within its body an appointed Field Services Manager. This person is in charge of all the Field Services across Canada. His or her job would be to liaise with Federal agencies, the Canadian National Red Cross, the Regional elected CRRL Director, as well as his/her elected Section Managers at the Provincial level.

The Section Manager is in charge of each respective section within Canada. There are seven sections within the Canadian Field Services. These are from the west to the east, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and the Atlantic provinces. The Section Manager is elected by the Canadian Radio Relay League members and holds a term for two years. After being elected the Section Manager must then coordinate and organize the Amateur Radio Emergency Service and the National Traffic System along with many other services provided for within the Field Services program.

Some of these others services provide for a Section Traffic Manager who is in charge of providing a network of provincial nets that interface with the National Traffic System across North America. He/she appoints another to handle the Official Bulletin Station affairs. Under the Section Manager then are many areas of responsibility that must be taken care of. To name all of these they are:

AREA RESPONSIBILITY LEADERSHIP POSITION
Section Manager's deputy Assistant Section Manager Emergency Communications Section Emerg. Coordinator Traffic Handling Section Traffic Manager Volunteer Monitoring Official Observer Official Observers
Coordinator Affiliated Clubs Affiliated Club Coord. Public Information Public Information Officer Federal Government Federal Government Liaison Provincial Government Prov. Government Liaison Technical Activities
Technical Coordinator On-the-air Bulletins Bulletin Manager

In addition, there are three leadership positions that are of subordinate status within the Section. They are Net Manager (NM), District Emergency Coordinator (DEC), and Emergency Coordinator (EC). Net Managers normally report to the STM, while DECs report to the SEC, and the ECs usually report to their DEC or SEC. At the SMs option, the STM can directly appoint NMs and the SEC can directly appoint DECs and ECs. Along with appointing (and endorsing or cancelling) the official CRRL leadership people in the Section, Section Managers will have to handle a similar function with the individual/station appointments. However, SMs can delegate the appointment function to the appropriate leadership official in the chain of command, if they so desire, as follows:

INDIVIDUAL APPOINTMENT
Off. Bulletin Station BM Off. Emerg. Station
Normally reports to EC/DEC, but can be directly appoint. by the SEC Official Observer, Coordinator Official Relay Station, STM Public Info. Assist., Assist. Technical Coord.

As can be seen, the Field Services Organization are a bunch of hard working people trying to fulfil many positions within the Section. Each Section within Canada has the same structure that eventually reports their activities back to the Section Manager who in turn reports back to the League for inclusion in the National magazine. Some leaders like the STM and SEC report to both their SM and directly to the League with their own report which becomes part of the Public Service column. I hope this article has given more insight to the affairs of how the Amateur Radio Emergency Service functions within your section. Ken Oelke, VE6AFO Section Emergency Coordinator (Alberta) CRRL Field Services Manager

Amateur Radio Emergency Service Contacts:

Section Emergency Coordinator Rod Kischook, VE4TM Ph. 853-7711 (Responsible for all ARES Organization and Operations within the Province of Manitoba.)

Emergency Coordinator - City of Winnipeg Bill East, VE4AAZ Ph. 233-2233 (Responsible for all ARES Organization and Operations within the City of Winnipeg boundaries.)

Emergency Coordinator - Interlake Paul Arsenault, VE4AEY Ph. 886-2610

Emergency Coordinator - Eastern Manitoba John Gowron, VE4ADS Ph. 444-3207

VE4TTU

The VE4TTU station located at the Museum of Man and Nature is still looking for volunteers for the last week of April and all of May. We could sure use your help, so why not give us a try. There is a brand new HF rig there just waiting for someone to make the very special contact. Even if you are not HF qualified, there is still a 2-meter rig and a packet station. The work is not terribly hard, all you have to do is tell the few people who stop and wonder what it is that your doing all about Ham radio, and it great rewards. If you don't quite feel comfortable then request to be partnered up with someone who can show you the ropes. Please call Vern VE4VQ @ 256-5346 or Pat VE4PLG @ 338-0511. New Hams always welcome.

Thank You From Dave, VE4KU

I recently received a gift from a fellow ham VE4KR, Ron Bilinski. This gift is one of my late father's QSL cards from the 50's. The call sign on the card is VE4LF and it is unused. I was so excited and I haven't seen on of these since I left home in the 60's. Ron , I thank you. I appreciate your thoughtfulness. The card will be framed and placed in my HAM shack where it can be fully appreciated.

