THE WEST RAND AMATEUR RADIO CLUB

January 2008
Volume 8, Issue 5

ANODE

Inside this issue:

Editor's Comments

February 2008
Volume 8, Issue 6

In this issue we conclude the article started last month. 'Listen to Amateur Radio Signals!'

In our next issue :-

"Somewhere out there is a man, a brother amateur, with a warped, very sick mind. 1 do not know who he is, but he knows me, and his fiendish paraphernalia has made me a slave to his electronic wizardry. 1 do not know if he is the fellow who invented Space Invaders, but if he is not, he surely is related to that other sick mind, except that his condition is now worse yes, far more diabolic and dangerous and his ability to derange the minds of innocent amateurs has grown even more malevolent. Yes, losing even your sanity now has a price, and that price is less than $200."

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Normal service will be resumed as soon as....

During the course of the last few weeks, I have changed the operation of my web servers. As a result of "load shedding" the power has been inconsistent here in Roodekrans. UPS' are

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Listen to AMATEUR RADIO Signals!

[from http://www.nzart.org.nz/nzart/ar_info/alivo/alivo-a.html]

Continued from last month.

Special points of interest:

- Contact details on back page (updated)
- Next HamComp has been postponed to February.

Check the board!

Is each component correctly placed? Are the electrolytic capacitors correctly polarised (negative and positive leads to the correct places)? Check and re-check the IC pins, are the correct ones earthed? Does each pin have the correct components attached? With a magnifying glass, examine each soldered joint. Is it a solid connection? Are there any 'dry joints'? Are there any solder bridges shorting any pins? Take time, you have to get it right!

Board-mounting and panel-wiring

The battery-holder goes at the left end of the baseboard (looking from the front). The battery holder is held on the baseboard with two screws, or alternatively, four small nails, two each side, bent over to form hooks, with a heavy rubber-band clipped over the top.

The circuit board must be positioned so that the leads to the front panel tuning controls C2, C6 and C10 are kept relatively short. Fig. 6 shows the connections.

Use stiff tinned-copper wire (0.7mm) for the front panel wiring where possi-

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Editor's rants and raves - comments

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not designed to 'hold up' a pc for longer than an hour. So I bought a low cost ADSL router which takes a 'minute' amount of power. This should ensure operation for the typical four / five hours of no power.

This summer/lightning season, I ran out of spare power supplies. I had to get some more. Not all were blown by lightning surges coming down the mains wiring. Some, were damaged by switching transients on the mains during load adjusting by Escom.

I never liked the fact that the pc power supply was a switch mode type. But I could accept the reasons why it was used. When the ATX power supply was supplied with the Pentium II pc's, I saw the problem straight away. Here in South Africa, surges on the mains wiring can be thousands of Volts. There is no hardware or on/off switch to isolate the electronics from the mains wiring. Electronic switches do not like the extreme voltages thrown at them. The rapid change in voltage (dv/dt) breaks down the semiconductor junctions. This usually causes spectacular failures in the power supply unit. Sometimes even a small fire.

Recent events on the power supply lines have even reset or tripped UPS's. The mini-UPS that allow for a reasonable shutdown on power failure, do not cope with short duration transients

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Listen to AMATEUR RADIO Signals!

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ble. Floppy wires could cause undesirable frequency shifts. Be sure to keep the leads to the variable capacitors short and rigid.

Lightweight stereo headphones work well with this receiver. Choose them with care, some are more sensitive than others. The phone jack automatically connects stereo phones as mono, the tip and the ring contacts are joined.

Wiring the variable capacitors

These capacitors have two sections of unequal capacity connected to three connecting lugs. Looking at the end of the shaft as shown in Fig. 5, the centre lug is the common (earth) connection with the larger capacity section B, the lug clockwise from the earth lug. Different connections are used on each capacitor.

The Fine Tuning

The main dial C6 gives coarse frequency control. The presence of a signal can be identified but the actual 'tuning in' is done by the Fine Tuning control C10.

Stick a piece of paper (from a sticky label is suitable) to the C10 thumbwheel knob as a pointer. Set it to point horizontally to the left when the knob is fully anticlockwise.

Aerials and earths ...

