

The Propagator

	<p>Official Newsletter of the Illawarra Amateur Radio Society Issued 7Jan 2003 Published Bi-Monthly</p> <p>Editor – Rob Heyer VK2XIC</p> <p>IARS meets at 19:30 Hrs. on the second Tuesday of each month (except January) in the SES LHQ Montague St. North Wollongong. VK2AMW Since 1948</p>
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IARS PO Box 1838 Wollongong 2500.

A Simple Regulated 13.8V 20A Power Supply

The following circuit is based on a simple conventional design that will allow full regulation with up to 20 amps of current draw continuously or even higher pulse rates when used with equipment of lower duty cycle.

One of the first considerations when building a power supply is how many pieces of equipment are going to hang off it and what will be the maximum current draw at any one time. For the average amateur shack, a value of 20 amps is quite a respectable figure.

Parts for the power supply are easily obtainable through local electronics stores, however, I feel that most amateurs will have the majority of parts in their junk boxes thereby keeping costs to a minimum.

It is not my intention to show you how to construct this unit, but rather to show you the basic principles involved so that you may experiment with the given circuit. But please note, the circuit as is works very well indeed.

Propagator downloads are available, contact Rob - email vk2xic@yahoo.com.au

PARTS.

250V/18V @ 20A Transformer	25A Bridge Rectifier
Electrolytic Capacitor 100 μ f 35V	Electrolytic Capacitors to 40,000 μ f total 50V
LM723 Voltage Regulator	Capacitor 0.01 μ f Disk Ceramic 4 required
2N3055 Power Transistors 5 required	15V 1.5W or heavier Zener Diode
20A 50V min SCR	1K 5% 1W Resistor 3 required
Case to house unit & Heatsink(s)	0.1 Ohm 5W Resistor 4 required
Power plug and cable	47 Ohm 1/2 W 5% Resistor
DPST switch 250V rating, Hookup wire	10K Trimpot
Associated hardware 20A fuse and holder	

The transformer should have a secondary voltage of 18 Volts and rated at the current level required (20 Amperes). For SSB operation, 15 amps will be suitable to drive a 100 watt solid state transceiver. The output of the supply will be capable of delivering 20 amps on voice peaks. If the chosen transformer has been obtained from another piece of equipment or from surplus/disposal areas, care should be taken to ensure that the transformer is of the correct type for the purpose. Also, transformers with a secondary centre tap can be used but this may require the use of a full wave rectifier consisting of separate diodes which in turn will require heat sinking.

The smoothing capacitor(s) should be rated at 40,000 μ f 50V. Several smaller values may be connected in parallel to achieve this as long as they are 50V types. As a rule of thumb when choosing capacitance value, 10,000 μ f per 5 amps is recommended.

The chosen transistors are 2N3055 or similar power types. One is used as a driver and the other four are used to pass the current. Before installation, I would recommend that the four transistors being used as the pass types be checked to ensure that they exhibit similar characteristics, otherwise, one or more of these devices may not carry their fair share of the load and cause the others to over load.

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Whilst it is not always possible to use matched transistors, equalising resistors should be used to balance the load between the pass transistors. These resistors should be of the wire wound variety usually 0.1 or 0.22 Ω . In our 20 amp supply, each of these resistors will be asked to carry 5 amps, therefore the power rating must be at least 2.5 Watts if the 0.1 Ω types are used and 5.5 Watts if 0.22 Ω are used. A safety factor of 2 is recommended I.E. 5 Watts for the 0.1 Ω types.

The LM723 voltage regulator is variable output voltage low current device and is capable of driving the single 2N3055 transistor for an output of 13.8V.

In any kind of high current power supply, output protection is mandatory. (Imagine cooking your power supply with a short circuit or your new \$2000 + radio with overvoltage!). Whilst the humble fuse is a necessary item in the output circuit, it does not prevent increased output voltages when the unforeseen happens, e.g. Unusually high mains voltage periods, regulator failure etc. So, another type of protection device should be incorporated on the output. Here I have used a circuit known as a *Crowbar Overvoltage* circuit. This circuit simply senses the output voltage and remains inactive if the voltage is below a specified value. Should the voltage equal or exceed this value, the output is shorted causing the output fuse to blow.

