



Repeaters: VK3RGV 2m - 70cm - Packet.
Freq: 146.650 - 439.775 - Packet 147.575

Founded 1979

Incorporation No. A6677
P.O Box 692 Shepparton 3632

REPEATERS VK3RGV 2m & 70cm

VK3RGV B D-Star

2m IRLP Node # 6992

CLUB CALL SIGN VK3SOL

Repeater Frequencies: 6 meters: (53.725Mhz Out, 52.725 In. 123Hz tone)

2 meters (146.650Mhz Out, 146.050Mhz In 123Hz tone)

70cm (439.775Mhz Out, 434.775Mhz In 123Hz tone)

D-Star (438.200Mhz Out, 432.800Mhz In 123Hz tone)

President:- Peter Rentsch

Vice President:- Phil Dwyer

Secretary:- Darren Glasson

Treasurer:- Greg Keegan

VK3FPSR

VK3ELV

VK3HEN

VK3POP

Presidents Report July 2013.

To all those that attended our last meeting a very special thank you for making the effort. It was a small attendance to listen to our guest speaker Kevin VK3CKC. Kevin and his wife Monica VK3FMON travelled from Axedale to be with us for the day and I thank them for making the effort to attend and provide us with some information on going "trike mobile" and the purpose behind the whole exercise. Thanks Kevin and Monica.

Please don't forget our Hamfest is coming up in September so please keep Sunday 8th September free to help out. This is our major fundraiser for the year so a concerted effort by all members to make it as successful as possible would be greatly appreciated. The money we raise at the Hamfest goes towards the improvement and upkeep of our equipment that we all use. As an example, this year due to a lightning strike we lost the main powers supply at Mt Wombat. To replace this power supply would have cost in the range of \$2000.00. We were very lucky this year in that we were able to get it repaired for next to nothing. Perhaps next time we won't be so lucky and we will have to find a large sum of money. Without the income from the Hamfest we would not be able to afford this. So put your thinking caps on, come up with some new ideas, let us know what you would like to see and then help bring them to fruition.

After our last meeting I had a discussion with a couple of people about our low attendance at meetings. An idea was bounced around that we perhaps should consider changing out meeting time. We don't seem to attract the younger Amateur Radio operators from the area. There are a lot of operators who have younger families and it was suggested that Saturday afternoons was often time when they did something with the family. Go shopping, sport commitments or simply spending time with the family. It was suggested that we move to an evening meeting but if we do this then we have an issue with older members who do not like to go out at night or those that have to travel a distance

getting home quiet late. It was suggested that perhaps we alternate, one month our normal Saturday meeting the next month an evening meeting.

I throw this idea into the ring for discussion and your feedback and for those that do not attend meetings or can't currently attend and wish to contribute to the discussion I am very happy to hear from you via email or phone. My email address is pages.cobram@bigpond.com or phone BH - 5871 1000.

Whilst you are in the mood to think about the Club and its direction I have been giving some thought to a Club name change. I believe there are a lot of people that have an interest in electronics and computers. There is definitely a cross pollination between the three disciplines of computers, amateur radio and electronics. If we were to change our name to say hypothetically the Shepparton Amateur Radio, Electronics and Computer Club would this be a good move? Would it work? Would it attract more members? Are we diluting what we are on about? Some food for thought and discussion.

The above two discussion points are primarily designed to increase our attendance at our meetings. If you have any other ideas about how we can get more people involved to enjoy, learn and learn from then please let me know.

Don't forget that subs were due on the 1st July and a membership form is supplied with this newsletter.

At our next meeting we will not have a guest speaker. If you have any ideas for guest speakers please let me know. I am happy to contact them. In place of a guest speaker I would like to have a Show n Tell. So, please bring along the latest project you have been working on and show the Club members what you have been up to.

At our September meeting we allocate our time to discussing the Hamfest and the final arrangements for it. Our October meeting will be our Annual General Meeting so please consider taking on a role within the Club to help keep it operating. Without willing volunteers to carry out the jobs in the Club we would not have a Club.

So, please come along and support your Club at the next meeting, and bring your latest project for others to see.

That's it for this month and I look forward to seeing as many of you as possible at the next meeting.

Peter – VK3FPSR
President – SADARC

Minutes of SADARC

Saturday JULY 6th,

Meeting opened 13.05

Present,

vk3hen,vk3fpsr,vk3pxj,vk3dsf,vk3ov,vk3cop,vk3dp,vk3tex,vk3xnw,vk3chv,vk3fbng,vk3ckc,
vk3fmon.

Apologies, vk3faln,vk3fjhm,vk3bph,vk3vce,vk3ao,vk3geb,vk3alf,vk3apj,vk3caf,vk3ug.

Previous minutes moved as correct

moved vk3cop/2ndvk3dp

Business arising from previous minutes

Wia Insurance does not cover equipment on Mt Wombat and it was decided to wait until after Hamfest to assess finances to get insurance for lightning, fire, theft

SADARC to share space with Vintage club at Cobram show (11th Aug) .Good chance to promote our hobby to the public. Some interest shown and will get numbers of members willing to help at next meeting.