Notice Of Motion presented by VE4HK

At the April Meeting of the Winnipeg Amateur Radio Club Inc., I wish to present the following motion:

I move that the Winnipeg Amateur Radio Club Inc. purchase a new simple-to-use 2 meter transceiver, as soon as possible

Moved by Dick Maguire VE4HK

in speaking to the motion: The two meter transceiver currently being used at the Museum of Man & Nature, VE4TTU is old, and very complicated to use. It is badly in need of repairs. A new unit can be used at our station and the Museum and other public service events. I feel that it is very important to purchase a simple to use rig, since many different people will be using it. Just remember the KISS rule!

Notice Of Motion presented by VE4WR

The following motion was introduced by Wayne Warren VE4WR at the March meeting. This motion was tabled for consideration at the April 12 meeting. We have included the text of the motion here for the benefit of those members who were unable to attend the March meeting.

BE IT RESOLVED: that educational agencies, the Department of Communications, the national radio amateur organizations and radio amateur clubs across Canada actively support and participate in the joint-development of new radio amateur applications in Canadian schools (including improved repeater and networking facilities, innovative curriculum- delivery "tele-teaching" projects in the VHF and UHF spectrum, more training courses in local schools, and other appropriate non-commercial applications).

LIGHTNING ARRESTERS FOR RECEIVING STATIONS BY VE4YH

(extracted from the Canadian Electrical Code)

A lightning arrester shall be provided for each lead-in conductor from an outdoor antenna to a receiving station except where such lead-in conductor is protected by a continuous grounded metal shield between the antenna and the point of entrance to the building. Lightning arresters shall be located outside the building or inside the building between the point of entrance of the lead-in and the radio set or transformer, as near as practicable to the entrance of the conductors to the building. Lightning arresters shall not be located near combustible material. LIGHTNING ARRESTERS FOR TRANSMITTING STATIONS-Each conductor of a lead-in to a transmitting station from an outdoor antenna shall be provided with a lightning arrester or other suitable means which will drain static charges from the antenna system except: Where

protected by a continuous metal shield which is grounded; or Where the antenna is grounded. GROUNDING FOR AMATEUR RECEIVING AND TRANSMITTING EQUIPMENT- The grounding conductor shall be a copper, aluminium alloy, copper-clad steel, bronze, or other corrosion-resistant material. The grounding conductor may be uninsulated. The grounding conductor shall be securely fastened in place and may be directly attached to the supporting surface without the use of insulating supports. The grounding conductor shall be protected from mechanical injury. The grounding conductor shall be run in as straight as line as practicable from the lightning arresters or antenna mast, or both, to the grounding electrode. (rod) The grounding conductor shall be connected to the grounding electrode with an approved connector which is approved for this purpose. A single grounding conductor may be used for both protective and operating purposes, but must be installed so that disconnection of the operating ground will not effect the protective ground circuit. All exposed metal parts of transmitter, including all exposed metal handles, knobs, and accessories such as microphone stands shall be grounded. All access doors to transmitters shall be provided with interlocks which will disconnect all voltages in excess of 250 V when any access door is opened. This information will help to provide a safe radio station for you and your family along with some good common sense. Next month; What type of grounding electrodes, how many, and where. Any questions or comments are welcome. Gary Smith, VE4YH

Welcome new HAMS

The following are new Station licences:

VE4GLR	Gordon Richards	93.01.26
VE4SCE	Shaun Epp	93.01.18
VE4KJF	Kelly Fitzpatrick	93.01.18
VE4WGW	Dan Keizer	93.01.08
VE4RRC	Gary Smith	93.01.13
VE4GHR	George Rodgers	93.01.29
VE4GAB	Todd Goranson	93.02.03
VE4BLG	Betty Green	93.02.03
VE4RON	Ron Larson	93.02.03
VE4NJ	Peter Wrublowsky	93.02.08
VE4BET	Betty Van Der Vis	93.02.09
VE4LVV	Leendert Van Der Vis	93.02.09
VE4AMD	Roland Wickstrom	93.02.11
VE4HF	Ray Edise	93.02.11
VE4JS	Hendrick Schippers	93.02.12
VE4 VP	Nendrik Makenbach	93.02.22
VE4VP	David Donahue	93.02.26
VE4WNR	trf to Kelly Taylor from Derrick Belbas	
VE4EEE	Changing to VE4WMR Wpg North Radio Grp.	

