



Founded 1979 Incorporation No A6677 P.O. Box 692, Shepparton 3632
July 21

VK3RGV repeaters and transmitter operating frequencies Mt Wombat

53.725MHz (-1 MHz), **In Service** 146.65MHz (-600 kHz), **In Service**
438.2MHz (-7 MHz -D-Star), **In Service** 438.650MHz (-7 MHz 91.5 Hz tone), **In Service**
438.9MHz (-7 MHz - DMR), **In Service** 439.775MHz (-5 MHz), **In Service**, IRLP (node #6990)

476.475 MHz (+750 kHz) CB Repeater WBT03 Channels 3- 33, **In Service**
VK3RDS, 438.7625 MHz (-7 MHz DMR) **Shepparton on test @ VK3YNV QTH**
Mount Major VK3RDU repeaters, 146.850 MHz and 439.875 MHz

Access to most analogue repeaters is by sub-audible 123 Hz tone or noise/carrier mute (less sensitive).
Your TX offset shown in brackets

Club informal on air get togethers - Wednesday evenings. All welcome. Club call sign VK3SOL:-
2mx repeater 8.00pm 146.650 MHz, 3.63 MHz SSB ± interference 8.30pm.
The vintage radio club have a sked at 11.00am Sunday on the 2 mx repeater.

Meetings the first Saturday of the month from 10 am for informal chats and technical talks. A BBQ follows (a gold coin donation). Business meeting 1 pm (except January when no meeting occurs) at Flexible Learning Centre, 18 Channel Road (250 metres from Archer Street), Shepparton.
Variations in these times, days and location are normally notified in the preceding newsletter.

Check website before coming Saturday due to possible Covid 19 restrictions

Website – www.sadarc.org or www.sadarc.org.au Face book Page - Shepparton and District Amateur Radio Club Direct Link: <https://www.facebook.com/groups/481867453084459>
Note: Want to get your licence? SADARC has examination assessors, contact the secretary for details.

DISCLAIMER: - No guarantee is given as to the accuracy of information in this newsletter.

Warning: - There is a danger of electrocution or injury when working on electrical/radio gear or working at heights doing antenna work. You do so at your own risk. 27/7/2021

President: - Peter Rentsch	VK3AXI	peter@rentsch.com.au
Vice-President: - Barrie Halliday	VK3KBY	
Secretary: - Andy Ashley	VK3AJA	secretary@sadarc.org
Assistant Secretary: - Geoff Angus	VK3ZNA	
Treasurer: -Andy Ashley	VK3AJA	secretary@sadarc.org
Membership Sec: - Andy Ashley	VK3AJA	"
Webmaster: - Ray Gardiner	VK3YNV	ray@etheira.net

Communications Managers (External Events):- Bruce (VK3PNG) & Darren (VK3HEN) Glasson

Tech. Committee: Geoff VK3ZNA, Ray VK3YNV, Josh Gardiner & Rodney VK3UG – with power to co-opt.

Newsletter: - Rodney VK3UG (Editor) rodlynn6@bigpond.com , Andy VK3AJA (Distribution)

Presidents Report July 2021

It was great to see everyone again in a face-to-face situation. Thank you to all those who attended and thanks especially to the cooks on the day who prepared the BBQ in the cold icy showers. Our enthusiasm is still evident by the chatter and the projects that occur at our meetings. At our last meeting we were also given approval to go ahead with the Antenna on the roof of the Club Room. Assuming the weather is OK could those involved please communicate with each other to make arrangements.

It has been interesting with my little Christmas Tree project. There are at least 3 other members who are attempting this project in various styles and with varying degrees of success. Perhaps we could all bring along our Christmas Tree Projects for table centre pieces at the Christmas Lunch!!!!

Let's aspire to inspire before we expire!

At this stage I am not sure if we can meet on the 7th or not. My gut feel is that we will have to have another on air meeting **but PLEASE CHECK THE SADARC WEBSITE PRIOR TO LEAVING SATURDAY IN CASE WE CHANGE**. We will also need to discuss the Hamfest. At this stage it is planned to go ahead but I feel further discussion is required since the Delta Strain reared its ugly head. See also Editor's Ramblings.