Some twenty metres of wire, suitably suspended, is a suitable antenna and will work well. Almost any type and length of wire is suitable. Run it out the window to a tree or building. A length of rope or cord at the distant end will act as an insulator and halyard. Suspend it high so it is not a hazard to passers-by. Keep your wire well away from power lines. Take care!

An earth connection to this receiver may improve reception (by noise reduction). Try it when you have the receiver operating! If you decide that an earth improves reception, drive a scrap length of metal water-pipe into the ground as a separate earth spike for your own use. Use an electrician's 'earth-clamp' to con-

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Editor's rants and raves - comments

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of thousands of Volts. It doesn't happen often but when it does, it mystifies both the user of the pc and the UPS control circuitry. Surge suppressor plugs are very handy for stopping this effect. Make sure you get the three MOV type as the surge is quite often 'common-mode' travelling down both line and neutral with respect to earth. [MOV - Metal Oxide Varistor]

The power of open spectrum
[http://blogs.zdnet.com/open-source/?p=1989]
"When the history of this era is written, it will be seen that one of the biggest bi-partisan mistakes was to treat spectrum as property rather than a commons."

Rice graduate student Joseph Camp (go to link above) calls it the Transit Access Points (TAPs) project. Off-the-shelf radios are connected via FPGA chips from Xilinx to a Gigabit Ethernet connection. There's no WiMax. It's all WiFi.

Club Notes

Bulletin Readers for the Months of February and March.

10-Feb-2008	ZS6WWJ	Willem
17-Feb-2008	ZS6CRW	Craig
24-Feb-2008	ZS6PVT	Phillip
02-Mar-2008	ZS6BZF	John
09-Mar-2008	ZR6RON	Ron
16-Mar-2008	ZS6C	Joop
23-Mar-2008	ZS6ARQ	Romeo

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Flaming kamikaze squirrel torches car
Sciurine death dive does for Toyota Camry
By Lester Haines
Published Wednesday 24th October 2007 09:55 GMT

A New Jersey woman's Toyota Camry last week suffered a sciurine kamikaze attack during which a flaming squirrel fell onto the vehicle, slid into the engine compartment and provoked an explosion which destroyed the parked vehicle, the Jersey Journal reports.

Lindsey Millar, 23, and bruv Tony, 22, were at home in Bayonne last Wednesday lunchtime when the incident occurred. The animal had apparently decided it was a really good move to chew through overhead power lines directly above the motor, and was duly fried for its trouble.

Tony Millar explained: "The squirrel chewed through the wire, was set on fire, fell down directly to where the car was. The squirrel, on fire, slid into the engine compartment and blew up the car."

He added: "They're always coming around here, chewing through the garbage."

Ms Millar is apparently fully insured for incendiary squirrel strike, although her brother concluded: "It's something to laugh about once she has a new car. It's not funny yet."

As a rather poignant footnote, the Jersey Journal notes that the Millars' house is fully decked out in anticipation of Halloween, "complete with a tiny plastic tombstone on their front lawn". Tony Millar said the family "will consider dedicating the tombstone to the squirrel".