CONSTRUCTION OF A NEW J-POLE ANTENNA FOR 2m

by W. Kinsner, VE4WK

SUMMARY

If you like building good antennas, this one is for you. The J-pole is a slim omnidirectional half-wave antenna fed at the end through a quarter-wave shorted transmission line. Its predecessor is the famous "Zepp" antenna developed for the Zeppelin airship. Both antennas have served many hams around the globe well. While the Zepp is easy to calculate, the J-pole is not; in fact, a one-percent error can throw you out of the band. However, when calculated properly, the J is an excellent candidate for a base station on the popular 144-148 MHz band, with a 1:1 VSWR and good efficiency. I have also used it during a Field Day on top of our "Winnipeg radio mountain".

The construction plans presented in this newsletter describe such an optimal antenna. It can be constructed from inexpensive materials at approximately $10 total cost. The first two drawings show the dimensions of the antenna in inches, while the third figure provides a step-by-step procedure for putting the antenna together. However, in order to achieve proper results, the following comments should also be considered.

CONSTRUCTION TIPS

The Pipe

-- The copper pipe may be of any thickness, as long as the outer diameter is rated at 1/2 inch. (Remember that the real dimension is always larger than the rated dimension by 1/8 inch. For example, the real outer dimension of a 1/2-inch copper pipe is 5/8 inch.)-- Do not bend or dent the pipe when transporting it from a supplier.-- Cut the copper pipe to the exact dimensions with a good pipe cutter (a metal saw may deform the thin pipe).-- Although a 12-foot copper pipe is sufficient for a single antenna, four antennas can be cut from only three 12-foot pipes.

The L and T Joints

-- Pay attention to the dimensions of the 90-degree copper elbow (the L joint). I found that the dimensions may vary from supplier to supplier by as much as 1/8 of an inch! This will reduce the efficiency of the antenna considerably. If you cannot get the exact L joint, adjust the dimension of the Q section appropriately. (Beaver Lumber used to have the one shown in the drawings.)-- The dimensions of the T joint and the cups do not vary very much when switching suppliers.

Soldering

-- For those who have never done soldering of large copper pieces (or forgot it!), here are a few useful tips.-- After cleaning all the joints with sand paper (or steel

wool), apply a very thin layer of soldering paste to both surfaces to be soldered. The soldering paste should not be acid based.-- Assemble all the parts. Make sure the quarter wave matching section is not twisted or skewed (keep it flat with a clamp).-- Take the antenna outside your house or shack, as the fumes will trigger your smoke alarm (if you have one), or will be very irritating indoors.-- Use a solid-core solder (without any acid or resin core). The preferred composition of led/tin is 50/50. Other compositions can also be used, but the 50/50 has a reasonably low melting point, and is the strongest for this application.-- Solder all the joints (in any sequence you like, but I prefer starting from the T and L joints).-- Use a propane torch to solder the joints. (I have tried a 1500-W heat gun without any success because the copper pipe conducted the heat away from the joint too quickly.)-- After about 30 seconds of heating a joint, touch the solder wire to it. The best moment to apply the solder is when the copper pipe changes into a slightly brighter colour. The solder will then melt easily and flow into the joints. Do not apply too much solder, or else it will drip to the ground (or on your hands). Protect your hands just in case!-- The solder remains molten for approximately half a minute, so let it solidify before moving the antenna.-- The antenna should be quite solid and look great by now.

The Feedline

-- For short runs, I use the RG-58A or the RG-8M (foam) coax. For long runs, the RG-8 or better cable is required.-- Since the coax is unprotected at the antenna end, water may get inside it and eventually damage it. To protect the connection against the weather, use either the new liquid plastic or a non-corrosive (no acetic acid) sealant. Do not use any sealant that has a vinegar smell.-- The feedline can be attached to the antenna either with two garden-hose clamps or by soldering it to the pipe directly at the locations specified. Do not use self-tapping screws to fasten the feedline as they weaken the antenna mechanically.-- A small change in the feed position will increase the VSWR and reduce efficiency of the antenna. Make sure it is done right.