The main components of this circuit are a zener diode and a thyristor. The voltage rating of the zener diode must be as close as possible to 15V and should be checked accordingly (3% or less is ok). The thyristor should be a 20 amp 50V minimum rated type. A lower current type may be used but larger heatsink and a fast blow type fuse must be used.

The 20 Amp supply will require wiring with fairly heavy duty cable to avoid voltage drops. Flexible 50/0.25 or 7/0.67 (2.5mm square) building wire would be the minimum size to use, but 4 mm automotive would be better. This cable should be used between the transformer and rectifier(s), smoothing capacitors, transistor collectors and emitters to positive output terminal and the negative rail. The output terminals chosen should be able to handle at least 20 Amps.

All connections should be clean and a heavy duty soldering iron should be used when soldering the larger cables using a good quality resin cored solder. The transistors and rectifier(s) should be mounted on adequate heatsink(s) with care taken to insulate the transistor cases (Collectors) from ground. A good heatsink compound should also be applied to these insulated joints.

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trimpot clockwise and carefully observe the voltage reading which should be increasing. Slowly increase the voltage to the point where the fuse blows which should occur at 15V +/- 300mV. Switch off unit, rotate 10K trimpot fully counter clockwise and replace fuse with 20 Amp type. Using the above test procedure, rotate the trimpot until desired voltage obtained i.e. 13.8V.

LOAD TEST

This test requires you to draw 20 Amps from the supply. (This is where you find out if you have done it right!). A transceiver capable of drawing 20 Amps on transmit (AM, FM or CW) is suitable. If you don't have such a beast, then you will have to devise a high powered resistor suitable for short duration tests. An example of this is several lengths of nichrome resistance wire paralleled together to produce 0.7 Ω and wound on a non conductive heat resistant former taking care that each length is separated from the other. **WARNING** this device will try to dissipate in excess of 270 Watts and will therefore become **very hot!**

Connect your voltmeter / multimeter across the output terminals and switch on the supply. Ensuring you have a reading of 13.8V, connect and key the load for 1 or 2 seconds and observe the voltage.

If all goes well, there should be a minimal voltage drop in the millivolt range. This voltage drop is quite normal and will vary according to wire size, solder joints and connections used in the construction.

73's DE Peter, VK2KHE.
Propagator September / October 1992

Note:

I have built a 13.8 Volts 20 Amp power supply not unlike the one described above. When it came to find a suitable load I used a car driving light, which proved to do the job OK.
No doubt this is not new but has been a round for many-a-year.

Rob Heyer VK2XIC

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Winding a HF Helical Whip Antenna

First there are some decisions that need to be made.

How long do you want the whip to be?

Common sense says that a long whip will perform better than a short one, but will a long whip be a nuisance on a vehicle?

Good results can be achieved with a whip 1.5 m long.

A fibreglass rod is needed, such as a discarded CB antenna, fishing rod blank, etc.

A brass base to fix (glue) the rod in place and a threaded hole on the opposite end to suit your vehicle antenna connector.

The amount of wire in metres is, $256/\text{freq (Mhz)}$ provided the wire is wound as described.

e.g at 28.5 Mhz wire length is $256/28.5$ is equal to 8.982 m

Thickness of wire depends on size of the rod and the frequency of operation **BUT** thicker the better. (*Some are thicker than others. ED*)

Procedure

Mark the rod off in nine equal parts. As an example if the rod was 1200mm long each part would be $1200/9$ equal to 133mm

Starting from the bottom call the sections A, B, C, D, E, F, G, H, I.

A. has 1% of the wire

B. “ 2 %

C. “ 4%

D. “ 6%

E. “ 7%

F. “ 9%

G, H and I have the remaining wire 71% which is close wound over these sections.

Now its time to calculate the thickest possible wire that can be used with the rod available. Suppose you used a rod 1200mm long and 8mm in diameter for the above frequency of 28.5 MHz, then in the close wound section G, H, and I there will be 71% of 8982mm of wire equals 6377mm close wound over a length of G + H + I which is 133×3 equal to 400mm.

