



# The PROPAGATOR

## Illawarra Amateur Radio Society Inc.



The monthly newsletter of the Illawarra Amateur Radio Society Inc.  
Registered by Australia Post publication number :- NBH - 1491.

Meetings are held on the second Tuesday each month (except January) at 7.30 pm in the  
State Emergency Services building in Montague St, Nth Wollongong.

Visitors are most welcome.

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NOVEMBER 1991

### EDITORIAL BIT

Welcome to the newsletter. Since membership officially expires at the Annual General Meeting (which is in July), we decided that we might remind those who haven't paid yet for 1991/92.

If you notice a BLUE wrapper sheet on your copy of the Propagator, then you should contact Ken VK2TKE or send us a cheque for your membership (price and address as per back page), because you are unfinancial. If your wrapper is WHITE, then you are paid up and all is well.

We had thought that this would be the easiest ever Propagator to write, because so much went on last month that we want to tell you about. We were not disappointed, with much input from our far flung reporters. This makes it easier for us, and less boring to you. Thanks to all of the outside contributors for their efforts.

### CALENDAR

**NOVEMBER:** Yes, you guessed it. Tonight is the big club auction for 1991. These are always well attended, with everyone (members or not, questionnaires filled out or not) to come along and have a great time. As they say on the bathtub ads, bring your truck or trailer along and buy everything. Or sell something.

**DECEMBER:** This year's Christmas night will also feature Col Christiansen, talking about his time spent in the Antarctic. There will of course be a moderate radio flavour to the evening, but the talk is very much directed towards the lifestyle down there, so families are as usual very much welcome and not likely to be hopelessly bored.

**JANUARY:** January is my month off - no Propagator to write and no Society meetings to go to either.

Minutes of IARS General Meeting 8th October 1991, at SES HQ, Montague Street, North Wollongong. Start 19:45

Apologies: VK2 JBS, FPN, ZLJ, JTB, EWJ, XTE.

Visitors VK2COM-Bob, Pauline wife of Roger VK2AIV.

VK2GID moved minutes of last of previous meeting be passed, seconded VK2XCX.

#### REPORTS:

1. Club station: The SES coordinator has verbally informed us that we need permission from council to install the door on the club room, insurance is required for the antenna, and power required to be paid for. Antenna removed on the Saturday preceding the meeting, and currently being stored by VK2XSV.

2. Exam devolution: IARS has sent a response to WIA and DOTC to voice our displeasure. The need for a unique paper per student was discussed.

3 & 4. Repeater & packet reports. See separate article.

5. Treasurers report was received.

6. There is no item 6.

7. Historian: There is a gap in the club history 1957 to 1962.

8. 2WL Lifestyle Expo. 5 shifts for the 2 days organised along with the items to be displayed.

9. Membership: It was suggested that the club might print a business card. A person is to be responsible for looking after visitors.

10. JOTA. Graham VK2GID informed us that he and Tony VK2ENX would be conducting JOTA activities at the Keiraville scout hall.

11. Broadcast Officer. Ken VK2TKE has been elected to the position of broadcast officer to coordinate the rostering system for the morning and evening broadcasts.

A video presentation on the club repeater sites given by Rob VK2MT was well received.

Meeting closed at 21:50.

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#### MICROWAVE UPDATE

You've heard of Klystons and Magnetrons of course but have you come across a Gravatron? Our resident microwave expert Lyle VK2ALU took part in an unusual experiment at the 2WL Lifestyle Expo and had a rather captivating experience. We couldn't get much out of him, only that the device is circularly polarised.

\*\*\*\*\*



"I find Amateur Radio is less complicated, much cheaper, and far less taxing than my former hobby."

\*\*\*\*\*

Minutes of IARS Committee Meeting -  
15 October 1991 at SES HQ, Montague  
Street Nth Wollongong. Start 19.30

Present: VK2 KLH (Chair), DSH, GID,  
GPJ, KCV, KNG, MT, XCC, XSV, Corey  
Hatch

Apologies: Nil

Minutes of the last committee  
meeting, 17/9/91 were received.  
Moved VK2DSH, C. Hatch.

Correspondence in:

- \* QSL Cards Inwards.
- \* BARG News - Ballarat & District  
ARG Newsletter.
- \* WIA - Affiliation Certificate and  
information re VK2 QSL Bureau,  
Regional Conference of Clubs, and  
summaries of latest amateur radio  
related magazines.
- \* What's new in Radio  
Communications - Sept 91.
- \* 4x Address Unknown Propagators.
- \* 2x Questionnaires
- \* 2x Subscription renewals

Correspondence out:

- \* McLean Conway - information for  
renewal of Public Liability  
Insurance.
- \* WIA - re the concern of members  
regarding the Examination Service

Reports:

Lifestyle Expo - 19&20/10/91: The  
IARS has been allocated an area in  
the old basketball stadium.  
Nametags have been prepared, DOTC  
brochures and frequency spectrum  
charts obtained for displays. Ken  
VK2KNG is preparing pamphlets for  
distribution.

Repeaters:

- \* VK2RUW: Satisfactory. The clock  
has been inhibited so that it will  
not announce during QSO's.
- \* VK2RAW: 146.850 MHz is suffering  
interference which has not been  
resolved. The repeater may be off  
air shortly for repairs and  
maintenance.

The Committee resolved that the  
questionnaire would be repeated in  
the next Propagator, due to the bad  
response.

Due to the time constraints on us  
all, the Committee undertook a  
little soul-searching and navel-  
gazing to determine what we are  
endeavouring to achieve. We feel  
that our purpose is to manage the  
affairs of the Society and make  
decisions for and on behalf of the  
membership and also to refer to  
members those matters that we feel  
should be determined by the  
majority will of the members.