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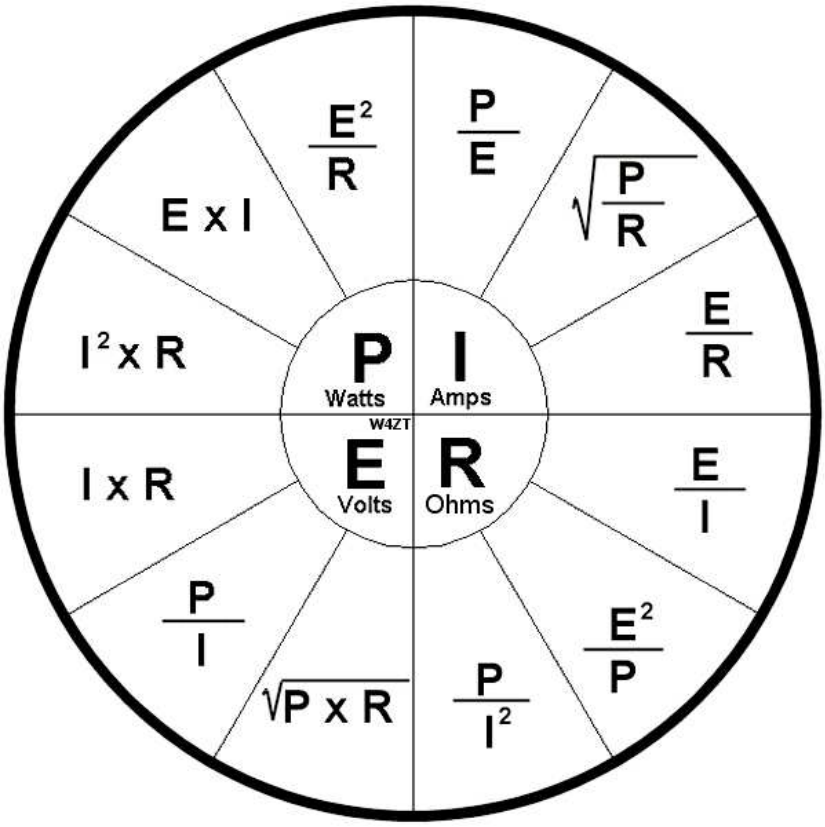
Editor's rants and raves - comments

Useful chart

This chart to the right, is courtesy of W4ZT. It comes in handy when working out the voltage on your antenna cable. It can be used by anyone who 'remembers' Ohms law!



Listen to AMATEUR RADIO Signals!

nect the earth wire to the pipe.

Getting it going ...

Check all the wiring - again! Make sure that the battery switch is 'off'. Be certain that the wiring polarity for the battery connector is correct. Connect the batteries.

The setting-up adjustments ...

Using your adjusting tool, set the slug in L1/L2 to about one-third of its length projecting out the bottom. Set the Slug in L3 to be away from the front panel with about one-third of its length inside the winding L3. Connect the antenna. Plug in the headphones.
The time of the great event has arrived. SWITCH ON! Some checks have to be done before you can listen to amateur radio stations. Remember to switch off when you make changes to the wiring!

Setting the dial

The dial scale shown in Fig. 4 has a 'logging scale' and the frequency calibration marks are already entered for the type of tuning capacitor used.

The 'Cal' (calibrate) position on the scale shows the frequency of ZLXA, the AM station of the Radio Reading Service at Levin, on 3.935 MHz. It is a convenient calibration marker station! Use it to check the dial at any time when that station is operating.

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Setting up the oscillator

The aim is to get the Tuning capacitor C6 to cover the frequency range 3.5 to 3.9 MHz and with the correct dial readings. Access to a calibrated communications receiver or transceiver for the setting-up tests can make the calibration job easy - but there are other ways too! Each receiver requires individual attention. It is not difficult - just a little patience is required. You can listen to stations to judge 'where you are' with the calibration process. The objective is to get ZLXA located at the dial position shown.

Check that the dial pointer is correctly mechanically set at the zero end of the dial and then set it at the Cal position on the dial. Set the Fine Tuning capacitor C10 pointer to vertical and leave it fixed at that position until the setting-up process is complete.

Run the slug L3 through its length. You should identify an AM signal with speech (or sometimes music). You will hear howls as you tune across the signal! If you can tune it in and identify it as the Radio Reading Service, your task is done! Patience is needed but is rewarded! ZLXA seems to give good coverage across New Zealand. At night, the presence of other signals may make the task confusing but correct adjustment is still possible.

The L3 slug position is sharp and critical. The slug must be finally fixed in position so that it does not move - try the cotton method described earlier.

You can make another check. Use a 'transistor radio' which tunes across the AM Broadcast band. Connect a lead from your receiver antenna terminal to the external aerial connection of the AM radio. With the AM radio set to about 856 kHz on its dial, its oscillator will be at 1311 kHz (being 856 plus 455, its IF frequency). The third harmonic of 1311 is 3933 kHz and you should hear it whistle on your newly-constructed receiver at the Cal position. You can use this method to check your C6 dial at other points too (3500 kHz is 711 on the AM dial).