The Choke

-- Since the coax is an unbalanced feedline, it will radiate from the outer shield and destroy the good radiation characteristics of the antenna. It is then critical to reduce the radiation by a choke positioned below the shorted end of the Q section, as shown in the first drawing.-- A good choke has four (4) turns coiled with a diameter of five (5) inches. This amounts to approximately six extra feet of coax for the choke.-- Fasten the choke to the quarter-wave support pipe below the shorted end of the quarter-wave feed section of the antenna. Use either an electrician vinyl tape or a plastic tie, rather than a metal tie.-- Remember, without the choke, the measured VSWR will be greater than 1:1 due to the unwanted radiation from the coax!

Fastening of the Antenna

-- The antenna may be fastened to any support, including grounded metal.-- For best results make sure that the shorted part of the quarter-wave feed section is above the support. Remember, however, that the support should be grounded because the antenna acts as a lightning rod.-- If the antenna cannot be mounted above metal structures, separate it from the metal by at least a quarter-wave distance. The usual omnidirectional radiation pattern will now change to a cardioid because the other supporting metal acts as a reflector. To prevent the half-wave radiator from swinging in a wind (thus producing a fading effect), it should also be fastened by a noncoductive material to the supporting structure.

Protection Against Corrosion

-- The antenna can be left unprotected and will work well for years.-- If you want to prolong its life, either paint it with a good metal paint resisting ultraviolet light, or apply a chemical treatment to the copper surface.-- The chemical treatment of copper surface is quite simple. First, if the copper surface is brown, wire brush it until bright. Then wash the copper with a solution of "cloudy ammonia" (available in most supermarkets in the household cleaner section). The metal should turn into a bright green colour (except for the soldered joints). When the surface has dried, wash it again with petroleum distillate paint thinner. This turns the metal into a dark bronze colour. The metal should now be more resistant to corrosive environmental factors.

Can the Antenna Size be Scaled Down or Up for Other Bands?

-- Although any piece of wire can radiate, it may not be very efficient.-- The antenna published here has been carefully designed for the 2m band, and when scaled may not produce good results. It may still be better than many other published J-poles, but it may not produce the desired 1:1 VSWR and be optimally efficient.-- For smaller dimensions, there are better antennas (such as collinear) that can produce more gain.-- So, the short answer is NO, do not scale it. Instead, wait for my full description of the antenna, with all the calculations included for any band.

Suggestions or Questions

If you have any suggestions or questions concerning this antenna, contact me either by packet at VE4WK@VE4KV.#WPG.MB.CAN.NOAM, or FAX: (204) 275-0261, or eMail: kinsner@ee.UManitoba.CA.

Final Legal Statement

-- I have released the antenna into the public domain. It means that any ham (amateur radio operator) may build the antenna for his or her private use, without compensation required by the author (VE4WK). It does not mean, however, that the antenna may be built for any commercial or any other purposes by any individual or company or organization, without a written consent from the author. W. Kinsner ,Dept. of Electrical & Computer Engineering University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2

Ham Radio and it's affects on Cancer
- Extracted from Arrl

(Part 2)

Thermal Effects of EMR

Nonthermal effects of EMR, on the other hand, may be of greater concern to most amateurs because they involve lower-level energy fields. In recent years, there have been many studies of the health effects of EMR, including a number that suggest there may be health hazards of EMR even at levels too low to cause significant heating of body tissue. The research has been of two basic types: epidemiological research, and laboratory research into biological mechanisms by which EMR may affect animals or humans.

Epidemiologists look at the health patterns of large groups of people using statistical methods. A series of epidemiological studies has shown that persons likely to have been exposed to higher levels of EMR than the general population (such as persons living near power lines or employed in electrical and related occupations) have higher than normal rates of certain types of cancers. For example, several studies have found a higher incidence of leukemia and lymphatic cancer in children living near certain types of power transmission and distribution lines and near transformer substations than in children not living in such areas. These studies have found a risk ratio of about 2, meaning the chance of contracting the disease is doubled. (The bibliography at the end of this chapter lists some of these studies. See Wertheimer and Leeper, 1979, 1982; Savitz et al, 1988).