To keep members informed, we  
publish the minutes of each meeting  
and members are welcome to contact  
Committee members to express their  
point of view on matters relating  
to our hobby. Members are also, of  
course, welcome to attend Committee  
meetings and express views and  
concerns.

Resolved that future Committee  
meetings would commence at 19.30  
sharp and finish at 21.30 unless an  
extension of time was sought. Moved  
Pat VK2GPJ and seconded Ray VK2XCC.

November Meeting: Auction - with  
Graham VK2GID as Auctioneer.

December Meeting: We are hoping to  
obtain Col Christiansen for a talk  
on Antarctica and Amateur Radio -  
plus the Christmas get-together.

Leather Tongue Award - Time for a  
move on. Suggestions include: The  
Talking Clock, Harry - VK2JHW.

Finance: A number of members are  
yet to renew their membership. As  
membership fees are our only means  
of income (used to provide members  
with the "Propagator" and keep our  
repeaters functioning) it would be  
appreciated if outstanding fees  
could be paid NOW. If this copy of  
the "Propagator" had a BLUE label -  
your supply will very shortly cease  
unless your membership is renewed.  
If you are not a member but use the  
Society's repeaters perhaps you  
would like to make a small (non tax  
deductable) donation to help defray  
the costs of keeping them on air.

Meeting closed 21.30

## REPEATER REPORT

The past month has been fairly quiet on the repeater scene (which explains the short column...Ed).

146.850: The repeater is still suffering from slight desense. On very weak signals, it appears as if someone is repeatedly "kerchunking" the system. All minor on-site adjustments have failed to cure the problem, so the next step is to remove the whole repeater including all the cavities, and bring it all down to the test bench for work.

Of course, this means that the repeater will be off the air. The plan is to remove it on a Monday, returning it (hopefully) on the following Saturday. This will of course give rise to a degree of criticism from some users, but it does have to be done. The committee will try to inform as many people as possible when this is going to happen, it will be sometime in November.

147.275: Working OK, although I have noticed the occasional noise bursts over weaker signals coming through the system. It appears that another service at Subline Point, possibly the pager, is causing desense to the repeater's receiver. Not really a problem, but something to keep an eye on (or should that be ear on).

438.225: Appears to be working the best since it was installed at Knight's Hill. The repeater now resides in the legendary "Pie Warner". All coax feedlines inside the cubicle are double shielded or Heliax type. The receiver's sensitivity seems to be better. Over JOTA weekend, quite a few "distant" stations called in, the furthest I heard was Newcastle. (And that was a noise free signal, too. I thought they were local at the time I worked then...Ed).

An inhibit circuit was added on 13/10. This stops the clock from announcing the time while there is a QSO taking place. If the repeater's squelch is open for more than 15 seconds, the circuit stops the clock announcement. The clock will still announce after quiet periods and at the o'clock. This should make the repeater a bit "nicer".

On the same visit we removed the link transceiver. It appeared to have gone very deaf. Also, its squelch was occasionally opening after prolonged use of the repeater. The link transmitter operates continuously when 438.225 is in use. (Obviously this drops to 50% if the link is being used both ways). The heat buildup inside the link transceiver must have affected something in its receiver. We knew that it was the link RX, because there was no "beep" after the squelch closes, unlike 438.225's RX which gives a "beep".

In the deaf department, it was found that there was a possible dry joint around the helical resonator in the front end of the link RX. This has now been fixed and the TX power turned down a watt or so to reduce the heat buildup.

438.725: Not much has progressed here unfortunately. Plans are still proceeding though. The repeater should be on the air before the end of the year.

29.520/620: Still working fine, although there is an intermittent problem that makes the RX deaf. I think that the problem is at the Mt Murray end, but it doesn't happen very often and hasn't occurred when we have been on site.

We are still waiting on word from the Mt Murray land owner as to permission on installing the mains to our cubicle. We are not in the position to push for a decision, so I guess we have to wait.

At the last meeting, Peter VK2XAN brought in a large bank of NiFe cells (nickel/iron) and the accompanying charger. Apparently these cells have a life expectancy somewhere in the order of 100 years. Their intended use was for Mt Murray when the mains is installed.

\*\*\* We must gratefully acknowledge the donation of these batteries and charger from BHP Slab and Plate Products Division. Thank you very much. \*\*\*

#### MORE QSL CARDS

The Wireless Institute of Australia's QSL card service seems to be getting its act together now. Every couple of months we receive a box of cards, which of course we have to distribute to their owners.

Many thanks to Ray VK2XCC, who can deliver some for us, and send some out with Propagators. Also Graham VK2GID delivers a couple when he goes past in his travels.

Cards are now available from VK2GID for the following calls, please pick them up at meetings or arrange with us to send them out:

VK2's: AEO, AIV, ALU, ALV, AQF, BHO, BIT, CDP, CO, DSH, DHP, DYU, EMV, EU (receipt only), EXN, FCW, FPN, JAC, JHW, JJ, JP, JT, JTS, KRP, KWN, MIL, MT, NNK, VAV, VCK, XNH, ZNS, ZSN.

Also, if anyone notices a call above that has moved out of the area, please tell Graham VK2GID or Bill VK2JBS so that we can redirect their cards, or send them back to the bureau. It's a difficult job, getting rid of some cards, so we thank you for your help.

Remember also, to get your QSL cards into the bureau system for free, get them to Graham or Bill at a meeting or however, and we will send them on.

One interesting card in this lot is from JY50, the special event station for the 50th birthday of his majesty King Hussein of Jordan. Imagine being able to have a special event station just for your birthday!