JOTA Mooroonpa scouts are wanting to go ahead with the jamboree .Still waiting to hear back from other scout groups.

Lack of response from the RSL about booking in so will look into other venues.

Dstar repeater has been repaired but will be reinstalled at a later date.Greg proposed that he could cover internet costs for Dstar.

Vk3pxj will send out emails to exhibitors about the hamfest and Greg will get info to the AR mag.

Inward Mail, QSL Cards.

General Business,

Squid Poles have arrived please pay asap as will be sold at hamfest if not paid for.

Does any body have any articles they would like to put in the news letter.

Murray Quad will be on the last weekend in feb 2014 need to send a letter of commitment.

Subs are due.

May look into having a get together for a meal the night before the hamfest for members and visitors, venue to be decided.

Motion was raised to sell the PA system due to little use.

Meeting closed 14.15

TECHNICAL COMMITTEE REPORT – August 2013

70cm D-Star Repeater

The repeater is not operational at this stage (15/7/2013). It has been out of service for around nine months, and in that time it has been serviced by Icom and brought back from Melbourne and it will be reinstalled by Toby VK3PNF and Greg VK3POP in the near future – it may even be operating by the time that you read this. Greg VK3POP researched possible economic internet connections for this repeater and came upon a 30 day account at \$36 per month. Greg is generously going to pay \$20 a month for this connection and the club has agreed to pay the other \$16 to have the internet connected to the D-Star repeater. D-Star cost the club just under \$3000 to purchase and install, and will have continuing internet cost at this stage. Amateur radio is about experimenting with new and different technologies. **So fellas if you have D-Star facilities or are thinking about it, please use this repeater so that the clubs monetary contribution to the use of digital is not wasted. It is up to you.**

70cm, 2 metre and 6 metre Analogue Repeaters

All analog repeaters are working well. How are users of the 70cm repeater finding the performance since the installation of the higher gain antenna? The new six metre antenna will be installed later in the year when the weather improves. Planning by Phil VK3ELV and Ian VK3CHV is progressing to determine the best compromise locations for all the antennas off the side of the lattice mast both for ease of mounting and optimum location for the best radiation patterns from the antennas. It appears that the placement of antennas over the years may not have been optimum. Note -- echo link and IRLP are available through the two metre repeater.

Miscellaneous

The cold standby power supply for Mt Wombat is at the testing stage with the fail safe features being tested.

Recently Phil VK3ELV was authorised to obtain two Digital Signal Processor (DSP) modules if he deems the asking price for them is reasonable. These would be used on the two metre and 70cm repeaters in the same way as DSP is used on the six metre repeater.

The antenna systems at the meeting hall are to be checked. Greg VK3POP has been able to organise a cherry picker for a very attractive fee and this work will take place at a mutually convenient time and your assistance may be required to assist. **Don't wait to be asked – volunteer.**

Other work to be done.

The list that has appeared for some months on the outstanding work on Mt Wombat can be seen in previous Technical Committee reports. This will be revised shortly.

Rodney Champness VK3UG on behalf of the technical committee, Ray VK3RW, Phil VK3ELV and Geoff VK3ZNA.

For Sale at a very reasonable price (make an offer):-

One Dimtronics DBC48/20/T 48 volt 20 amp battery charger. Manufactured around 1984.

This is quite a sophisticated device designed for unattended operation in the likes of Telephone Exchanges. The transformer could be rewound to suit the charging of 12 volt batteries. It weighs 50 kgs. It comes complete with the instruction/service manual.

If you are interested Rodney VK3UG has been asked to dispose of the unit for a friend. Rodney's phone number is 5825 1354.

Part 1: FT-857 Backpack

As this is a somewhat lengthy article, it will appear in at least two parts. Any images presented here are those of the prototype and may undergo some changes.



My recent wrist injury provided plenty of months to think of things I could be doing if it hadn't happened. One of these things requires pedestrian mobile transceiving capability. This project describes one way of using a Yaesu FT-857D in this role. Sure, maybe the '857 is not the best candidate for such activities but it is all-mode, all-band from HF through to 70cm. I can't change any of its features, operation or other less-than-optimum attributes but it is small and using it, I don't have to buy yet another radio. Its output power can be wound back as required. It is just a menu setting.

There are basically three areas of concern:

Portability – As the radio will have to be carried, a backpack would be pressed into service with the removable radio front or control head positioned for best access.

Battery power - There are a number of SLA and Gell cell batteries available. Transmitter power would be reduced to, say, 20W to minimize battery mass and, with the dial light turned off a number of hours operation should be possible. Anyway, compromises have to be made.

Antenna/s - Clearly, HF presents the biggest challenge. A vertical whip is actually one half of a dipole. How is the required counterpoise or groundplane for the other half of the antenna provided? The thought of dragging a length of wire behind did not sit well as it would be subject to catching on something or even being stood on by someone else and pulled out. Should there be a number of antennas or would it be possible to multi-band?