In October we have our Annual General Meeting where all office bearer positions come up for election. After considerable thought and discussion with Karen I have decided not to stand for President again (assuming I was nominated). I have been an Amateur now for twelve years and of those twelve I have been President of SADARC for 10. Its time I had a break and let someone else with new ideas take over.

Don't forget also that Subs are due. Please pay to Secretary Andy as soon as possible. PLEASE remember to fill in the Membership form and return it to Andy. This is most important for our Club records and for filling our legal obligations with the appropriate authorities.

Hopefully, we can all catch up in 8 days at our next meeting, if not then on air.

Cheers for now.

Peter Rentsch
President

CLUB CALLANDER

7th August 2021 - Regular Meeting – Vision Centre BBQ Discussion on Hamfest TBC (Check website to see if it is permitted under Covid restrictions – Editor)

4th September 2021 - Regular Meeting – Vision Centre BBQ Final discussion on Hamfest

12th September 2021 - Hamfest

2nd October 2021 - Regular Meeting and AGM – Vision Centre BBQ

SADARC MEETING MINUTES

3 July 2021 Club rooms 1:03 pm

Apologies: VK3UI John, VK3ZYZ Denys, VK3FALN Alan, VK3GEK Graeme, VK3PNG Bruce, VK3YYY Ian. VK3AFD Arthur,

In Attendance: VK3AJA Andy, VK3BPH Kevin, VK3UG Rodney, VK2RK Robert, VK3AWT Alan, VK3ZE Huntly, VK3AXI Peter, VK3GSR Geoff, VK3TJS Jacek, VK3KBY Barrie, Bill C, VK3TEX Les, Josh, VK3EB Dallas, VK3ASK Peter, Stevo, VK3BLD Rob, VK3ZNA Geoff, VK3OV Pat.

Minutes of last meeting, ready by Peter, moved by VK3ASK Peter, second Rob VK2RK. All in favour.

In: Memberships.

Out: various misc. emails.

Moved by VK3TEX Les, second by VK3ZE Huntly, all in favour.

Reports,

Financial: read by Andy, moved by VK2RK Rob, second by VK3BPH Kevin. All in favour.

Technical: Read by Ray, all appears to be operating ok. Ray picked up some UHF cavities and Rob VK2RK has some spare cavities for proposed Wire-X repeaters. We will need to source antennas, may have already. Josh asked if anybody has used D-Star? (no) Moved by VK2RK Rob, second by VK3ASK Peter, all in favour.

Proposed repeater. Licence paid by club, moved by VK3TJS Jacek, second VK3BLD Rob. All in favour.

General business: Geoff VK3GSR spoke about the process of sitting exam online. Foundation can't be done online because of the Practical section. Geoff told us how he was able to book an online exam to upgrade to Standard Lic. Geoff has sat this and passed! Congratulations Geoff.

Geoff has also got some stickers made up at his expense with Robs artwork and handed them around, thank you Geoff.

VK3ASK Peter has told us that the dept. has approved the antenna works at club rooms. Pencilled in works at next meeting.

Rodney spoke about the Vintage Radio Club meeting and some interesting tools that were shown. Rodney showed them to club.

Hamfest: wait and see. Due to Covid.

Kevin's 15 min of fame! We now know more about Kevin!
He has nominated... Geoff VK3GSR

Meeting closed 2:28 pm

Some soldering tools

At a recent Vintage Radio Club meeting Bill Crocker passed around a collection of small hand tools under the Weller trademark intended to be used mostly on printed circuit boards. They can be used for other work on electronic equipment as well. They are available from Bunnings and maybe elsewhere with a price of \$12.99. In Bunnings they are in the tools section where soldering equipment is displayed. Rodney Champness.