If we use 1.2mm dia wire and if one turn of wire is the circumference in the centre of the wire when wrapped around the rod, then the circumference will be ($2\pi \times 0.6 = 3.77\text{mm}$) the length of wire for one turn. Therefore 6377mm will need 195.6 turns.

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The other 6 parts of the rod will take the remainder of the wire according to the percentages calculated.

- A. 1% of 8982 = 90 mm / 32.6 = 2.8 turns
- B. 2% of 8982 = 180 mm / 32.6 = 5.5
- C. 4% of 8982 = 360 mm = 11
- D. 6% of 8982 = 539 mm = 16.5
- E. 7% of 8982 = 629 mm = 19.3
- F. 9% of 8982 = 808 mm = 24.8

These are wound evenly over their respective section.

Section F will have a spacing between turns of $133/24.8 = 5.4\text{mm}$

Mark the spacing for each section on the rod and then wind the wire on tightly using tape at various points to hold it temporarily.

Attach the whip antenna to its mounting position. If you have a dip meter or rf impedance bridge you can find the resonant point.

Otherwise with your transmitter on low power and with a vswr meter find the frequency with the lowest vswr.

Remove or add wire to the top section as required to resonate the antenna at the desired frequency, note:- adding turns adds inductance and lowers the frequency, moving the close wound coil up will increase frequency.

Allow for additional inductance from the heat shrink that you place over the windings.

For added flexibility an adjustable brass screw can be added to the top of the antenna for adjustments. Screw it out to lower the frequency.

If the rod is tapered use the average diameter.

This article was condensed from an article printed in the Propagator several years ago by Roger Graham VK2AIV.

(Thanks to Dom VK2SX for researching the above article on helical whip antennas)

Homebrew FM Receiver

by Dale VK2DSH

This article describes a basic superhet FM receiver that is suitable for use on any band up to 2 meters. The design is based on the CA3089 (RCA) or LM3089 (National) chip. This is quite an old chip now, but is still readily available from a number of sources. It costs about \$5. The main advantage of this chip compared to more recent types of FM demodulators is that it will work over a wide frequency range and that it is suitable for both narrow and wide band operation.

The design is conventional. a single stage of RF amplification followed by a dual gate mixer which also has some conversion gain. The local oscillator is crystal locked. If more or less channels are required the circuit is easily modified. For HF bands. the crystal oscillator could probably be replaced by a VFO, however I have not tried this. The crystals must be series mode, third overtone types. If operation on 2 meters is contemplated, fifth overtone mode would be required. Almost any npn transistor with a Ft of 300 - 500 MHz would be suitable in the oscillator circuit.

Following the mixer is an amplifier at the IF frequency, this stage provides some gain as well as impedance matching to the bandpass filter. I have tried a number of different filters in the circuit, both crystal and ceramic types. Old 2-way radios from the club auction are a good source of suitable filters. Depending on the filter type, the collector resistor of the IF amplifier may need changing to obtain optimum bandpass response.

Crystal filters that I have tried have had bandwidths from 10 to 60kHz, ceramic types up to 300kHz. If no filters are available, an LC combination may be used. If filters for other frequencies are available they may be used without difficulty.

The 3089 chip contains a limiter, demodulator, signal strength and squelch circuit. Most of the components around the chip are to provide bypassing and bias to the internal circuitry of the chip. The demodulator requires a resonant circuit at the frequency of the IF stage, either a single or double tuned circuit may be used. The single tuned circuit is easy to setup and seems to work well.