The objective is to get your oscillator to cover the 3.5 to 3.9 MHz band with the dial setting correct. Careful adjustment of the slug in L3 should make this possible. If the frequency calibration settings are not near enough, changing C5 will alter the 'spread' and adjusting the appropriate trimmer (on the back of C6) can help too.

Setting up the input circuit

The aerial input circuit is easy to set up. With an antenna connected, noise (or an incoming signal), can be used for this setting-up test. But first check that the Level control R1 is set to its minimum attenuation position - i.e. full clockwise, maximum signal, the aerial goes direct to L1.

The 'peak' in the noise level (or signal level) heard as the Peak control C3 is swung through its range will be distinct. Adjust the slug in L2 to be sure that with the Tuning set (on the dial) at the low end of the frequency range (below 3.5 MHz), that the Peak control shows a definite peak in noise, and will peak again with the Tuning set at the high end of the frequency tuning range (about 3.95 MHz). Fix this slug in position too.

With an aerial connected, you should now be receiving signals - depending on the time of day!

The cover

A discarded cardboard carton with thick solid sides can be used to make a cover! Measure up and cut it out with shears or a sharp knife and a straight-edge, fold it, and give it a couple of coats of paint. Attach it to each end of the baseboard with screws. The finished receiver looks like a bought one! You can choose any colour you like!

Add some self-adhesive rubber feet or felt pads

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to your receiver, and prepare to enjoy listening!

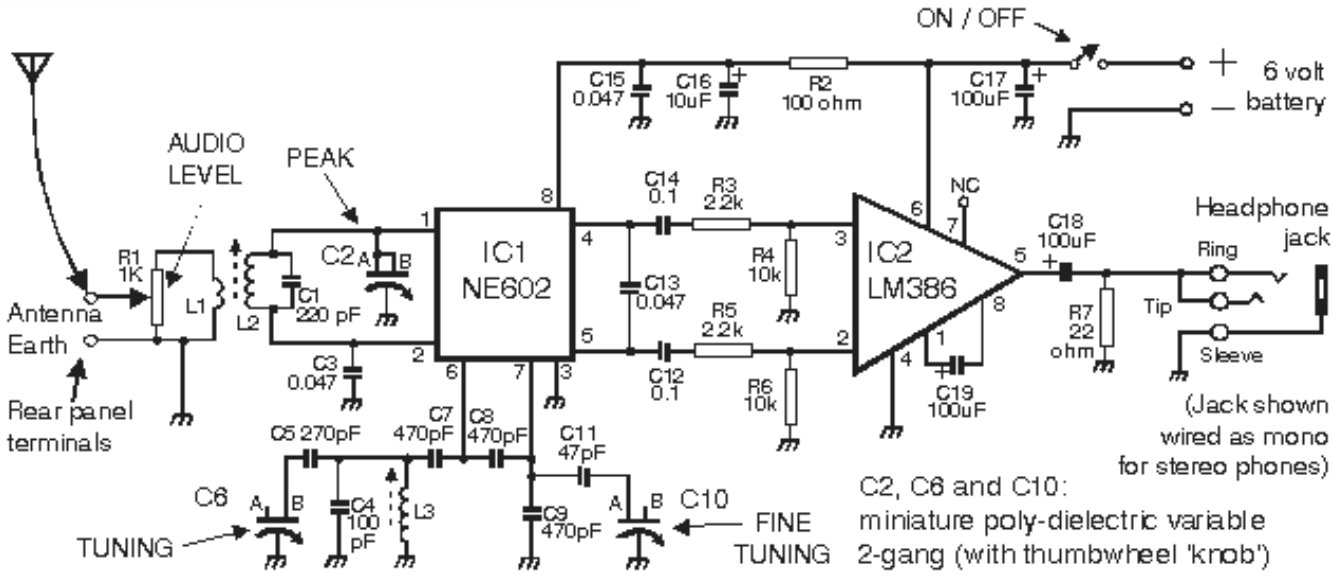

Fig. 2 ALIVO-ZL Receiver circuit diagram

Operating Your Receiver

CW (Morse code) reception:

In Fig. 1 we saw how signals are processed by direct-conversion from the original radio frequencies down to audio frequencies. Consider a Morse signal (CW - continuous wave) being sent on 3736 kHz. This will be heard as a 1 kHz note in the phones (the difference between the incoming signal and the receiver oscillator - which is at 3735 kHz). As the transmitting Morse key is operated to form the elements of the Morse code characters, the 1 kHz note heard by you will respond accordingly.