Editor's Ramblings

- The meeting day (3rd) didn't look great but 20 members turned up for the BBQ (between trickles of rain) and meeting. A lot of general chit chat before the meeting.
- Congratulations to Geoff VK3GSR who has now climbed higher on the licence levels and now holds a Standard Grade licence. How long before sitting the Advanced grade exam?
- Our finances are still healthy whilst Covid has been causing concern and the new 2mx antenna on top of Mt Wombat has been paid for. Thanks to Paul Watters for the great work done on obtaining the antenna and installing it.
- Apparently some more distant amateurs are making comments such as "I don't hear the repeater well but others say my signals into the repeater are strong" or vice-versa. Ray VK3YNV made the point that the new 2 mx antenna is mounted on top of the tower and has uniform gain in all directions. However, the transmit antenna is an array mounted off the side of the tower so it will have a radiation pattern that puts a better signal into some areas and not so good in others. Ultimately the technical committee is looking at using just the mast top antenna to overcome this observed problem. That will occur after the cavities originally used are refurbished.
- Things are moving steadily if slower than some would like to have VK3RDU and a new Fusion repeater system installed on Geoff V3ZNA's tower. Geoff VK3GSR has a riggers ticket so installation of the antennas system can take place. Thanks Geoff.
- Approval has been given to have the 2mx/70cm antenna ex the Scout hall installed at the club rooms, possibly with a TV antenna as well. All being well this will happen at the next meeting during the morning. The two Geoff's are organising this.
- The stickers as mentioned in the previous newsletter are available (I forgot to pick up one). Thanks for the donation of these Geoff VK3GSR.
- Our membership renewals are due from 1/7/21 and are set at \$25. Andy requires us to fill in the annual membership sheet for various records for the insurance etc.
- Kevin VK3BPH gave us a talk of his life particularly his work life. Like many his first radio was a crystal set. Initially Kevin started out as a farmer in the Kiewa Valley area.. He and June moved down into the Heytesbury region in South West Victoria once again as a farmer and was a farmer for around 30 years all told.

Kevin wasn't content to be just a farmer and became involved with UHF CB installations and other two ways and servicing of many sets. He was also involved in getting TV reception for people in difficult reception areas. Down through the South West of Victoria I personally saw many extreme methods of obtaining reception. I saw many in North East Victoria too. Kevin and many like him installed some very impressive systems with remote antennas on top of hills and coax or twin cable stretching a kilometre or so from antenna to TV set. He was involved for some time installing Austar Satellite TV systems and some Christian Satellite systems in more recent times. Always ready to try something new Kevin obtained his private pilot's licence and was endeavouring to obtain masters qualifications for captaining small ships at sea. As you can see Kevin is a man of many talents and we are fortunate in having such a member in our club.

- **In discussion with Peter following the release of the latest Covid restrictions, we are not really any the wiser. Groups of up 10 can meet, and 100 if you are not in a group. So where does that put us! The decision at this stage is that we will have the next meeting by Radio because of the uncertainty of what the conditions really mean and also because of the NSW conditions as we don't want another furniture removalist debacle. It is suggested you look at the website on about 5th August for the latest info re the meeting. Hopefully it will be face to face. 28/7**

Electro-magnetic fields

I asked and got permission to reprint the following article from OTN magazine by Lloyd Butler VK5BR. Many will recognise his name and background in Weapons Research Establishment (WRE) in South Australia. The article is prefaced by me, additional comments by Lloyd. I was particularly interested in the graph that shows on **page 54** of his article. It explained a lot of the things that I dealt with in my previous place of employ.

"A few years back I got drawn into an email chat group on Crossed Field Antennas. The claim was that if one oriented the electric and magnetic fields at right angles and that they were similar in relative amplitude to an electro-magnetic field, one would have an EM wave. After messing with their antennas for a couple of years, I proved that their antennas were radiating from the feed-line not the antennas proper.

It wasn't until I started writing about EM field hazards that I realised that the two induction fields were already at right angles. Also I learnt from physics that, whilst we transfer energy from one form to another, we can't create energy nor destroy it. (So how can energy carried by the electric and magnetic induction fields re-create energy in an EM wave?). Then I looked at the vectors and the result seemed clear.

But back to the request to re-publish. I rarely knock back a request because it advertises the distribution and membership of the Associations which publish AR and OTN. (Not forgetting that the members contribute the articles).

My best regards to yourself and the Shepparton Radio Club. Lloyd VK5BR"

Dangers of electro-magnetic fields

Lloyd Butler VK5BR
RAOTC member No 1495

Over earlier years we have carried on sending radio signals around the surface of the earth at a wide range of frequencies and at some quite high powers, with not too much concern whether electro-magnetic fields could be harmful. However, in more recent times, concern has grown and a lot of people are worried about it. But there are a lot of variables involved in deciding what is harmful to the human body. I thought I would have a look at what could be made of all this.