#### JAMBOREE ON THE AIR

One of the events to happen during October was the 32nd annual Jamboree on the Air. This is where scouts and guides from all about the placé get on the radio and talk to each other.

Tony VK2ENX, Graham VK2GID and Greg VK2ZZZ ran their usual set up at the 1st Keiraville scout hall, as VK2SCK. Conditions were better than usual, but unfortunately due to the busy weekend and our closeness to the Beaton Park activities, we didn't get many scouts down who wanted to talk. However, a couple of those that came got very keen to the extent that they were talking for hours (line those exams up!)

We had a lot of fun nonetheless, with some scouts and guides talking to Spain, Azores Islands (middle of Atlantic - wouldn't mind the card for that one!!!), Canada, and more locally New Zealand and Australian contacts. We also made the first ever packet contact with VK2AMW.

Running 2 HF rigs, 2 metres, 70 cm and packet (on 2 metres), with a selection of antennas slung off the temporary 30ft tower (do it in style fellas), there was quite a bit of installation done in the darkness of Friday night. We even had a rotator for the 2m beam - climb the tower and turn it around.

At 1st Berry Scout Hall, Geoff VK2XVK, Steve VK2SNH and some others ran another JOTA station. Running 2 HF rigs, 2 two metre rigs and packet, they made lots of contacts for a very large audience to all sorts of places. They also had Ian, one of the scouts, who single handedly ran one of the 2m sets all Sunday, except to give others a go. Another ticket on the way.

The verdict??? See you again next year, fellas. Bigger and better no doubt.

THE CLUB REFORMED AS THE  
ILLAWARRA SECTION OF WIA(NSW Divn)

On 11th June 1962 a meeting was held at the home of Don Reynolds VK2ZRK for the purpose of reforming the Wollongong Radio Club which had ceased activity sometime during the period 1958 to 1961.

There were 16 people present, including several members of the former club. After some discussion a committee of three was chosen to investigate the situation and to report at a later date.

A check of the list of names of those attending this meeting shows that only one has been involved regularly in club activities ever since - VK2ALU.

On 9/7/62 a further meeting was held, this time at the home of Laurie Jordan VK2ALV. The 15 people present decided to hold the inaugural meeting of the club in August and to seek assistance from the Council of NSW Division WIA on the current situation with regard to radio clubs in NSW.

On 6th August 1962 the inaugural meeting was held at the Wollongong Technical College, Foleys Rd. North Wollongong, at which 26 people were present, including the President and 2 Councillors of NSW Divn. WIA.

At this meeting it was decided to name the club The Illawarra Section of the NSW Division of the Wireless Institute of Australia - thus being a Member Club of the NSW Divn. WIA.

The Officers elected included -

President - Dick Lee VK2ZNL  
Vice Pres. - Eric Fisher VK2DY  
Sec./Treas. - Don Reynolds VK2ZRK  
plus a Committee of three members.

Meetings were to be held monthly at the Wollongong Technical College

and membership fees for the Section were set at -

Seniors - One Pound (\$2) per year  
Juniors - Ten Shillings (\$1)  
plus two shillings (20c) per meeting for cost of supper.

The Station Licence and VK2AMW Callsign held by the defunct Wollongong Radio Club were transferred to the Illawarra Section WIA NSW Divn.

Articles of Association for the Section were based on those applicable to Member Clubs of WIA NSW Divn.

Monthly meetings usually included a technical talk, tape or film - seven talks being given by members in the first year and a visit was made to AIS for the Jan. 1963 meeting. The first field event in which the Section participated was the Jamboree of the Air in October 1962. A station, operating under the callsign VK2AMW was set up at Mount Keira Summit Park, using 3 transmitters on HF and VHF. Scouts, Cubs etc. participated.

A list of books and magazines of interest to radio amateurs was provided to the Wollongong City Council Library, some of which were subsequently placed in the Library.

In February 1963 a family picnic day was held at Geroa and Tim Mills VK2ZTM was invited down from Sydney to show us how Fox Hunts were run on 2 metres. A second 2 metre Fox Hunt was held in March, then others from time to time. These became a favorite event, club members becoming quite adept in locating the small "Fox" transmitters. Our cars sprouted various assorted types of directional antennae for these events. A "real sight to see" careering around the streets of the Wollongong district!!!

Several club members were "prime movers" in forming the Illawarra Youth Radio Club, based in Dapto, early in 1963 and then successfully

running it for a period.

During the remainder of 1963 several more technical talks on amateur subjects were given by club members and a debate on AM versus FM was held. More technical films were also shown. A transmitter was set up at the Youth Radio Club exhibit at the Dapto Show and a very successful operation was carried out over the 1963 JOTA weekend at the Mount Keira Scout Camp.

The major event for the year was the club's first official Field Day, also held at the Mount Keira Scout Camp, in November 1963. This drew visitors from Sydney and elsewhere in NSW. It provided a full and varied program of events for amateurs and their ladies and their families, including 7MHz and 144MHz Scrambles. 7MHz and 144MHz Hidden Transmitter Hunts. Blindfold Transmitter Hunts and a Nail Driving Competition for the Ladies. Technical and other Guessing Competitions for all. Races etc. for Children.

All events provided prizes for the winners, the prizes being donated by 7 major firms in Sydney and Melbourne.

The WIA NSW Divn. donated a Cup which was presented to the overall winner. (VK2ZCF from Sydney)

The prize for the amateur travelling the furthest distance to attend went to VK2ACQ of Narrandra.

The day was voted an outstanding success, the location being said as the "best location ever" for a Field Day held in NSW. Almost 100 attended. It even made a small profit!

A Christmas Social Evening, including a buffet tea, was held for wives and families in December.