If your receiver oscillator is now tuned to 1 kHz lower in frequency - to 3734 kHz - the 1 kHz note you hear will increase to 2 kHz (being the difference between 3734 and 3736 kHz). So as you tune your receiver across an incoming carrier signal, you will first hear a signal as a high pitch note. This note will decrease to zero and will then increase again to a high pitch as you tune across the signal. When the oscillator is at the same frequency as the incoming signal, you will hear nothing - this is position is called 'zero beat'.

At each side of zero beat, you can hear the signal as a 1 kHz note, in this example when the oscillator is at either 3735 kHz or at 3737 kHz.

The receiving characteristic of this receiver can be described as a 'double-sideband effect'. With the oscillator set at 3735 kHz, signals at 3736 and at 3734 kHz will each produce a 1 kHz tone in the phones (this is 3735 kHz, the oscillator frequency, plus and minus 1 kHz, to give you these incoming signal frequencies). This characteristic can be likened to a superheterodyne receiver with its bfo (beat frequency oscillator) set in the middle of its pass-band.

So the effective 'radio frequency pass-band' of the receiver is twice that of the pass-band of the audio filter shown following the mixer in Fig. 1. In practice, the real limit may be twice your personal hearing 'limit of audibility' - twice the highest frequency note that you can hear!
This characteristic can be used to advantage. It

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gives you a choice of 'two spots' that you can choose for the reception of a CW signal - you can tune your oscillator to above or below the incoming signal and still get a suitable tone for reception of the wanted signal. One spot may have an interference advantage over the other by changing the pitch of an adjacent and unwanted signal whilst keeping the pitch of the wanted signal the same. Try it!

SSB (Single-sideband) reception:

To explain SSB reception, we first consider the audio (speech) input to a typical SSB transmitter to be from 300 Hz to 3000 Hz as shown in Fig. 7 (a), the diagrammatic 'wedge' symbol. The 'low end' of the wedge represents the 300 Hz end, and the 'high end' of the wedge represents the top end of the speech range, 300 to 3000 Hz. This diagram is for purposes of explanation only and should not be taken to represent the voice energy distribution in actual practice. It is usually the other way around - the low notes contain most of the voice energy whilst the high pitch notes are weak but are very necessary for speech recognition purposes.

An 'amplitude modulated' (AM) transmission can be shown as diagram 7(b) using this diagrammatic 'wedge' symbol. Here is a carrier signal with two adjacent 'sidebands' - the wedges shown above and below the carrier - each indicated here as USB (upper sideband) and LSB (lower sideband). The energy of the AM signal is contained in these three components - the lower sideband, the carrier, and the upper sideband. Remember: with no input speech to the AM transmitter there are no output sidebands - but the carrier continues on unchanged.

In a SSB transmission, only one sideband is radiated - both the carrier and the other sideband (of AM) are suppressed. Remember: with SSB, with no input speech, no signal at all is transmitted.

On the 80m band, it is customary for amateur stations to use the lower sideband for a SSB transmission. Amateurs use the (suppressed) carrier frequency when referring to the frequency of a SSB signal. So the diagram 7(c) applies. The position for the 're-inserted carrier' (your receiver oscillator), which is needed as the reference to restore the signal during demodulation in your receiver, is shown in this diagram as 3736 kHz.

Note that the LSB signal appears 'inverted'. The 300 Hz component of the speech is now the higher frequency component in the transmitted signal at 3735.7 kHz, (3736 kHz minus 300 Hz). The 3000 Hz component is at 3733 kHz, (3736 kHz minus 3000 Hz).

You can resolve this SSB signal by carefully setting your receiver oscillator to 3736 kHz. You will hear the 300 to 3000 Hz range of the transmitted audio in the phones.