Foreword

This article commences with the elements of matter, how they form fields in a tuned antenna and the characteristics of those fields. Fields are examined from broadcast stations, mobile phones (including the potential danger to the human brain) and danger to amateur radio operators. There is also a discussion on field strength measurement and body heat build up from fields. One might be surprised at what I have said about the formation of electro-magnetic waves.

Theory on the formation of electro-magnetic fields

In defining the structure of matter we have elements called electrical conductors and elements called electrical non-conductors or insulators. There are also some elements which have both characteristics and are called semi-conductors.

A conductor can pass electrical current which flows into it and it stores energy and creates a magnetic field. From this, the current creates a magnetic field. The component is called an inductor.

At the ends of the inductor two plates may be formed. With an insulator between them, an electric potential is developed across the plates and these create an electric field. The component formed is called a capacitor and this also stores energy.

The process results in separate fields being generated, one from the current running in the circuit and the other from the voltage developed across it. The current and voltage are 90 degrees out of phase with each other and no energy is generated by these components in their own right.

But energy is generated when there is resistance in series with the looped circuit. Energy can also be coupled from an external field through the inductor. And an electric field can couple in energy across the plates of the capacitor.

When the inductor and a capacitor are connected together they form a tuned circuit which, if excited from an external magnetic or electric field, can be triggered into self oscillation called resonance. The self oscillation will occur at a frequency determined by the characteristics of the elements. The resistance in the circuit represents power loss in the circuit in the form of heat.

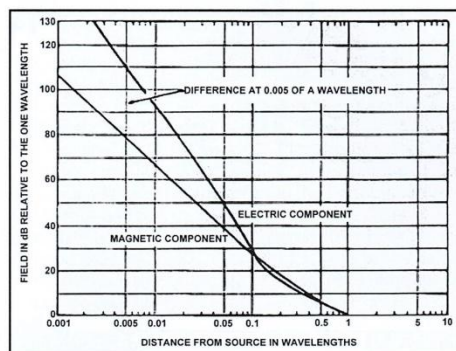
At resonance, energy is stored by the capacitor during part of the oscillating cycle and also returned to the circuit during further parts of the cycle. The ratio of power circulated to power lost is what we call 'Q factor'. If that factor is high, we get high voltage developed across the paralleled capacitor and we get high current through the series loop, including the inductor.

The combined magnetic and electric fields from the resonance make up what has been called an electro-magnetic wave. In the form of a half wavelength tuned antenna, the fields are very strong within the first half wave distance from the antenna's electrical centre. This part of the field is often called the 'near field'. The following algorithms and curves have been prepared from an early text book to demonstrate the high field strength in that first half wave...

1. The electric component of the induction field decreases with the cube of the distance and $dB = 60 \log (d2/d1)$ where $d2$ and $d1$ are the relative distances.

2. The magnetic component of the induction field decreases with the square of the distance and $dB = 40 \log (d2/d1)$

The vector sum of the combined electric and magnetic components decrease directly with distance and $dB = 20 \log (d2/d1)$. In the absence of loss in the transmission path (if this could occur), the curve, if put in the following diagram, would just sit on the X axis as zero field strength.



The near electro-magnetic fields showing their exponential expansion of amplitude versus distance from the antenna centre.

The effect of all this is that, in the near field, the electric and magnetic components continue from the antenna electrical centre for a radial length of about half a wavelength, falling to a signal level where their combined strengths form a near linear slope at the half wave point. In the near field, these two field components are clearly much stronger than beyond the half wavelength.

The fields continue on their way, decreasing in amplitude and in reverse exponential form, continuing towards infinity.

Being 90 degrees out of phase with each other, when the amplitudes are added as vectors, the result is also a sine wave plot of shape giving the appearance of a third field. Text books have listed this as a third field and called it an electromagnetic wave, but it isn't really another field. It is the vector sum of the two individual fields (perhaps we could call it a ghost field).