All this from a club of about 25 members and an average attendance at meetings of 19!!

At the end of 1963 the club

assets amounted to less than twenty two pounds (\$44), but we received full measure of enjoyment from every penny spent. Just about all our gear was homemade and we were proud of our handiwork. Such was the beginnings of our present club.

Lyle. VK2ALU.

2WL EXPO 1991

On the 19th and 20th of October the 2WL LIFE STYLE EXPO took place and the club was invited to participate. Our intention was to raise the profile of amateur radio in the eyes of the general public.

Many club members lent equipment and manpower for the weekend. Our thanks to the following people: VK2MT, VK2KWG, VK2DSH, VK2ALU, VK2XGJ, VK2KHE, VK2XCC, VK2XQX, VK2KLH, VK2TKE, VK2ZLJ & VK2TPH and any others who have been missed.

Also our thanks to the D.O.T.C for supplying brochures and posters.

Our display covered many aspects of amateur radio, from historical equipment, packet radio, satellites, ATV and home brew equipment. The display of the satellite tracking software was a real crowd puller.

In addition to the above, an 'antenna farm' sprouted, with beams for 2m and 70cm, verticals for 10m, 2m and 70cm as well as two long wires! One long wire was for the HF rig, the other was for.... a crystal set! complete with real cats whisker and galena crystal.

Lyle reckoned that we should have been able to pick up the BBC on the crystal set given the huge aerial we had up! But even if we had, it would not have been heard over the general noise of the EXPO.

Much information on amateur radio was given out over the two days, over 700 items of literature were handed out, and much interest was generated. Hopefully we might see a few new faces at the next club meeting. Please make any new faces feel extra welcome!

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\*\*\*\* Page 7 \*\*\*\*

...those involved with the EXPO felt that the effort was worthwhile as it did display our hobby in a very positive light and that the effort of raising the profile of amateur radio can only be beneficial to us all.

The public had many questions about the hobby, especially satellites. Of course we all fielded the expected barrage of questions about C.B. radio! We tried to make them see the light....

Overall the weekend was most successful and was enjoyed by all concerned. Thanks to everyone who took part.

### DOTC QUESTION

Hum...might have to rename that to WIA Question sometime soon. OK, last month we asked what a 0.022uF capacitor was in pF.

The answer was (D) 22000 pF. There are one million pF in a uF. Or move the decimal point six places to the right.

This time we ask about Peak Envelope Power calculations: In an SSB transmitter modulated at 100%, the PEP is:

- (A) Lower than the average power
- (B) 1.414 times unmodulated power
- (C) Twice the unmodulated power
- (D) Four times unmodulated power

### EXAM NEWS

Last chance for an exam from Wollongong TAFE and Keith VK2OB will be this month. See Keith for details. I already know several people who are going to put a big effort in for the last exam under the present system.

### CIRCUIT WANTED

Bert VK2TBW (I think that's right) from the southern highlands is after a circuit and info on the Philips 880 unit, so that they can get the Mt Gibraltar repeater back on air. Anyone with any details please forward them to Bert (Ken VK2TKE can tell you how). TNX.

### SELL YOUR ANTENNA FARM!

Many thanks to Rob VK2MT for this article. The advertisement below is for a new type of TV antenna. Check it out: there are some fairly amazing claims (such as, VHF and UHF channels 0 to 10).

See if you can outwit Rob. He found 10 "interesting" points in the ad. (For legal reasons, we call them "interesting".)

If these are anywhere near as good as claimed, we should all be using one for all our VHF and UHF needs. (Limiteds will only need one antenna!!!)

### **ENJOY TELEVISION**

**WITHOUT INTERFERENCE. WITHOUT "GHOSTS". WITHOUT DISTORTION.**

Here is a state-of-the-art indoor parabolic antenna which picks up every VHF & UHF channel from 0 to 10. No wiring, installation or licence is required — just plug the antenna into the aerial socket on any TV. The four-phased array of direct and reflecting elements will fine-tune your TV to pull in weak and distant signals, while the dish antenna will enhance colour, eliminate ghosting and provide astonishing clarity.

The parabolic design of this powerful antenna is completely compatible with all TV sets on the market, while the elegant black and silver dish fits comfortably on top of any set. At just \$29.90, they're a must for every TV in the house!

**3023 TV DISH ANTENNA \$29.90**



### FREQUENCY AGILE COMMUNICATIONS

Ken VK2TKE tested out a new frequency-agile system taking callbacks on 27th October. Switching back and forth between 148.850 and 438.225 no fewer than 3 times in ten minutes, and not one wrong transmission in the process! No need for this high-tech computer driven stuff at VK2TKE!

### Wanted

Circuit diagram for a Yaesu FT-7  
Contact Ken VK2KWG please.

(he needs it since he blew it up at the expo! Ed)

### ILLAWARRA AMATEUR RADIO SOCIETY QUESTIONNAIRE

This questionnaire has been extended slightly since its last appearance. We present it again to get some idea of the changing face of Anateurs in the Illawarra. People who are not members are very welcome to fill it in too. All forms returned in person or by mail by the October meeting go into a draw for a free year's membership. If you need more room, write on the back...Thanks.

1. Are you a member of the Illawarra Amateur Radio Society? Yes No
2. What day and time would suit you best for meetings? \_\_\_\_\_
3. Which of the following topics for club nights interest you?