However, at times you may also hear an interfering signal. If there are two quite separate but adjacent SSB signals - shown as SSB1 and SSB2 in Fig. 7(d) - and you are listening to the lower frequency one, you will hear the higher frequency one as 'inverted speech'. The 3000 Hz component of that higher-frequency SSB signal will be heard by you as a low-pitch audio signal and its 300 Hz component as a high pitch! Fortunately this interference is almost indecipherable by the human ear. Your ear will tend to discard it as noise and will receive and listen to the 'natural-sounding' wanted signal. Of course this ear-discrimination characteristic also depends upon the relative levels of the two signals.

AM reception:

Listening to an amplitude modulated (AM) signal - Fig 7(b) - on this type of receiver, requires the oscillator to be tuned very carefully to carrier 'zero beat'. A slight shift from true zero beat will show a low-speed warble effect on the audio signal that you hear. Two-thirds or more of

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the radiated energy of an AM transmission is in the carrier (which carries no intelligence) and the rest of the energy is divided between the two sidebands. This shows up on reception during tuning, with a very loud squeal from the beat with the carrier until zero beat is reached and with much weaker audio from the sidebands.

You will soon learn how to 'tune in' a SSB and other signals. This receiver is very good for demodulating the CW and SSB signals which predominate on the 80m band. AM is not frequently used today but can be received.

The 'eighty metre band'

Band plans for all amateur radio bands and the operating privileges for each licence grade are given in the NZART Call book. General Licensees may operate in the '80 metre band' from 3.5 to 3.9 MHz.

The International Radio Regulations allocate the band 3.5 to 3.9 MHz to the Amateur, Fixed and Mobile Services in Region 3. Amateurs share these frequencies with 'commercial' stations. So expect to hear signals from stations of other services. Overseas stations playing Asian music can sometimes be heard.

Expect to hear CW signals from amateur stations anywhere in the band - they do appear throughout. Phone is found above 3.55 MHz.

This receiver can monitor AREC (Amateur Radio Emergency Communications) activities on 3.9 MHz.

Above the 80m band, the AM station ZLXA of the Radio Reading Service, at Levin, on 3.935 MHz, acts as useful calibration marker point. You will find the programmes interesting.

Below 3.5 MHz there are stations with Aeronautical Mobile functions but their transmissions are brief and infrequent.

The monthly NZART Official Broadcasts from ZL6A are on 3.9 MHz. Refer to the Callbook for the days and times, generally on the last Sunday in the month at 8 p.m. and again at 9 p.m.

The Australian (VK) amateur band is split into 3.5 to 3.7 MHz and 3.794 to 3.8 MHz. The VK Novice band is 3.525 to 3.625 MHz.

From time-to-time you may hear speech signals around 3.5 to 3.6 MHz which you cannot clearly resolve. Your neighbours may have a cordless telephone operating just above 1.75 MHz and you may be hearing the second harmonic! Tell them that others can hear everything they say - it may be enough reason for them to upgrade their unit to a more modern one and your interference problem may go away!

Performance - and can it be modified?

The receiver will receive all that 'communications' receivers receive. Overseas stations will be regularly copied.

Many tests and experiments are possible with this receiver. Part of the fun of amateur radio is redesigning and modifying! Keen experimenters will develop improvements!

An Audio Filter

A simple external audio filter suitable to use with this receiver is given in Reference 2 in the Reading List.

Learning the Morse code ...

A new monitoring dimension is opened up when you start listening to Morse code signals. The signals carry information in the internationally-used language, abbreviated English, so

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signals from foreign stations too are easily read. If English is your first language you are already on the way! The time soon comes when you suddenly realise that you too can understand these transmissions!

A knowledge of the code will enhance and enrich your listening pleasure. Find out who is communicating with who and what they are saying, a lot goes on which you can soon learn to monitor. A little time spent will bring rewards by extending your listening skills, widening your understanding of the radio traffic being passed and can lead to a General grade amateur licence.

A General grade amateur radio licence requires 5 words-per-minute competency, both sending and receiving. This is about 1 character in a little more that two seconds. A free computer program is available by download from the NZART webpage and is thoroughly recommended. Go to: http://www.nzart.org.nz Audio tapes can help you too.

The tuning range of this receiver includes regular evening 'Morse practice' nets which are fun to monitor.