In terms of time, the ghost field is phased somewhere between that of the two individual fields. I think that if the fields were of equal amplitude, the ghost field would be at 45 degrees to the others. The important conclusion is that there is no third radiation field. The amplitude of the vector addition can be detected and displayed as a sine wave on a CRO but the energy carried is shared between the two fields (electric and magnetic).

Field strength of broadcast stations

But all this leads us further into the fields of powerful medium frequency (MF) broadcast stations and others in the LF/MF region, such as the Homer Beacons (Non-Directional Beacons [NDBs]). Some of these stations run quite high power. Several of the national broadcast stations run power of 50 kW and 100 kW. The near field components of these LF/MF stations would extend up to 1.25 km from the station transmitting antennas for the longest wavelength.

MF broadcast stations in the past have been required by legislation to be consistently staffed by qualified operator/technicians when the stations are on the air. This has put the operators in the position of possible health effects from the continuing radiated fields over the operational work 'shift'.

In the city of Adelaide, broadcast transmitters and their towers have been operated in large building complexes. Workers in those buildings and also the surrounding buildings, would have been affected by the near fields.

These stations in the city have been limited to 500 watts of output power. As time progressed, higher power stations have been relocated to more isolated locations where there is low density housing. Some of these higher power stations were initially also manned, but ultimately they were remote controlled and only needed occasional visits from the technical staff. Hopefully their visits were limited in time. (See later section on **Dangers in lapsed time of fields.**)

Dangers to transmitter staff is one thing but there is also the problem of residents living too close to broadcast transmitters and other transmitting stations. A serious example in South Australia is the national broadcast station at Pimpala, Reynella, SA. First established in 1959 amid open fields, there was hardly a residence in sight from the station which generated 100 kW plus of power. Clearly the station was established by the PMG managers to get away from residential housing. This was fine for many years, but the housing developers finally caught up with the clear land and now there are houses just across the road from the transmitter installation.

Damage to the brain and mobile phones

I have given thought to possible damage to the brain from electro-magnetic fields. This is based on resonance in the brain area and being triggered by microwave radio signals from closeness of the mobile phone. Judging from the dimensions of the brain assembly, resonant frequency would be in the microwave region. But resonance might also be triggered from lower frequency fields from MF

transmitters, which have been discussed. But how can the lower frequency of typical broadcast stations, or the homer beacons, excite resonance at microwave frequencies?

To give some samples of this we can go back to microwave frequency theory where they use various types of oscillators such as the laser and where a microwave oscillator is pumped by a lower frequency. Or there is the simple semi-conductor diode which, on rectification, generates copious harmonics. No doubt the brain is made up of basic elements, pure conductors, insulators, and semiconductors. So maybe the brain can rectify the incoming sine wave signal to produce a harmonic which will pump a resonance in the brain.

Getting back to the mobile phone, the phone is normally operated close to the ear which, when transmitting, induces an induction field into the head. The induction field is extremely strong and distance between the mobile phone and the brain is within the half wave near field area. For Australian mobile channels, the strong near field is between about 8 cm (for 5G) and about 30 cm for the lowest frequency channel. All the mobile channels are within the length of the strong near field region, the lowest field strength being at the 5G end.

I do believe that triggered resonance in the brain is a danger from an incoming signal or a mobile phone held to the head. I am suggesting that if the brain has a resonance at the incoming signal frequency (or harmonic of it), it might cause a lot of heating in that area. If that heating is excessive, it might respond with some form of pain, perhaps a headache (or something more serious). (Refer also to the section **Dangers in lapsed time of fields.**)

I believe there are few limits which have been considered for field strength and a lot of testing has been done by telephone companies. But their testing seems to be field tests triggered by public fear of repeaters on towers.

I think that if there is a worry, it is the close proximity of the mobile phone to the brain, right in the near field of the phone transmission, rather than the field of the towers themselves, which are beamed well above the ground.

Danger to the radio amateur

The question of amateur radio transmission is now considered with discussion on how the amateur operator might be affected by strong fields. Looking at the attached field strength curves, field strengths above the 0.1 wavelength point, is the strong near field which is examined.