Debates/Discussions	Demonstrations	Tutorials
Construction	Social Events	Videos & Education
Auctions	Computer Stuff	Amateur T.V
Commercial demos	Club Station work	E.M.E
Trip reports	Operating hints	

Anything else \_\_\_\_\_
4. Do you feel that Amateur radio should be promoted in schools and other educational places? Yes No
5. Would you be prepared to help out? Yes No
6. Should the Club run courses for the Amateur licences? Yes No
7. Are you interested in attending Club Field Days? Yes No
8. Are you interested in contesting and awards? Yes No
9. If the club arranged visits to other clubs and outside facilities, would you attend? Yes No
10. What sort of radio do you work regularly? (As many as you like)

H.F D.X	Ragchewing	RTTY
Packet/Computers	Slow Scan TV	A.T.V
C.W	Microwaves	Contests
Chasing Awards	Repeaters	Building Rigs
Antenna Building		

Other things \_\_\_\_\_
11. Which areas are you interested in pursuing?

H.F D.X	Ragchewing	RTTY
Packet/Computers	Slow Scan TV	A.T.V
C.W	Microwaves	Contests
Chasing Awards	Repeaters	Building Rigs
Antenna Building		

Other things \_\_\_\_\_
12. Are you interested in helping newcomers to these types of working?  
Yes No

P.T.O

13. Why are you in the Club (members), or, what would encourage you to join a Club (non-members)? Please say as much as you like:
- 
- 

14. What sort of things would you like to see in the Propagator?  
Reports                      Technical                      Construction                      Historical  
Gossip (eg Leather Tongue)                      General Raving                      Operating Hints

Other \_\_\_\_\_

15. Which of the Club's repeaters do you use regularly? (Circle)  
29.820      148.850      147.275      147.575      438.225      438.725

18. Are you happy with each one's performance? Why?

29.820 \_\_\_\_\_  
148.850 \_\_\_\_\_  
147.275 \_\_\_\_\_  
147.575 \_\_\_\_\_  
438.225 \_\_\_\_\_  
438.725 \_\_\_\_\_

17. What improvements (if any) or extra repeaters would you like to see? (None, extra freq's, nodes, more power, coverage, links etc)
- 

18. Any comments you would like to make (please write on back):

19. Your name or callsign please. (Not compulsory, but otherwise we won't know who won the free membership):
- 

Please return it to the Editor or Secretary, either in person or mail, by the October meeting to be in the draw for a year's membership. Results will be published (in a readable format) when they are reasonably complete. Thanks from the Committee.

**PLEASE HELP US TO MAKE THE CLUB BETTER!  
FILL OUT THIS QUESTIONNAIRE AND RETURN  
IT AT THE NEXT MEETING!**

## CLUB AUCTION

A heading like that should bring them out of the woodwork! Another of the most popular Illawarra Amateur Radio Society activities is to be held in November - the annual big auction of all sorts of stuff. This is a night to sell anything you have lying about (sorry, we don't sell children for legal reasons), or you can come along and buy almost anything.

Ken VK2TKE and Vic VK2XSV have obtained some gear of some sort from Wollongong TAFE to auction off, some other bits and pieces have been dredged up, plus everything everyone brings.

Auctioneer for the night will be the popular Graham VK2GID (hey...I write this stuff, so I give myself a good write up), assisted by the ever able Ken VK2TKE taking the dollars.

The committee has decided that perhaps some lots may be sold by the interesting "Dutch auction" technique - we start from a high price and work down, first bid gets the goods. This is supposed to be very quick and also nerve wracking.

Bring your stuff to sell from 5:30pm on the night (or maybe a bit earlier - depends when we get there) until 7pm. Please get your stuff in on time as otherwise it keeps everyone waiting. The usual commission goes to the club, and you keep the rest.

Potential sellers are asked to write a label for each thing they sell, so that I can tell people what it is without making up too much. Also, think about if you want to set a reserve price (minimum), but don't put it on the label.

I should also mention that the financial arrangements for the auction are now different. To save having to bring along lots of cash,

or risking not being able to buy things, the club now will accept IOU's (pay within a week and get the thing you bought when you pay for it) and also cheques (subject to approval by the Treasurer).

This should make it easier to buy and sell radios, because with prices going as they are, nobody carries enough cash to buy one (unless assisted by several armed security guards). It also means when you see one of those really neat things that you wanted, then you can buy it.

The action is on at the next Illawarra Amateur Radio Society meeting. Be there or be a rhombic!!!

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## CQ WORLDWIDE DX CONTEST

This event was run on the last weekend in October. This should mean a few outward QSL's for us to deliver.

Take pity on Steve VK2KSP. His brother managed to drop the Kenwood and destroy the power amp. No contest for Steve!

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## SHACK CLEARANCE

All of the following gear is to be sold, due to moving out of Amateur radio and on to other things:

Yaesu FT-301 transceiver (12V or 240V supply), Kenwood AT-200 antenna tuner, Yaesu FP-107E 100W power supply, dummy load and lots of books. Call Dudley on (042) 718465 for more details.

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For People Who Want Quality and Support a Realistic Price!

## Thinking about PC's??

We sell quality IBM COMPATIBLES with Superior specifications to the original AND at much LOWER PRICES

XT, AT and 386 compatible Computers

All are TURBO machines and have 12 months warranty.

All we ask is that you PHONE US before buying  
COMPUTERS, SOFTWARE or PERIPHERALS.

### SOFTWARE

Available :- Educational,  
Real Estate, Milko, Doctor,  
Fire, Register, Accounting,  
Sales Monitoring and  
Programming Languages for  
IBM and compatibles.

### HARDWARE

Available :- All peripherals  
for IBM and compatibles  
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## antenna restrictions — another solution

How to install  
a full-size  
40-meter dipole  
inside a mobile home

Antenna restrictions often make life difficult for hams who live in one of the new mobile-home parks. In fact, restrictions can make it almost impossible to get on the air without using a high degree of ingenuity. Articles have been written describing the use of fake (and not so fake) flagpoles as vertical antennas,

but the problems of ground radials and low radiation angles limit the effectiveness of this kind of solution.