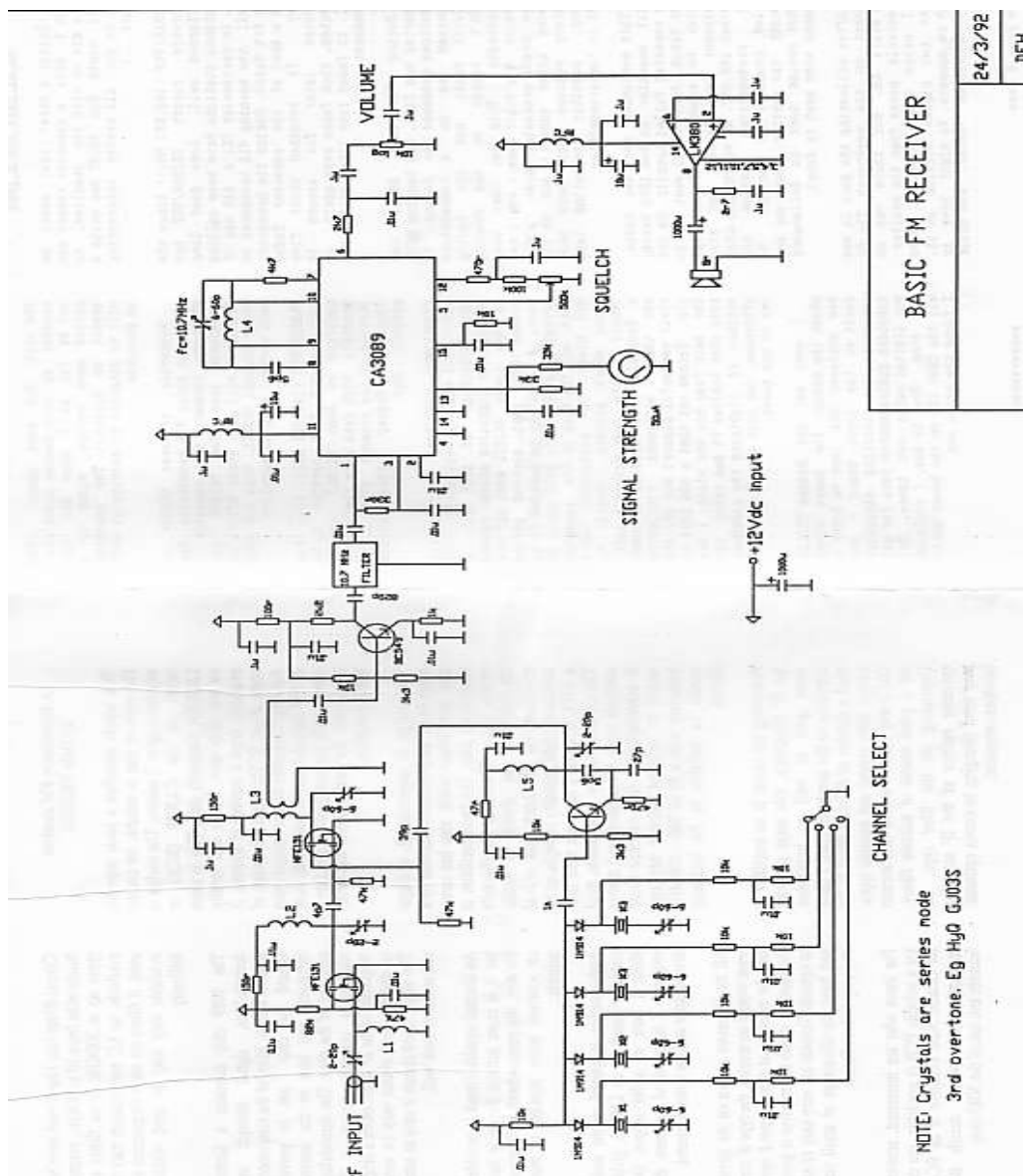
An internal squelch circuit is provided, but it is more suitable for wide band FM use. For narrow band applications, an external noise squelch is more suitable.

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Audio output is passed to the audio amplifier based on an LM380, 'giving about 1 watt of audio output. Deemphasis is provided between the demodulator and the volume control.

All the inductors shown on the circuit were wound on toroids, the type of core and the number of turns depend upon the band on which the receiver is going to operate. Toroids are very easy to use and have the advantage of small size and very little radiation.

For those who are interested, artwork for a suitable PCB it is available, see me for details. Also available is an RCA application note the details the features and use of the 3089 chip.



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Our HomePage

Illawarra Amateur Radio Society Homepage can be found at:

<http://www.iars.1earth.net/>

Work is still to be done, small step improvements...

Australia Day

26 January 03



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Amateur Abbreviations For CW Operators

The table below contains some more listings of amateur radio operating abbreviations used when working CW.