Danger to the amateur radio operator from his own transmitter obviously depends on the frequency of transmission, the average radiated power, the distance between the operating location and the antenna, and a few other variables. All this may be undefined, but I have nominated eight metres between the antenna centre and the operating location and consider whether the near field lays along this line. It does not attempt to provide all the answers to safety but it is somewhere to start.

The 160 metre band is the most probable one to cause high induction levels from the near field. The radio amateur usually operates with the usual 160 metre antenna above the house. On 160 metres, the near field extends to 16 metres and certainly floods the 8 m distance with a high field strength level.

On the 80 metre band, the near field ends at the 0.1 metre point, so that the band field strength extends downward below the 0.1 wavelength point. If the operator sat a little more than 8 metres away, the person would probably be quite safe.

For wavelengths shorter than the 80 metres, the operator should feel quite safe if an 8 m distance to the antenna is exceeded. But there is one provision! If the antenna is a directional beam, don't point it towards the operating point.

In using the increased wavelengths of the LF/MF bands, one should be very careful. The 630 metre band has a near field radius from a probable non-directional antenna of 315 metres.

For 2200 metres, to predict the danger from an antenna the amateur operator might be able to build for this band, it is not too clear. One might not be able to achieve much radiation efficiency, and not provide much field strength to cause danger. A practical amateur antenna would probably be electrically very short, a fraction of an ohm, and the loss resistance in the earthing or counterpoise much larger than the radiation resistance.

On the other hand, there would be a strong ground current running in the earth below the operator and creating a field above the ground. If one can walk around the radio shack with a fluorescent lamp lighting up in the hand, the field strength is high and dangerous.

Field strength testing

The most practical thing to do in protecting against body damage from excess field strength is to make use of a calibrated Field Strength meter. I down-loaded a copy of the *Australian Standard on Radio Frequency Fields Exposure Level* and this indeed is a complex document.

It has a multitude of variable factors, making it difficult to come up with a general algorithm which can define a general Field Strength level. This, of course, is a level which is considered reasonably safe for those who have need to operate or work within radio electro-magnetic fields.

From what sense I could make of the documentation, there is a safety standard for limitation of field strength as follows:

Maximum field strength = 40TmV/metre.

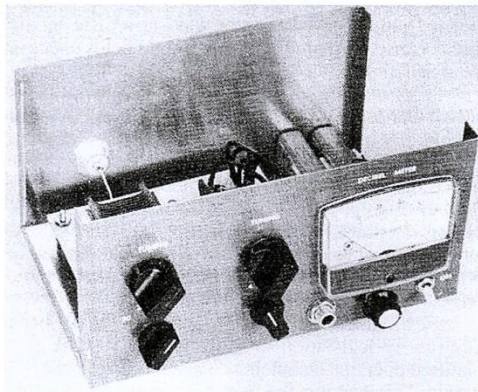
The character T, standing for Tesla, is a constant defining several of the variables related to the fields. (I cannot say I am confident that the formula I derived is correct. If someone has different information, by all means please contact me.)

From another source, I found maximum field strength power P is equal to E (200 mV) squared divided by R (R, space impedance = 376.7 ohms). This led to a field strength of 27.5 mV/metre. (I am not all that confident in this formula either).

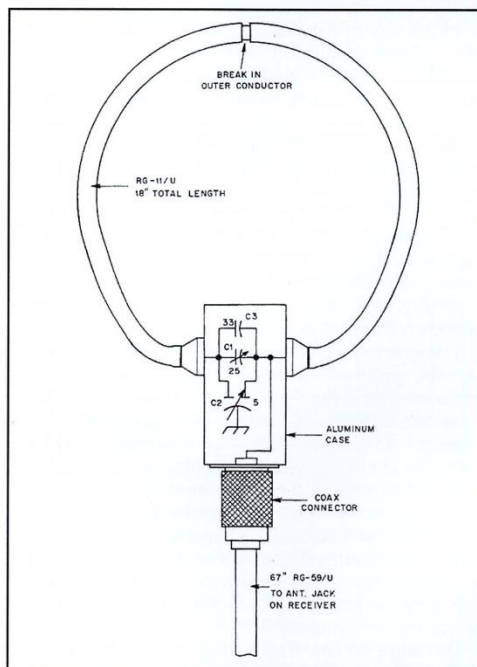
But on to some practical amateur radio construction. The photo and circuit diagram are of a field strength meter taken from an ARRL Handbook. The ARRL model uses a plug in antenna for each band. A diagram is also shown illustrating the structure of the loop antenna for 28 MHz. I note the absence of a comparison of sensitivity between the different frequency antennas. The illustrations and the reference below, could be a guide for home construction. I think it would be a good idea for someone who enjoys taking on this type of project to build a prototype that others could copy and reproduce.