Lately many of the new double-wide modular homes are being built using conventional framing and roof construction with wood joists and rafters, wood sheathing and composition shingles. This leaves only the matter of space in the attic — how do you hide an 80-meter or even a 40-meter antenna inside if the long dimension is only 12-15 meters (40-50 feet)?

### 15-meter antenna

In my situation, our home is a 7.3-meter (24-foot) wide double unit in a park where restrictions prohibit outside antennas. As a retiree ham, off the air for about 40 years until 1978, I was able to solve my own antenna problem this way: For 15 meters I made up a simple dipole using four pieces of 1.8-meter (6-foot) long telescoping aluminum tubing, fed directly with 50-ohm coax and secured inside the attic close to the apex of the roof rafters. It works quite well, with low SWR and easy loading to one of the new "touchy"

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transceivers. As an afterthought, because I wanted to work primarily in one direction, I added a passive reflector mounted *outside* on the roof, down the slope far enough to provide the proper spacing. The reflector tubing was fastened to four small L brackets slipped under the shingle edges.

#### 40-meter antenna

The 40-meter solution was a little more trouble. My mobile home is about 12 meters (40 feet) long, inside measure, so there was no way to insert a horizontal full-length halfwave dipole. I stretched the wire inside the limited attic space, then shoved the remaining lengths at each end (to make a total of 19.5

meters reactances. Then I inserted an SWR meter at the antenna end of the coax and adjusted each side of the tuner for lowest SWR, which came out to be very near unity at the phone end of the band. I've not tried to tune the antenna to 75 meters, but I'm sure it can be done with added inductance in each tuner leg.

Contacts on both 15 and 40 meters have given good reports, even before I told them of the indoor nature of the antenna arrangement.

#### further reading

The bibliography provides other interesting approaches to the problem of erecting Amateur antennas in locations that restrict outside structures.

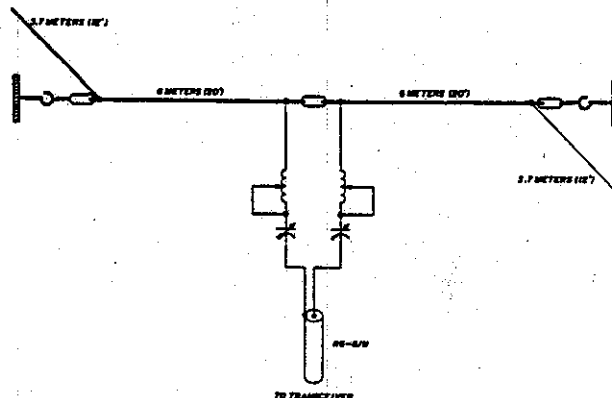


Fig. 1. Author's inside 40-meter dipole. Horizontal sections occupy the length of the mobile-home attic. The end sections follow the corners of the attic to make a total radiator length of 19.5 meters (64 feet). The tuner provides near unity SWR in the phone portion of the band.

meters, or 64 feet) at 90 degree angles to the attic corners. This was done with 3.7-meter (12-foot) cane fishing poles, which I left in place to keep the wire extended.

To have some leeway to tune out any reactance, I improvised a tuner using series inductance and capacitance in each leg of the antenna at the feed point. I ended up with the arrangement shown in fig. 1. The center of the antenna and tuner were accessible through a hatch cut into the ceiling of the mobile home. Fortunately the location was right over the laundry alcove.

#### tune up

For final tuning I used a dip meter coupled to a one-turn loop at the line-to-tuner feed point to determine the approximate resonance adjustment of the

series reactances. Then I inserted an SWR meter at the antenna end of the coax and adjusted each side of the tuner for lowest SWR, which came out to be very near unity at the phone end of the band. I've not tried to tune the antenna to 75 meters, but I'm sure it can be done with added inductance in each tuner leg. Contacts on both 15 and 40 meters have given good reports, even before I told them of the indoor nature of the antenna arrangement.

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## solid-state T-R switch for tube transmitters

Combine the advantages  
of full break-in  
CW operation  
with the cost savings  
of older equipment

A recent article in *QST* by Dave Shafer, W4AX, explained the advantages of full break-in QSK CW operation,<sup>1</sup> advantages that can't be provided in today's high-priced transceivers. The article brought to mind another by Stu Goodman, K2RPZ, which appeared a year earlier.<sup>2</sup> He was concerned with the economics of getting on the air and pointed out the

possibilities of using older equipment. To quote Stu, "All that is needed is a T-R switch and an antenna . . ." The T-R switch described here uses solid-state components and provides the capability of full break-in operation with low-cost used transmitters with vacuum tubes.

### T-R switches

The origin of the T-R switch stems from early radar days. An automatic device was required in the radar to prevent transmitted energy from reaching the receiver, but allowing the received energy to do so without appreciable loss. For fast, reliable break-in CW operation, using a single antenna for transmitting and receiving, the T-R switch is used today. However, with transceivers now dominating the Amateur-equipment market, T-R switches have all but faded from sight.

I checked several references in this regard with no results. Either they were too new and didn't mention T-R switches, or were so old that only vacuum-tube circuits were shown.

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Reference 3 provided some good design concepts. However, these designs were more applicable to solid-state transmitters. Between the extremes of too old and too new, I found a design by W4ETO that was described by W1ICP in the April, 1971, edition of QST (it later appeared in several editions of *The Radio Amateurs Handbook*.<sup>4</sup>) I modified the design slightly to improve some operating parameters. It should work well with any moderate-power, class-C vacuum-tube amplifier (such as a pair of 6146s with a plate supply of 750 Vdc).