The FT-857D has two antenna sockets – one for HF and 6m, the other for VHF and UHF. So, at a minimum, two antennas would be required. A multi-band, groundplane-independent, Diamond SG-7200 antenna from the car will be used for VHF/UHF. That's two bands already satisfied.

A Magnetic loop antenna does not require a groundplane and this is the type of antenna that will be tried for HF and there are many design sources available on the Internet. They can be made very efficient but one must be aware that they have very high voltages on the tuning capacitor – even at low power levels. Air insulation is approximately 3000V/mm so capacitor plate spacing needs to be watched. Practical size limitations may not permit operation on 40m and below and 6m might also be out of the question – at least initially. Maybe a 6m and up version may be made in the future to cover VHF/UHF Field Days.

A number of hours were spent trawling through a vast amount of information on Magnetic Loop antennas – including the downloadable spreadsheet from AA5TB.

A few notes on power supply and consumption:

Unlike SSB, an FM transmission uses the maximum supply current the whole time the PTT is pressed – whether you are talking or not. The current during SSB only approaches this current level during voice peaks and then is only required for a very short time. The average current is far less. Therefore, SSB transmissions are far more economical. Also, the rated supply voltage of many radios is 13.8V +/- 15%. This is a range of 11.73V to 15.87V. RF power output due to this variation may not remain the same.

My '857, set for maximum power output of 20W (FM) and tuned to 40m, was connected to a 40A DC supply and a dummy load for checking current consumption versus FM power output over the supply range of 14.8V down to 10.4V. The radio's internal meter was used to indicate output power. The relative indication at 14.8V and 20W was noted. The output indication did not change over the whole test. However, supply current did – possibly more to do with the various internal modules rather than the PA. The display current requirement for example, and who knows what else, may vary considerably over the supply voltage range.



The transmit current at 14.8V was 6.8A. It dropped to 6.7A at 13.8V, 6.6A at 13.2V, 6.5A at 12.6V and 6.4A at 10.4V. I decided not to go any lower. This range sort of indicates that the minimum operating voltage may actually be less than 11.7V - very helpful from a battery operation point of view.

A fully charged 12V SLA battery might rest at, say, 12.4V – off-charge. This is only 0.7V above the minimum specified supply voltage and is when no current is

being drawn. It will drop as soon as some significant current is pulled from it. Not much headroom there. Although the above output power test does not indicate the need for it, is it possible to increase the headroom? What is the difference between two batteries in parallel? What about two batteries in series with some sort of voltage regulation or even a switchmode DC/DC converter to boost the voltage a little? Efficiency would suggest the converter and this will have to wait until a later date. Until I prove the need, I won't worry about it. In any case, there is a finite limit to how far an SLA battery can be discharged before being irreversibly damaged. Check your datasheet for details.

The data sheet for the Diemic 12V, 9AH (Jaycar SB-2487) battery shows that at full charge, with a current drain of 9A, the available supply voltage will be approximately 12.2V and will have dropped to 11.7V after 12 minutes. Not a great deal of range. The discharged voltage is shown as 10.5V or 9.6V – depending on the discharge rate. The preceding figures do not

indicate a long transmission time. It would be more than twice as long (18AH) with two paralleled batteries. The initial terminal voltage would be more and discharge time would be longer as each battery only has to supply half the required current at any time.

Loop Antenna Considerations

A considerable amount of time was spent in deciding the size of the loop antenna. Critical aspects are the high voltages on the tuning capacitor, the diameter of the tube used and the diameter of the loop itself. Variable tuning will provide frequency flexibility as such antennas a very narrow band.

The calculation spreadsheet download from AA5TB's web site provided data on a range of inter-related design considerations. I decided on a 0.9m (actually turned out to be 0.911 after later measuring) diameter loop for practical reasons. I would have preferred a diameter of 1.2m but that would have been a little unwieldy. Those compromises appeared again.

Calculated values from the spreadsheet with 20W power and 0.9m diameter loop:

Freq.	Bandwidth	Efficiency	Q	Cap Value	Capacitor Volts	Plate space
3.655MHz	4.64kHz	0.794%	787.692	776.401pF	939.976Vrms	0.318mm
7.100MHz	9.940MHz	7.556%	1023.014	205.752pF	1493.016Vrms	0.506mm
14.25MHz	17.559kHz	48.352%	809.722	51.078pF	1881.785Vrms	0.637mm
21.25MHz	53.179kHz	79.128%	399.595	22.969pF	1614.299Vrms	0.547mm
28.5MHz	149.003kHz	91.373%	191.272	12.769pF	1293.429Vrms	0.438mm
50.500MHz	1359.252kHz	98.741%	37.153	4.067pF	758.815Vrms	0.257mm

As a comparison, 20W power and 1.2m diameter:

Freq.	Bandwidth	Efficiency	Q	Cap Value	Capacitor Volts	Plate space
3.655MHz	4.399kHz	1.861%	830.866	546.104pF	1151.090Vrms	0.390mm
7.100MHz	7.183kHz	16.230%	988.472	144.722pF	1749.893	0.593mm
14.25MHz	27.441kHz	68.935%	519.303	35.927pF	1796.875Vrms	0.609mm
21.25MHz	103.953kHz	89.986%	204.420	16.156pF	1376.706Vrms	0.466mm
28.5MHz	314.716kHz	96.169%	90.558	8.982pF	1061.172Vrms	0.359mm
50.500MHz	2999.657kHz	99.465%	16.835	2.861pF	609.054Vrms	0.206mm

The above figures show that operation below 40m might be just possible and 20m should be alright. It is usually suggested that a separate antenna be used below 20m. Operation will probably also be out on 6m as stray capacitances might be more than the value required. Distributed capacitance may be more than the tuning capacitor minimum and this will dictate the highest frequency. The tuning capacitor would have to provide 51pF and have a minimum plate spacing of 0.637mm. Ingenuity might be required here. It will also have to be remotely controlled while walking to peak it on the various bands as required.



Construction will be approached in a number of stages – Carrying Case, VHF/UHF antenna, HF Antenna, tuning control and Battery Charger.

Carrying Case

A suitable carry box was initially designed to hold all items and provide antenna mounting. Once the required

size was determined it became obvious that an aluminium case scrounged from a bargain, discarded, JAYCAR repair item from a radiofest would do the job – and save a lot of construction time. It should fit in a backpack and not be seen.

A 3m length of 12.7mm copper tube was purchased at Home Hardware, Bendigo at around \$30.00. The store did not have anything approaching the 5/8" diameter as suggested as copper tube is being phased out in preference for a new, plastic tube. Compromises again.

In order to get under way with other requirements, I also purchased a "High Sierra" brand backpack from Strand Bags in Lansell Plaza for \$99.00. This is somewhat fancier than intended but it has a large number of pockets and appears to be well organized and can also be used for other purposes – like backpacking? Plenty of space for refreshments and other things. The aluminium case that will hold the radio, batteries and locate the two antennas, fits in nicely.

A compartment for holding the two batteries was constructed. This compartment consists of a separation plate that is also used to stiffen the light duty case and to provide rigid mounting for the VHF/UHF antenna pole. As designed, it holds two 12V/9AH SLA batteries. A short operating trip could see the removal of one battery with a reduction in operating time. After all, one has to carry whatever is in the case and backpack at any time.

The top half of the carrying case was used for housing the main body of the radio. The front controls are removed from the radio body which is then sandwiched between some foam packing to hold it firmly in place – laterally. It cannot move vertically due to the separation plate for the battery compartment. Room is left down the side to locate the support pole for the HF antenna later.

VHF/UHF Antenna:



The aluminium tubing support pole for the VHF/UHF antenna is deliberately made over-length until the project is tested. It will be used to mount my usually mobile antenna – the ground-independent Diamond SG-7200 - via a bracket at

the top end of the pole. I really don't need it any higher than necessary. Coax was initially fed down the inside of the pole and out an opening at the bottom to permit complete removal if required. The pole is screwed to a small brass mounting block on the battery compartment separation plate for support. Consideration will be given to fitting a socket to the top of the case to take the antenna coax. This will facilitate connection to another, external antenna if circumstances require it.

Radio Controls:

The radio controls are connected to the backpack via an extension cable so that they can be readily seen and operated while walking – initially just dangled over my shoulder. An extension speaker is also provided. The panel dial light is turned off to conserve approximately 50mA of continual battery drain.

At this point there is a bit of weight in the project. Exercise might end up playing a greater part than at first thought.

The First Test:

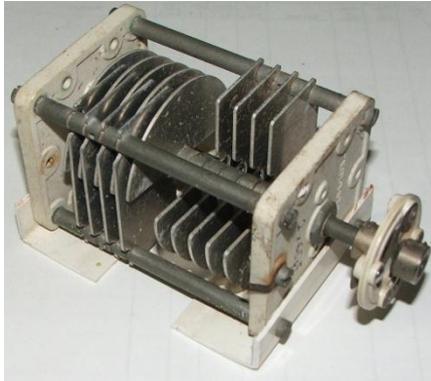
An earlier test had been conducted with a bare bones handheld at 5W near the Axedale Cemetery. At this time, both VK3RCV and Police frequencies were “iffy” on reception and input to RCV was quite noisy during walking.

On the first backpack test with the VHF/UHF antenna connected, one battery and using repeater VK3RMM as a signal source at home, the received signal registered full scale whereas it was only about 1/3 scale on the handheld. At this point it was decided to take the project out on a short test walk. The result was like chalk and cheese when compared with the bare handheld on the same power output – even while actually walking. However, the old battery was not up to it for long but viability for backpack VHF/UHF was soundly proved.

That's all for this part. The next part should cover the finished project – including its first field test.

Part 2: FT-857 Backpack

This part continues on from, and should be read in conjunction with, Part 1 in the last issue.



HF Antenna:

The HF antenna is to be mounted at the top of a PVC tube support.