It is the type of project which radio clubs sometimes set up to distribute models to their members. I am wondering if someone might take this on and in the process perhaps even come up with a simpler circuit.

Of course, to be put into use, each instrument constructed must be calibrated against another trusted meter. Note also that, in the ARRL design, the different band antennas don't appear to be compared for their signal sensitivity. Once a prototype is constructed and calibrated, copies of the unit can be made. Copies should work the same if the components are identical to those of the prototype



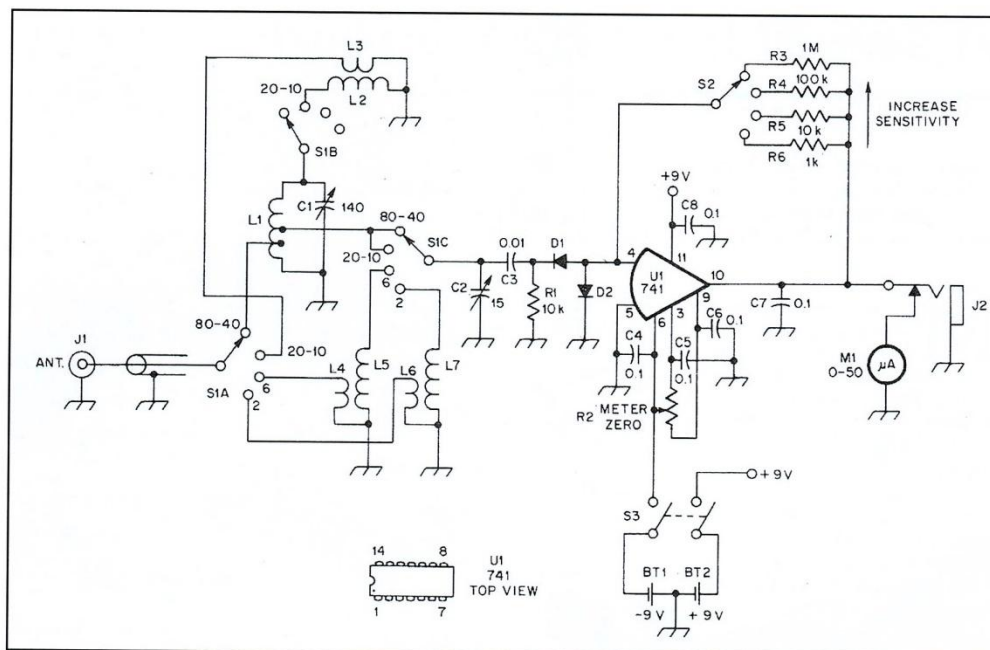
Field strength meter picture (ARRL Handbook).



Loop 28 MHz
Field Strength Meter (ARRL Handbook).

Time exposure to electro-magnetic fields

A final factor concerning limits of exposure to fields is the time exposed. Heat temperature builds up and can cause some damage. Heat energy is absorbed by the



Field strength meter circuit (ARRL Handbook).

body (or parts of it), but energy is also transmitted from the body. The temperature keeps rising until the heat entering the body balances the energy being transmitted. If that point is beyond the field strength time limits, look out for a threat to your health.

Rays from the sun are also electro-magnetic fields. In getting a sample of sunbaking, I observed the following: After exposure to the sun for 10 minutes, I noted that the section of my body exposed was getting tolerably warm. I came to the conclusion that this was a warning that if I persisted any longer, I might get sunburn. So I took a break!

Along these lines, when testing your radio field strengths, you might be able to use a similar idea with radio electro-magnetic fields.

If some part of the body is feeling warm, give the transmitted signal a break for a while. Perhaps you could try 10 minutes or a bit longer.