### theory of operation

A short explanation of how the T-R switch operates should be helpful. The principal purpose of the T-R switch is to allow both the receiver and transmitter to be directly connected to the antenna. When the transmitter is keyed, the switch should reduce the amount of signal reaching the receiver to a safe level, but otherwise provide a near unity gain path between antenna and receiver. The noise figure of the device should also be low enough to prevent loss of receiver sensitivity on the upper high-frequency Amateur bands. Some of the older T-R switches were designed to be placed at the transmitter output, but in some cases they caused RFI problems. While these circuits did protect the receiver, harmonics were generated in the T-R switch when the transmitter was keyed. To eliminate the harmonics associated with the circuit, the T-R switch is connected to

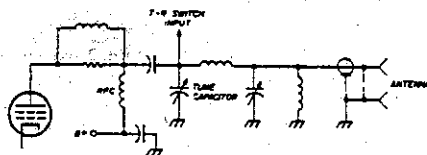


fig. 1. Typical vacuum-tube transmitter output circuit showing the pi network and connection point for the T-R switch.

the tube side of the transmitter pi-network; not to the antenna side. Any harmonics generated in the switch will be attenuated by the lowpass characteristic of the pi-network. The pi-network will also act as a pre-selector, attenuating out-of-band signals.

Most transmitters use shunt-fed, class-C, final amplifier stages and pi-network impedance-matching networks, as shown in fig. 1. The input to the T-R switch is taken from the TUNE capacitor in the pi-network, rather than from the plate rf choke, so that high plate voltage (B+) won't have to be blocked in the switch. When the transmitter is keyed, the vacuum tube sends current pulses into the pi-network that are filtered before reaching the antenna. When the key is up, the final amplifier tube is cut off and has no effect on the received signal. Note that a T-R switch can be used only with class-C final amplifier stages. With linear class A or AB amplifiers, current flows in the final device even when no signal is being

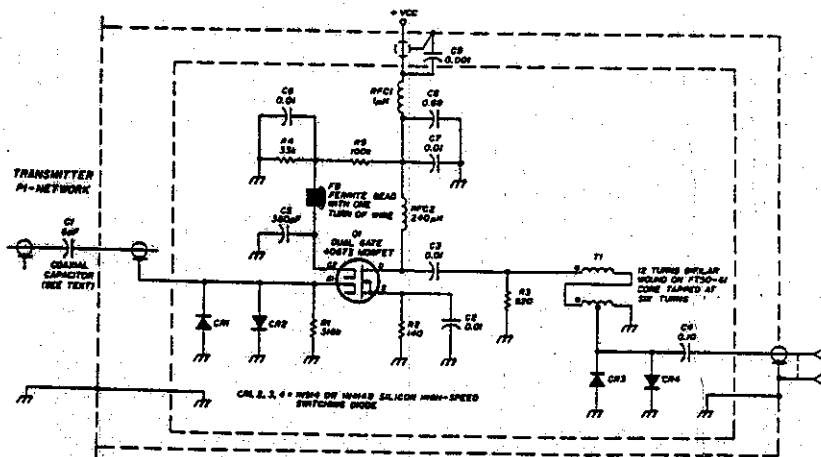


fig. 2. Schematic of a solid-state T-R switch that is suitable for use with moderate-power, vacuum-tube transmitters.

amplified. This action allows amplifier noise to pass directly into the receiver.

#### circuit details

The T-R switch circuit is shown in fig. 2 and differs from W4ETO's original design in several ways. One is that a common-drain amplifier is used so that the overall gain can be set at unity. The pi-network transformation steps up the input voltage by the square root of the transformation ratio.

The switch input capacitor C1, and the parasitic capacitances of the two diodes and the mosfet form a voltage divider that reduces the signal level very close to the value it originally had at the antenna input to the pi-network. From the mosfet input at gate 1 to the output, the amplifier is designed for a nominal gain of unity. The mosfet  $g_m$  is typically 10 millisiemens, so that the 800-ohm load resistor sets the no-load gain at eight. The voltage stepdown in transformer T1 reduces the gain by a factor of four; adding a 50-ohm load reduces it by another factor of two. If the receiver input impedance is substantially higher than 50 ohms, the overall gain will be closer to two. A second set of limiting diodes, CR3 and CR4, is placed at the output to protect the receiver in the event of a T-R switch failure.



fig. 3. Construction details of the coaxial cable input capacitor (C1) in fig. 2).

**Mosfet biasing.** The mosfet is biased to operate with a drain current of 5 mA with a gate 1-to-source quiescent voltage of  $-0.7$  Vdc. This allows the input signal voltage to switch to 1.4 volt p-p without appreciable gain compression. The diodes at the amplifier input will limit the signal to this same range so that they won't reduce the T-R switch dynamic range.

The voltage on gate 2 is set by a resistor divider at approximately 4 Vdc, setting the gate 2-to-source voltage to at least 3 volts. With these quiescent voltages and currents, the mosfet will have a transconductance of 10 millisiemens and a drain current swing of at least 10 mA p-p.