In the last Propagator you will remember a page listing a few abbreviations, I thought I would add to this a selection from the 'Q Code'. This not unlike the 'Z Code' which was used extensively by ROs at sea and in the air and has been taken up amateur radio operators world wide.

It has been said that a contact is like a bridge, long enough to do the job. Codes and abbreviations have increased the operators brevity, accuracy, simplicity and speed.

A great deal of information was transmitted in a short time on CW when full use was made of the standard abbreviations and codes. Originally the only code available for reporting signals was the one used to denote loudness and that was graded in the arbitrary scale R1-R9. Later, when interference became a problem it was necessary to indicate readability of the signal and the scale QSA1-QSA5 was used to denote this. At the same time the signal strength was given as QRK1-QRK9. When attention began to be paid to the quality of CW signals another code was evolved, this is the now universally used RST code.

The Q-code was instituted at the Radiotelegraph Convention held in London, 1912.

Rob Heyer VK2XIC

Note: **QRA** bolded are found in the Australian radio amateur's 'Handbook.'
Reference sources from C of Aus Handbook Operators of Radio Stations in the Amateur Service (Oct79) and RSGB Radio Communication Handbook fifth edition

QRA What is the name of your stn?	QTS Send call sign for tuning?
QRB How far are you from my stn?	QTV Shall I guard frequency...?
QRG Will you tell me my freq?	QTX Will you keep your stn open?
QRH Does my frequency vary?	QUA Have you news of (Callseign kHz/MHz)?
QRI How is the tone of my transm?	QUM May I resume normal working?
QRK Intelligibility of my frequency?	QRY What number is my turn?
QRL Are you busy?	QSB Are my signals fading?
QRM Interference?	QSL Can you acknowledge receipt?
QRN Any trouble with static?	
QRO Shall I increase transm. pwr?	<i>Informal Use:</i>
QRP Shall I decrease transm. pwr?	<i>Often vocalised on the bands and repeaters.</i>
QRQ Shall I send faster?	<i>QRM Interference from other stns</i>
QRR Ready for automatic operation?	<i>QRO High power</i>
QRS Shall I send slower?	
QRT Shall I stop sending?	

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<p>QRU Have you anything for me? QRV Are you ready? QRW Shall I inform (Callsign) that you are calling him on ... kHz/MHz? QRX When will you call again? QRZ Who is calling me? QSA What is the strength signal? QSB Are my signals fading? QSD Is my keying defective? QSL Can you acknowledge receipt? QSN Did you hear (Callsign kHz/MHz)?</p> <p>QSO Can you communicate with (Callsign kHz/MHz)? QSP Will you relay to (Callsign)? QSR Rpt call on calling freq? QSS What working freq. will you use? QSU Shall I send or reply on this freq? QSV Shall I send V's on this freq? QSW Will you send on this freq? QSX Will you listen to (Callsign on kHz/MHz)? QSY Shall I change to...frequency? QSZ Shall I repeat words or groups? QTH What is your lat. & long? QTR What is the correct time?</p>	<p>QRT Close down station QSB Fading QSO Radio Contact QTH Location (fixed or portable) station QRN Electrical or atmospheric interference QRP Low power QRX Stand by QSL Card to confirm contact QSY Change frequency</p> <p>These are included by Robert Harris, in his book "Enigma", he states that <i>QRJ</i>, <i>QWP</i>, <i>QXA</i> and <i>QXH</i> have the meanings stated below, but the authenticity of these definitions is open to debate.</p> <p><i>QRJ</i> Your frequency is too high <i>QWP</i> Observe Regulations <i>QXAn</i> My message consists of n cipher groups <i>QXH</i> Broadcast your traffic</p>
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Snaps of the 'Dam Picnic'

The BBQ held at Cataract Dam Saturday the 18 December, was an enjoyable time for all. For some, a time to meet new people, and a time to see old friends who have travelled far and wide since the last face to face 'contact'.

Rob Skelcher VK2TNK

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Top left Allan Walker VK2ZEW

Above right David Downie VK2EZD &
Bob Freebain VK2ZRF

Above Hank Laauw VK2BHL and his Great Dane !

To the right is John Lawer VK2KET
Maybe it was all a little too much !