The small roll of 12.7mm copper tube was opened out by carefully placing it around a small corrugated iron tank of about 1m diameter. It was then cut to length to allow for a diameter of approximately 900mm. The finished loop turned out to be 911mm at a later measurement. A

capacitor that I had made before moving to Axedale was resurrected for tuning testing purposes. The connection to the rotor is not really suitable for this purpose but it will do for testing.

Being the impatient type, I quickly lashed the components together and added a rough



RG58 coaxial coupling loop to do a quick “suck it and see” test. A VNA SWR scan showed that the lowest frequency was 7.2MHz with a VSWR of 2:1. No adjustment of the coupling loop was made at this point.

I purchased a small, 3V electric motor and gearbox (Jaycar YG2730) for tuning capacitor drive. It runs at 12000 rpm – more than a little fast. Despite being geared down 6 times to 0.742 rpm, it still proved too fast. Another motor and gearbox kit was purchased and, with only one more reduction gear attached, the additional 4:1 ratio looked sufficient but I will investigate Pulse Width Modulation (PWM) drive before a final decision.

It was at this stage that I purchased a used, physically smaller butterfly capacitor with a capacitance value around 64pF per section. As expected, it proved to be inadequate for tuning down to 20 metres. However, a butterfly capacitor’s sections can be used in series and this removes any wiper resistance. The tradeoffs are double the voltage rating but half the overall capacitance. Anyway, it will do for initial testing if nothing more.



The tuning range was basically as expected - a few MHz too high for 20m and a few MHz too low for 6m. A retry in parallel provided a range from too low at 9.1MHz to not high enough at 19.8MHz. After much fiddling with various padding values – and much editing of this text – I eventually arrived at the conclusion that I was not going to be able to cover 20m through to 10m with the butterfly capacitor alone.

Any additional parallel capacitance was also limiting tuning to 10m. Should I look for another capacitor or persevere with what I have?

A 500pF capacitor enabled the loop to be tuned all the way down to 4.5MHz. We don't have an amateur allocation between here and 40m and, even if there was, the loop would be far too inefficient to contemplate. Even so, 50% of the capacitor's rotation was used up in tuning up to 40m and, from memory, it didn't go anywhere near 20MHz. I eventually decided that I might try and cover 40m after all – if at all possible. Therefore, I would use the butterfly capacitor for the variable tuning role and parallel pad it with a plug-in capacitor set to the required value to enable tuning on the 40m and 20m bands. It would be nice to be able to hop from one band to another but I will have to put up with swapping capacitors for the two lower bands.



Various measurements and experiments showed that the required additional capacitance for 40m was around 186pF while 20m required around 25pF. That should be pretty straight forward to provide with air-spaced trimmer capacitors. Tuning of these lower bands should now also require more shaft rotation which will make tuning much easier. No padders at all will allow operation from 17m through to 10m. Some sort of plug-in arrangement would be required but it should work. Efficiency will have to be what it will be – those compromises again.

A quick lash-up provided the following bandsread after roughly pre-setting the padders to limit the lower frequency:

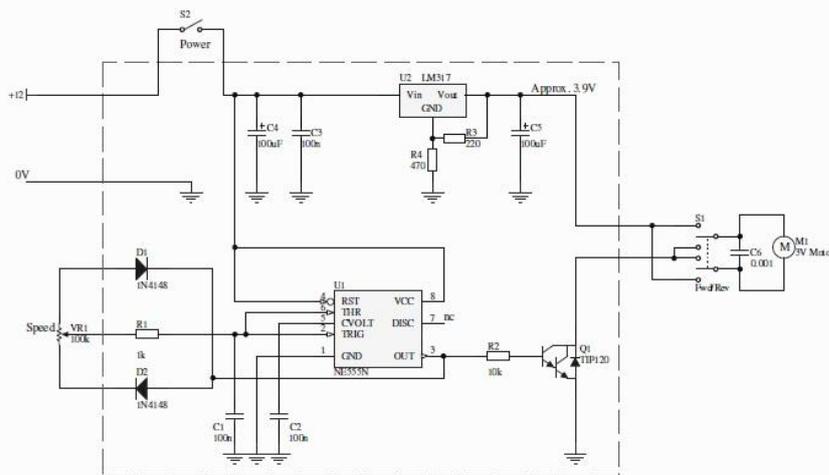
Band 1 - 40m Band: 6.927MHz @ 2.52:1 to 7.325MHz @ 2.49:1 - two padder caps in parallel with main butterfly tuning cap.

Band 2 - 20m Band: 14.01MHz @ 3.36:1 to 18.75MHz @ 2.73:1 - one padder cap in parallel with main butterfly tuning cap

Band 3 - 15-10m Band: 17.56MHz @ 2.95:1 to 31.44MHz @ 2.06:1 - only main butterfly tuning cap.

No adjustment/fiddling/modification with the matching loop yet, just enough to get the VNA working on it. At the moment it consists of a single loop across the coax, roughly positioned. As I have used trimmer capacitors as padders, the lower limits on 40m and 20m are adjustable until finalised. Physical tuning of the two lowest bands is very easy. Now to making more permanent and durable plug-ins.