**Bypass considerations.** The mosfet is shunt fed to allow the drain-to-source voltage to remain above the minimum recommended by the manufacturer with the gate-2 voltage used. The value of the rf choke isn't critical. Values between 150  $\mu$ H - 360  $\mu$ H could be substituted. The decoupling of the mosfet drain supply is very conservative, using two capaci-

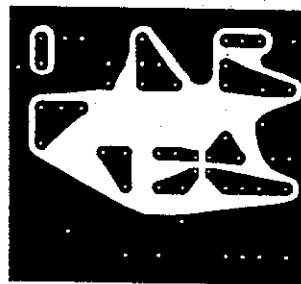


fig. 4. Printed-circuit board layout for the T-R switch. Component layout is shown in fig. 5.

tors in parallel (C7 and C8) to obtain several decades of effective bypassing. Gate 2 of the device is also decoupled with two capacitors and a ferrite bead to ensure the mosfet will remain stable through the uhf range. Again, the values of the decoupling capacitors aren't critical.

**Supply voltage.** The supply voltage,  $V_{cc}$ , for the T-R switch can range from +12 Vdc to +18 Vdc without much effect on performance. Additional decoupling of the input supply voltage is obtained with RFC1 and C9.

**Input coupling.** The only unusual component is C1, the input-coupling capacitor. Because the rf voltage levels are quite high and the required capacitance so low, a suitable commercial component would be difficult to find. An inexpensive substitute is a piece of coaxial cable. A typical piece of 50-ohm coax will have a capacitance of 1 pF/cm (30 pF/ft), so that a 6.3-cm (2.5-inch) center conductor-shield overlap will provide 6 picofarads of capacitance. A sketch of the coaxial capacitor is shown in fig. 3. The length of

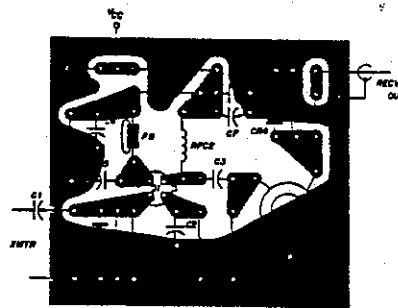


fig. 5. Component layout for the T-R switch.

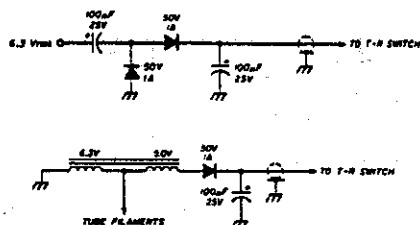


fig. 6. Two power supply options for the solid-state T-R switch. Supply voltage is not critical and may vary from +12 to +18 Vdc.

the un-overlapped portion can be as long as necessary to go from the pi-network to the T-R switch input. A piece of bare wire can be wrapped around the shield and soldered to complete the capacitor. For plate voltages less than +500 Vdc, RG-58/U can be used, with RG-59/U suitable for voltages up to +900 Vdc. With 70-ohm coaxial cable, the capacitance will be approximately 0.7 pF/cm (21 pF/ft), so an overlap length of 8.7 cm (3.4 inches) should be used.

### construction

Circuit layout is shown in fig. 4. A 5.7 × 5 cm (2¼ × 3¼ inch) single-sided copper-clad printed wiring board was used, and mounted in a 10 × 7.6 × 5 cm (4 × 3 × 2 inch) aluminum minibox. The board is mounted to the minibox using 2-cm (¾-inch) aluminum angle stock. The whole assembly was mounted on the rear of the transmitter shielded pi-network cage. The only critical aspects of the mechanical assembly are to provide good rf returns between the pi-network ground and the T-R switch board ground, and between the output connector return and the board ground.

Only one board was constructed, so photo etching wasn't used to make the board. Copper tape was used on the back of the board to provide the component interconnections. For those who wish to use an etched board, a suggested layout is shown in fig. 4;\* the component placement is shown in fig. 5.

If the transmitter doesn't have the necessary supply voltage available, fig. 6 shows two possible solutions. Both use the power-transformer filament windings in the transmitter. If the 5-volt rms winding is used, be sure it isn't connected to the high-voltage supply through the rectifier tube. This winding also must be properly phased with the other filament winding to prevent the two voltages from bucking. The power supply can be mounted in any convenient

location in the transmitter and connected to the T-R switch with a shielded wire. At the switch end, the shield should be connected to the minibox, with C9 between the supply voltage and the shield-box connection.

### conclusion

The T-R switch has been in use for over a year and has worked well under various operating conditions. Remember that the T-R switch protects the receiver only; it will not prevent the receiver from overloading if its dynamic range or agc characteristics are not up to standard. In most cases, muting the receiver when the key is depressed is the best solution to this problem. Take the advice of W4AX and K2RPZ: Turn that bargain transmitter into an effective CW rig with the addition of a good T-R switch.

### editor's note

The bibliography at the end of this article has been culled from *ham radio* for the benefit of CW enthusiasts interested in break-in control circuits.

The article by Al Brogdon, K3KMO, combines the advantages of electronic switching using a Johnson model 250-39 T-R switch and an antenna change-over relay.

Cal Sondergoth, W9ZTK, describes a solid-state system for use with separate receive and transmit antennas using low-power transmitters (under 100 watts). The article emphasizes receiver overload during transmit.

W.M. Mitchell, W8SYK, presents a single-transistor CW break-in circuit for stations with separate transmit and receive antennas. The design is for grid-block keying.

J.K. Boomer, W9KHC, shows a low-power, solid-state T-R switch using a PIN diode. The circuit handles power to 100 watts at any desired keying speed.

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1. David P. Shefer, W4AX, "Why QSK?" QST, February, 1978, page 63.
2. Stu Goodman, K2RPZ, "A Sonarize Awaits You in the Ham-Ad," QST, December, 1977, page 11.
3. Wes Hayward and Doug DeKleer, *Solid-State Design for the Radio Amateur*, ARRL, Newington, Connecticut, 1977, pages 179-180.
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\*A printed-circuit board and parts kit is available from Radikit, Box 429, Hollis, New Hampshire 03048.

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