Old folks need their 40 Winks ? Z Z Z Z Z Z Z Z Z Z Z Z



Photos Rob Heyer VK2XIC

Colour photos can be sent via email, just ask Rob VK2XIC

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Coming Events

IARS Picnic BBQ

18 January 2003 at Cataract Dam BYO everything.

CQ 160 Meters Contest (CW)

24 – 26 January 2003

Asia-Pacific Sprint 40 – 20 Meters (CW & SSB)

8 February 2003

RSGB 160 Meters Contest (CW)

8 – 9 February 2003

First Meeting For 2003

11 February 2003 at the SES LHQ Meeting set to start at 19:30 Hrs.

ARRL International DX Contest (CW)

15 – 16 February 2003

The Central Coast Field Day 23 February 2003

Check out the web site for more information www.ccara.org.au

IRAS Experimental SSTV Group

Monday evenings 19:30 hrs and Saturday afternoons 13:30 hrs local times.

See Dec/Jan 03 AR for further details

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Some Humour



“M” Theory

How would you go answering this type of question from the past?

It was Question (9) in the February 1978 AOCF Section 'M' exam.

9 Two resistors of 10 and 30 ohms respectively are connected in series and placed across a 24 ohm resistor, a supply voltage of 30 volts is connected across this combination.

Calculate: -

- (a) the total current drawn from the supply ; and
- (b) the power dissipated in each of the three resistors.

Repeater Officer's Note

One of the changes to the Repeater listing is the inclusion of an "experimental" 2 Meter CW Beacon on 144.625MHz (the old PIG frequency). So if anyone wants to learn a bit of morse (to upgrade or whatever), they can listen anytime and anywhere

It is set for 10wpm at 1/2 sec spaces between letters / numbers. I was considering setting it to 5wpm (to match the licencing requirement) but no one actually communicates at that slow rate, a minimum communication speed is probably 10 wpm.

Rob VK2MT

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The IARS Repeaters



Maddens Plains Repeater Site

The Illawarra Amateur Radio Society operates several repeaters on the Illawarra & South Coast.

Below is the listing of frequencies in use.

Access tones are not required.

Their status is also displayed along with the type of repeater.

The listing below also includes the Satellite Gateway and BBS run by John Simon VK2XGJ.

Call sign	Freq In/Out	Type	Location	Linked To
VK2RUW	29.520/29.620	10m Voice	Knights Hill	Off Air
VK2RMP	52.650/53.650	6m Voice	Maddens Plains	<i>Linkd to 146.850 for Broadcasts</i>
VK2RBT	146.075/146.675	2m Voice	Mt Boyne	RMP/RIS
VK2RMP	146.250/146.850	2m Voice	Maddens Plains	RIS/RBT
VK2RIS	146.375/146.975	2m Voice	Saddleback Mtn	RBT/RMP
VK2RUW	433.225/438.225	70cm Voice	Knights Hill	RGN/RHR RGI/RTW
VK2RMP	433.725/438.725	70cm Voice	Maddens Plains	
VK2AMW	144.625	Morse Beacon	Sublime Point	10 wpm
VK2AMW-1	145.175	APRS Digi	Knights Hill	APRS "Wide"
VK2AMW-2	145.175	APRS Digi	Mt Boyne	APRS "Wide"
VK2AMW-7	147.575	Packet Digi	Mt Murray	
VK2XGJ	53.100	BBS/Satgate	Dapto	
VK2XGJ	144.700	BBS/Satgate	Dapto	
VK2XGJ	147.575	BBS/Satgate	Dapto	
VK2XGJ	440.050	BBS/Satgate	Dapto	

If you are aware of any problems with the above systems, please contact Rob VK2MT on 0408 480 630 or e-mail on mcknightr@winns.com.au

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Illawarra Amateur Radio Society

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Club meetings are held 7:30 PM on the second Tuesday of each month, (except January) at the SES Building Montague Street North Wollongong

Committee meetings are held bi-monthly on the third Wednesday.

Membership:

Full - \$20 Concession - \$15. Membership expires after the AGM in August.

Visit the Illawarra Amateur Radio Society inc. Homepage IARS@1earth.net.au

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