Although it was educational with all the hands-on experimentation, I could have just consulted the calculation spreadsheet as all calculations proved to be within a few pF of



what I eventually discovered the long way. However, one learns more by actually doing something.

Weight considerations require that the HF antenna support be as light as I could make it. I used a length of 15mm PVC tubing. As expected, it proved a

little too flexible and I had to come up with a method of stiffening it. This was provided by temporarily shoving a few lengths of fiberglass rod up the centre. At this point the main antenna loop was completely disassembled in order to start the final build and mounting in the aluminium case.

Tuning Motor Drive

A simple, PWM circuit borrowed from the web site of Alexandre Grimberg, PY1 AHD, - from <http://www.alexloop.com/> - was put together on a development board to try it for the



tuning capacitor motor drive. I then modified it to suit my particular requirements. As my motor runs from only 3V, I added an LM317 voltage regulator set for a voltage of about 3.9V to limit the voltage applied to the motor. A double-pole double-throw centre off switch for forward/reverse, a purpose-designed circuit board and I was in business.

A little more thought and development time could see the controller modified for automatic operation. This project isn't even finished and a new one is being suggested. May be a job for the future.

Coupling Loop

There are a number of designs that can be used for the coupling loop. I initially elected to use a Faraday loop made from RG214 coax as it would be mechanically quite rigid. However, I changed this to just a simple loop of RG214, using the outer shield only, across the coax as it was nice and easy. The loop size is approximately 20% of the main antenna loop or around 182mm diameter in this case.

A number of different attachment methods were used and what I finally came up with enabled the driving loop to be slid up and down the main supporting pole seeking a reasonable match across all bands. The driving loop is connected to the transceiver via a coaxial fly lead and a coax connector on the top of the case.



The antenna was reassembled with the motor drive and coupling loop. It was then lashed to a step ladder and the VNA was used to see how it all worked. The VNA was set on continuous sweep as I roamed up and down the frequency ranges from the comfort of the computer desk. After some

adjustments of the distance between the coupling loop and the main loop, I was rewarded with SWR measurements from the desired operating regions of 40m through to 10m of from 1.1:1 through to 1.5:1. Not much sense in trying to improve on that.

Transceiver Control



What is required here is a means of providing adequate radio control along with an extension speaker and antenna tuning controls. The '857, like many radios these days, has a removable front control panel. All that is required is to provide some means of positioning it for easy access and viewing. The first test will have to be with the front panel hand held.

Once everything was all interconnected, I "saddled up" and took it for a brief test after checking what bands had activity. Signals on 15m didn't last long but I was able to peak up a Japanese station before signals disappeared. I then changed to 40m where things were only



a little better. There was a storm brewing and electrical noise was high. Tuning the antenna for minimum VSWR was quite easy although the control circuitry contributed some noise that was obvious but didn't register on the meter. The circuit itself ran all the time as I had overlooked providing a switch to turn it off when not actually required. I will spend some time suppressing this before the final circuit board design. The support pole for the antenna was too flexible and was replaced

with a short length of aluminium tubing. The PVC section was slipped inside and secured.

A standard Yaesu radio separation kit provides a panel mounting bracket and cable extensions – albeit at a price. Having been there before, I cut a section from a length of rectangular PVC downpipe – used for many things over the years - and while considering exactly how I would mount things, hit upon the idea of trying to “mould” a mounting bracket from another section of PVC using a hot air blower. New technology here. Having carefully, but not carefully enough, measured various aspects of the bracket, I had to



discard it due to a 5mm mistake with a measurement applied in the wrong direction. The second one suffered from either too much heat or not enough hands but it at least made it into the prototype. It works better than it looks but most of it is covered up in use. It works almost as good as a bought one. I'll still have to come up with some sort of clip to stop it falling out but it is quite secure as is.

The bracket was then fitted to a panel made from the first section of PVC along with the speaker, motor speed control pot, forward/reverse switch and controller power switch. I elected to move the circuit board from the aluminium case to the underside of the panel which then enabled a standard RS232 cable with DB9 connector to provide all connections – 6 wires for the radio control, 2 power wires for the controller and 2 wires to return from the forward/reverse switch to the capacitor drive motor. Just enough wires available (10 in all) using the shield for the negative DC connection.

At this point everything is ready for the second test. All is essentially working as it should - including 40m with whatever efficiency level it affords. The final connections to the two batteries still need to be finalized but that can wait. A brief test from the back yard on 15m didn't result in any response. A later 40m test around 5.30pm local with Mike, VK3AHA in Kangaroo Flat, resulted in a one-way contact only due to Mike's local noise level. I received him S4 but that was with the preamp on and it is also the magloop's most inefficient band. However, I had a comfortable two-way contact with Peter, VK3NEO, in Griffith without any difficulty with a 5x7+ signal report.