Parental exposures may also increase the cancer risk of their offspring. Fathers in electronic occupations who are also exposed to electronic solvents have children with an increased risk of brain cancer (Johnson and Spitz, 1989), and children of mothers who slept under electric blankets while pregnant have a 2.5 risk ratio for brain cancer (Savitz et al, 1990).

Adults whose occupations expose them to strong 60-Hz fields (for example, telephone line splicers and electricians) have been found to have about four times the normal rate of brain cancer and male breast cancer (Matanoski et al, 1989). Another study found that microwave workers with 20 years of exposure had about 10 times the normal rate of brain cancer if they were also exposed to soldering fumes or electronic solvents (Thomas et al, 1987). Typically, these chemical factors alone have risk ratios around 2.

Dr. Samuel Milham, a Washington state epidemiologist, conducted a large study of the mortality rates of radio amateurs, and found that they had statistically significant excess mortality from one type of leukemia and lymphatic cancer. Milham suggested that this could result from the tendency of hams to work in electrical occupations or from their hobby.

However, epidemiological research by itself is rarely conclusive. Epidemiology only identifies health patterns in groups--it does not ordinarily determine their cause. And there are often confounding factors: Most of us are exposed to many different environmental hazards that may affect our health in various ways. Moreover, not all studies of persons likely to be exposed to high levels of EMR have yielded the same results.

There has also been considerable laboratory research about the biological effects of EMR in recent years. For example, it has been shown that even fairly low levels of EMR can alter the human body's circadian rhythms, affect the manner in which cancer fighting T lymphocytes function in the immune system, and alter the nature of the electrical and chemical signals communicated through the cell membrane and between cells, among other things. (For a summary of some of this research, see Adey, 1990.)

Much of this research has focused on low-frequency magnetic fields, or on RF fields that are keyed, pulsed or modulated at a low audio frequency (often below 100 Hz). Several studies suggested that humans and animals can adapt to the presence of a steady RF carrier more readily than to an intermittent, keyed or modulated energy source. There is some evidence that while EMR may not directly cause cancer, it may sometimes combine with chemical agents to promote its growth or inhibit the work of the body's immune system.

None of the research to date conclusively proves that low-level EMR causes adverse health effects. Although there has been much debate about the meaning and significance of this research, many medical authorities now urge "prudent avoidance" of unnecessary exposure to moderate or high-level electromagnetic energy until more is known about this subject.

Safe Exposure Levels

How much EM energy is safe? Scientists have devoted a great deal of effort to deciding upon safe RF-exposure limits. This is a very complex problem, involving difficult public health and economic considerations. The recommended safe levels have been revised downward several times in recent years--and not all scientific bodies agree on this question even today. In early 1991, a new American National Standards Institute (ANSI) guideline for recommended EM exposure limits is on the verge of being approved (see bibliography). If the new standard is approved by a committee of the Institute of Electrical and Electronic Engineers (IEEE), it will replace a 1982 ANSI guideline that permitted somewhat higher exposure levels. ANSI recommended exposure limits before 1982 were higher still.

This new ANSI guideline recommends frequency-dependent and timedependent maximum permissible exposure levels. Unlike earlier versions of the standard, the 1991 draft recommends different RF exposure limits in controlled environments (that is, where energy levels can be accurately determined and everyone on the premises is aware of the presence of EM fields) and in uncontrolled environments (where energy levels are not known or where some persons present may not be aware of the EM fields).

Fig. 20 is a graph depicting the new ANSI standard. It is necessarily a complex graph because the standards differ not only for controlled and uncontrolled environments but also for electric fields (E fields) and magnetic fields (H fields). Basically, the lowest E-field exposure limits occur at frequencies between 30 and 300 MHz. The lowest H-field exposure levels occur at 100-300 MHz. The ANSI standard sets the maximum E-field limits between 30 and 300 MHz at a power density of 1 mW/cm\2/ (61.4 volts per meter) in controlled environments--but at one-fifth that level (0.2 mW/cm\2/ or 27.5 volts per meter) in uncontrolled environments. The H-field limit drops to 1 mW/cm\2/ (0.163 ampere per meter) at 100-300 MHz in controlled environments and 0.2 mW/cm\2/ (0.0728 ampere per meter) in uncontrolled environments. Higher power densities are permitted at frequencies below 30 MHz (below 100 MHz for H fields) and above 300 MHz, based on the concept that the body will not be resonant at those frequencies and will therefore absorb less energy.