73

73 is an expression used in Morse transmissions. It means 'best regards'. You will enjoy this receiver project - enjoy the thrill and satisfaction of listening to signals on a radio that you yourself have constructed. On the basis of the fun per dollar and the time spent, you are assured of a good return.

73 from your NZART friends.

Further reading ...

1. 'The ALIVO Receiver', Break-In September 1996 pp 4-12.

2. 'A Simple Audio Filter', Break-In May 1997 pp 12-13.

'Break-In' is the monthly official journal of NZART. You will receive it and the annual Call Book after you join.

Enquiries to: NZART, P.O. Box 40 525, Upper Hutt 6415 New Zealand.

Phone: +64 4 528 2170 Fax +64 4 528 2173.

Parts List for the ALIVO-ZL Receiver

Resistors (all 1/4 watt or smaller)

Value	**Number**
22 ohm	1
100 ohm	2
2.2 k	2
10 k	1
Potentiometer, 1k, panel mount	1

Fixed capacitors
(ceramic OK) low working-voltage

Value	Number
47 pF	1
100 pF	1
220 pF	1
270 pF	1
470 pF	3
0.047 uF	3
0.1 uF	2

Electrolytic capacitors, 10 volt working or more

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Other Construction Pieces

Value	Number
10 uF	1
100 uF	3

Wire for coils 0.4mm (26 SWG enamelled) about 2m

Solder, cored, a short length, as required

Small pin nails & rubber band (if required)

Hook-up wire, tinned-copper wire etc., scraps, as required

NZART Headquarters can guide you if your local supplier is out-of-stock.

The above receiver construction information is extracted from the booklet "Secret Listening" published by

The New Zealand Association of Radio Transmitters Incorporated (NZART), P.O. Box 40 525, Upper Hutt, New Zealand, Phone +64 4 528 2170 Fax: +64 4 528 2173

A copy of the complete booklet can be obtained, postage-paid, by sending $3.00 to that address.

Please note the original article is on the web at:-
http://www.nzart.org.nz/nzart/ar_info/alivo/alivo-a.html

Value or Description	Number
Variable capacitors, miniature, double-section, 60-160pF with thumbwheels	3
Integrated circuit NE602 (or NE612)	1
Integrated circuit LM386	1
Coil formers 7 mm dia with 9mm square base	2
Slugs 6 mm diameter by 16 mm long	1
Battery-holder for 4 AA cells	1
Clip lead for battery-holder	2
Phone jack, 3.5 mm panel mount, stereo	2
Knob, small, for potentiometer	1
Terminal red (for antenna)	1
Terminal black (for earth)	1
Switch, miniature toggle, on/off	1
Circuit board, blank, 75 mm by 50 mm	1
Baseboard, wood, 195 mm by 100 mm	1
Panel, 1.2mm aluminium, 195 mm by 90 mm	1
Panel, 1.2mm aluminium, 50 mm by 35 mm	1
Bolts to mount tuning capacitors, M2.5 x 6 mm	6
Screws, self-tapping, 4g x 10mm	12
Paper clips (glides)	2

The West Rand Amateur Radio Club
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Roodepoort
1725

Phone: 082 573 3359 (Chairman)
Email: **zs6wr@gmail.com**

Bulletins (Sundays at …)
11h15 Start of call in of stations
11h30 Main bulletin start

Frequencies
439.000MHz 7.6MHz split
Input: 431.4MHz (West Rand Repeater)
145,625 MHz (West Rand Repeater)
10,135 MHz (HF Relay)

Radio Amateurs do it with more frequency!

Chairman	Stuart Baynes	ZS6OUN	082 573 3359	sbaynes@iafrica.com
Vice Chairman	Ron Eva	ZR6RON		ronnie@calidus.co.za
Secretary (Anode)	John Brock	'PieRat'	011 768 1626	brockjk@gmail.com
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SARL liaison	Willem	ZS6WWJ		marie.w@absamail.co.za

West Rand members - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

Please send plain text with no formatting to the email address below.

In July 2003, we re-published an Anode Compendium on CD. It has the issues from July 2000 until June 2005. This included the new Adobe reader. It has been updated, check with the chairman for details.

We need your input! Email us articles, comments and suggestions please.
zs6wr@gmail.com