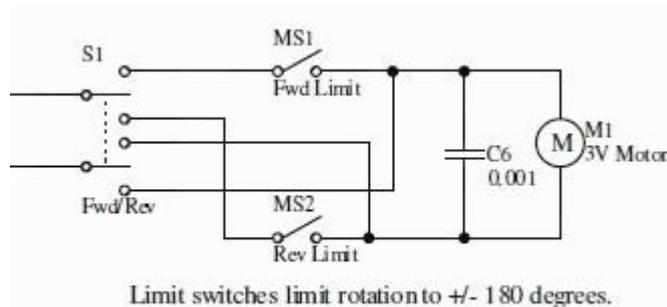
Battery charging is described as a separate project elsewhere.

Summary

There are a couple of concerns left over from this project. They are not deal breakers though and the following comments are offered in case you wish to explore a similar setup for yourself. The main one is the overall weight at around 13.5kg. This is both more than expected and more than what I would really like. Main contributors are the radio itself (2.1kg), the batteries (2 x 2.55kg) and the loop antenna. Refreshments add more weight and need to be accessible during operation. The other is the cantilever affect caused by the loop antenna mounted on its support pole and the rather heavy tuning capacitor at the top. The

pole is about as short as it can be. This just makes things a little awkward but is manageable – like the other concerns. Walking through doorways, near or under obstacles, bending over, climbing fences, etc., are all out.

As the radio is designed for 100W and has a diecast integral heatsink, a purpose-built QRP radio would be expected to be lighter – but not a great deal. A 50% saving is only 1.05kg. It is possible to remove one battery from the case, resulting in half the operation time if that is acceptable. The benefit is a weight saving of only 2.55kg. The overall benefit would depend on how long it would have been carried.



Limit switches limit rotation to +/- 180 degrees.

The antenna itself is another matter. A smaller (lighter) loop would be far less efficient and compromise the whole operation. If it was possible to use lighter materials it would be too flimsy. A vacuum capacitor would have contributed less weight but they are expensive. Some means of detecting when the tuning capacitor is at

minimum or maximum would also be nice as everything is completely out of sight during operation.

I decided to try and limit the rotation of the tuning capacitor before declaring the project finished. Twenty minutes and a cup of tea and a suitable approach had been developed. Two microswitches to switch the drive motor power off when the limit is reached, turn the forward/reverse control switch around and add two wires to the motor control. A microswitch is inserted in series with both main motor wires. At any time a wire is used as the negative supply, its microswitch is bypassed. To put it another way, the wire carrying the positive supply is opened whenever the tuning capacitor reaches its direction limit. Throwing the forward/reverse switch still allows rotation in the opposite direction until its limit is reached. A neat solution without requiring too much modification.

It is possible that the two additional wires could be removed and suitable diodes placed across the microswitches so that they conduct around the microswitch in the negative DC supply side. Parallel bypass capacitors may be required to prevent random conduction in the presence of the antenna RF when transmitting. I won't be changing mine back again in order to find out.

Having made that last statement I discovered on the day of our February Home Brew meeting that I didn't have enough connector pins to connect up those two additional wires so I had to remove them and try the diode approach. It works but has not been tried in a transmitting situation.

You can make your own butterfly capacitors by following the instructions available at: <http://www.alexloop.com/artigo21.html>. I might even try this myself one day to see if I can get wider tuning range without using the plug-in additional parallel capacitors.

Kevin Crockett – VK3CKC

Ham Radio Paradise – Friedrichshafen 2013

Article by Phil, VK3ELV.

If Ham Radio has been one of your major hobbies then a visit to Friedrichshafen in late June should be on your bucket list. I don't think I could write anything that could do this Ham Radio get together justice. 15,300 Hams from all over the world were there this year. It may not be quite as big as Dayton in the USA, but I believe the variety of equipment and people there is greater. I have never been in a place that was absolutely crowded with happy friendly people. And to think we were all from different cultures, religions, countries, continents, and spoke different languages, all with the common bond of Amateur Radio. "Ham Radio" at the Messe in Friedrichshafen uses three main halls. The larger one had all new commercial equipment while the other two slightly smaller ones had the flea markets. There are conference rooms, restaurants and bars also in the complex. There are large car parking areas and a camping area with powered sites available. A free Ham Radio bus runs every 30 minutes from the Messe to the CBD in Friedrichshafen.

The first few hours were very exciting, but after a while it became overwhelming. There was too much to get around and absorb in one day, just as well it runs over three. Just about anything you could think of was there, from Cat's Whiskers to Software Defined Radio, from Longwave to Lasers, from second hand cheap components to \$15,000 radios. I have never seen so many "hard to get" components and mostly at good prices. Toroids of every type, reels of chip components of every type and value, RF power transistors and fets, high voltage RF capacitors and valves. The list goes on and on.

I could not stop looking at the microwave equipment and components available and had to keep reminding myself that I live in a valley and it would be no use at home. Many kits were available and also small QRP rigs built by smaller manufactures. Hand keys, keyers and new digital modes were on display. Amplifiers ranged from 5 watts to 4 KW, from 160m to 24Ghz, from older valve HF types to solid state kilowatts at microwaves. I did not take many pictures because I was too busy looking.