I think I need to say a few words about mobile phones and their owners. In particular those owners who live with their smart-phones all day, spending hours of continuous time using them without a break, including those who stream and down-load long video files, etc. Again I suggest breaking up extended use of the phone into shorter lengths of time.

Summary

This article is about electro-magnetic fields and the possible danger they pose. I have introduced the article with some theory on the fields and, in particular, those in the near field region. We move on to the fields transmitted by MF broadcast stations and other stations in the LF/MF region, then on to possible damage to the brain by mobile phones, and then to how the radio amateur fares with the fields generated by the personal amateur radio station.

There is a section on field strength testing with a test instrument illustrated which you might consider building or suggesting to your radio club as a project.

And finally, a little about spending too much time transmitting, or too much time living too close to MF broadcast transmitters or other types of transmitting sources.

As you might gather, the information I have researched to assemble the article does not lead to highly accurate mathematical safety limit figures. My main theme has been to point out when the strong near fields appear threatening. But, hopefully, what I have written is a lead in that direction, to improve the safety of those who engage in work or pleasure in the presence of those electro-magnetic fields.

References

1. ARRL Handbook - 1989 edition, pages 39-10 to 39-16.
2. Report - Australian Standard on Radio Frequency Fields Exposure Level.

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Where is Gordon VK4KAL?

From time to time, the RAOTC loses track of a Club Life member. OTN is returned to us from the Dead Letter Office with no forwarding address. A check of ACMA records shows that the callsign has lapsed, so that is no help.

Perhaps the Club member has become a Silent Key; perhaps they have moved into care, but in those cases generally we are advised by family of a new address.

However, I have been unable to trace what has happened to long time RAOTC member No 707, Gordon Loveday VK4KAL.

If you have any knowledge of what happened to Gordon, or where he is, could you please let me know.

Bill Roper VK3BR
RAOTC Membership Officer.

For Sale. Amateur radio equipment of the late Bob Knaggs VK3AJN.

Bob was a very active amateur who lived in South Wangaratta. We are offering for sale his equipment. Later we will offer the towers and antenna's. All radios as listed are in good order and condition and include (in most cases) the relevant handbooks, power lead and microphone.

Kenwood TS2000X, S/N B0700007	\$1,200.
Yaesu FT 680R 6m all mode transceiver S/N 20080087	\$140
Yaesu FT 780R 70cm all mode Transceiver S/N	\$160
Yaesu TR7205 2m FM only S/N 931643 has a fault	\$20
Yaesu FT707 HF transceiver S/N	\$300
Kenwood TR751A 2m all mode Transceiver S/N 7057411.	\$140.
Henry 2002-A VHF Linear Amp. S/N	\$600
Yaesu FL2100Z HF linear Amp S/N 40150195	\$650
Power Supply switch mode variable to 15volt/40amp max.	\$160.
Timewave audio filter fully variable S/N 45972 12volt	\$30
Yaesu YS2000 SWR/Power meter S/N 1E/050294	\$80
Revex W750 VHF/UHF to 1.4Ghz SWR/Power meter	\$80.
Mirage 2m Linear amp S/N 1155-495 10w in to 160w out. 13.8V supply required.	\$240
Mirage 70cm Linear amp S/N 7130-1294 10w in 100w out. Includes external receive pre amp. 13.8V supply required.	\$280
VICtor VC 3165 Frequency counter S/N 991553414 240 volt measure to 1.4 Ghz	\$30
BWD 509B C.R.O.	\$40
Heavy Duty Variac	\$100.
H/brew 2m FM transceiver crystal control 20w watt?	\$30
H/brew 70cm Fm Transceiver crystal control 20watt?	\$30.
Scanner VHF/UHF Realistic Pro 2022. S/N 918099	\$50
H/brew Solid state 13.8V high current power supplies? there are 4?.	\$60 each.

For dedicated 1296 operator's only. A complete 1296 high power setup with water cooled final pair of 2C39A s and power supplies. sell complete. Contact Dennis or David to discuss

Contact Dennis Leseberg VK3VDR 0357652321 or David Waring VK3ANP 0467 740 535 If you are interested and **please do not contact Bob's home.**