In general, the proposed ANSI guideline requires averaging the power level over time periods ranging from 6 to 30 minutes for power-density calculations, depending on the frequency and other variables. The ANSI exposure limits for uncontrolled environments are lower than those for controlled environments, but to compensate for that the guideline allows exposure levels in those environments to be averaged over much longer time periods (generally 30 minutes). This long averaging time means that an intermittently operating RF source (such as an Amateur Radio

transmitter) will show a much lower power density than a continuous-duty station for a given power level and antenna configuration.

Time averaging is based on the concept that the human body can withstand a greater rate of body heating (and thus, a higher level of RF energy) for a short time than for a longer period. However, time averaging may not be appropriate in considerations of nonthermal effects of RF energy.

The ANSI guideline excludes any transmitter with an output below 7 watts because such low-power transmitters would not be able to produce significant whole-body heating. (However, recent studies show that handheld transceivers often produce power densities in excess of the ANSI standard within the head).

There is disagreement within the scientific community about these RF exposure guidelines. The ANSI guideline is still intended primarily to deal with thermal effects, not exposure to energy at lower levels. A growing number of researchers now believe athermal effects should also be taken into consideration. Several European countries and localities in the United States have adopted stricter standards than the proposed ANSI guideline.

Another national body in the United States, the National Council for Radiation Protection and Measurement (NCRP), has also adopted recommended exposure guidelines. NCRP urges a limit of 0.2 mW/cm\2/ for nonoccupational exposure in the 30-300 MHz range. The NCRP guideline differs from ANSI in two notable ways: It takes into account the effects of modulation on an RF carrier, and it does not exempt transmitters with outputs below 7 watts.

Low-Frequency Fields

Recently much concern about EMR has focused on low-frequency energy, rather than RF. Amateur Radio equipment can be a significant source of low-frequency magnetic fields, although there are many other sources of this kind of energy in the typical home. Magnetic fields can be measured relatively accurately with inexpensive 60-Hz dosimeters that are made by several manufacturers.

Table 3 shows typical magnetic field intensities of Amateur Radio equipment and various household items. Because these fields dissipate rapidly with distance, "prudent avoidance" would mean staying perhaps 12 to 18 inches away from most Amateur Radio equipment (and 24 inches from power supplies and 1-kW RF amplifiers) whenever the ac power is turned on. The old custom of leaning over a linear amplifier on a cold winter night to keep warm may not be the best idea!

Table 3

Typical 60-Hz Magnetic Fields Near Amateur Radio Equipment and AC-Powered Household Appliances

Values are in milligauss.

Item Field Distance

Electric blanket 30- 90 Surface Microwave oven 10- 100 Surface 1- 10 12" IBM personal computer 5- 10 Atop monitor 0- 1 15" from screen Electric drill 500-2000 At handle Hair dryer 200-2000 At handle HF transceiver 10- 100 Atop cabinet 1- 5 15" from front 1-kW RF amplifier 80-1000 Atop cabinet 1- 25 15" from front

(Source: measurements made by members of the ARRL Bio Effects Committee)

There are currently no national standards for exposure to lowfrequency fields. However, epidemiological evidence suggests that when the general level of 60-Hz fields exceeds 2 milligauss, there is an increased cancer risk in both domestic environments (Savitz et al, 1988) and industrial environments (Matanoski et al, 1989; Davis and Milham, 1990; Garland et al, 1990). Typical home environments (not close to appliances or power lines) are in the range of 0.1-0.5 milligauss.

DETERMINING RF POWER DENSITY

Unfortunately, determining the power density of the RF fields generated by an amateur station is not as simple as measuring low-frequency magnetic fields. Although sophisticated instruments can be used to measure RF power densities quite accurately, they are costly and require frequent recalibration. Most amateurs don't have access to such equipment, and the inexpensive fieldstrength meters that we do have are not suitable for measuring RF power density. The best we can usually do is to estimate our own RF power density based on measurements made by others or, given sufficient computer programming skills, use computer modeling techniques.

Continied next Month .....

Please Remember that VE4TTU need your help.

Why not stop in there one day, and see what there is to do. You'll be suprised, how simple it is, to sit there, and chand out a few brochures, answer a couple of question and still have a fun afternoon, searching for that distant station. Please call Vern VE4VQ to set up your own day and time .....