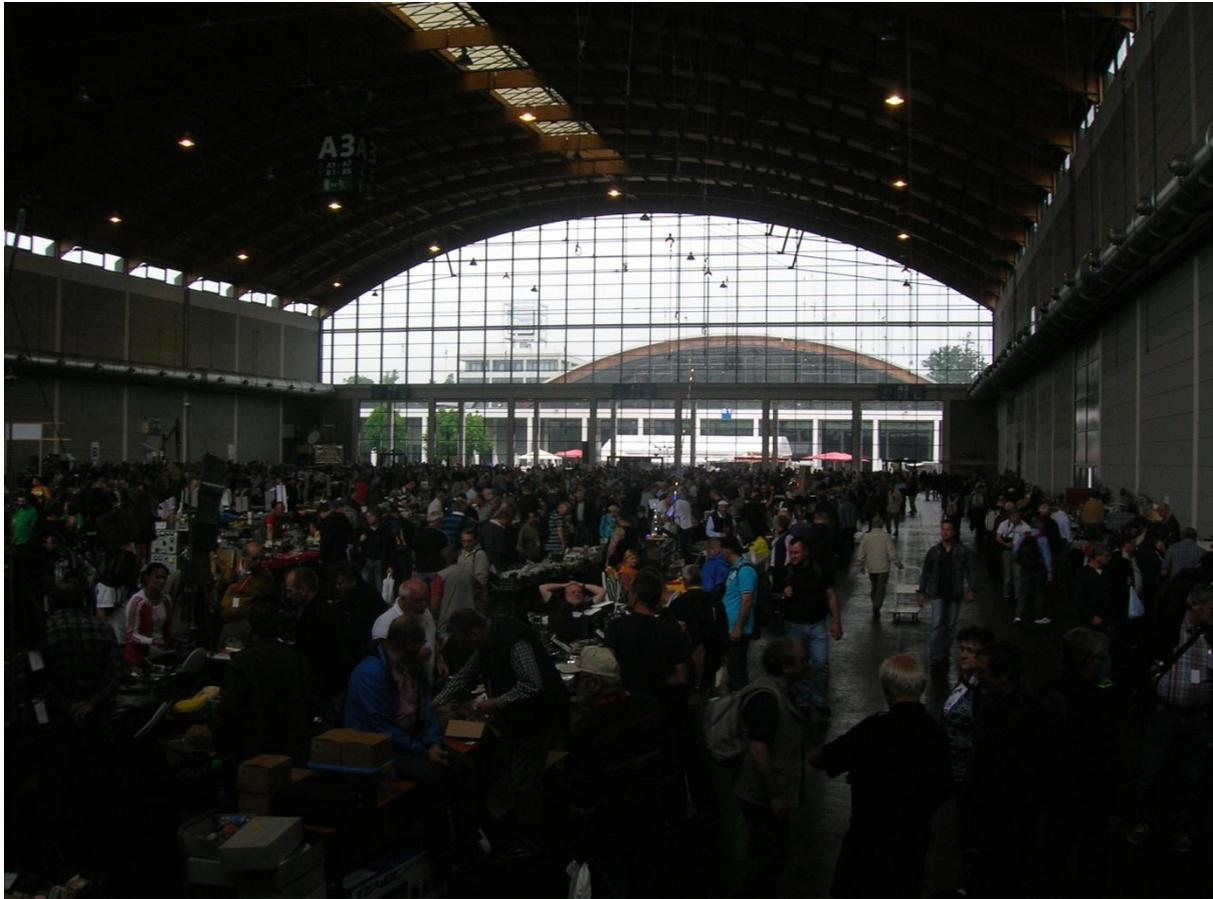
While the RSGB and ARRL were there with most of their publications I was just amazed at the number of books, the detail of information, and the range of radio related subjects, published in German available. If only my German was little better.

A section of the main hall had Kids with their Dads and/or Mums building electronic projects and toys. There was something for everyone.

There were many stalls with different countries national representative groups. As far as I know the only Aussies with a stand were the guys from WinRadio. I had to say hello to a group of guys from Ireland. Their stand was combining amateur radio with hot air ballooning (EI2AIR). The fellows there told me that theirs was not a normal stand and counter, it was really an undercover bar, as they produced a couple of shot glasses and a bottle of Irish whiskey that went down nicely. I guess you get the idea, I had a good time.

The location of Friedrichshafen, on the shore of Lake Constance, in Southern Germany, must be one of the most beautiful spots in Europe. Lake Constance borders Germany, Switzerland and Austria, with views of the Swiss Alps across the lake from Friedrichshafen. Ferries run across the lake to most

of the towns on the shores. Friedrichshafen is the birthplace of the Zeppelin and Dornier Aircraft with museums and flights. There is a good variety of shopping, restaurants and cafes, all fairly close. It's a great place for all the family. If you are planning a trip to Europe and have an interest in Ham Radio, I suggest you coincide it with a trip to Friedrichshafen at the end of June.



One of the flea market halls



Once again thanks to all those who contributed to making this a great Newsletter. Les VK3TEX – Newsletter Editor.