

# Cambridgeshire Repeater Group



## Newsletter Number 44 Winter 2002

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# Editorial

Dear Member

When I took over the job of newsletter editor, I aimed to produce two or three issues a year. The more eagle-eyed among you will have noticed that this has not always been the case. However, for some perverse reason I do enjoy the job, and I hope you like this issue.

One thing I must do, however, is to blow the dust off my ageing laptop, so at least I can work on it the next time I get woken up from a nice peaceful coma. Seriously though, I have spent a long time in hospital over the last year, so I hope you can forgive the delay in getting this issue out to you.

However, this means that I'm now looking for articles for future editions, and plan to spend more time on the air from now on. Or, to put it another way, **YOU HAVE BEEN WARNED**. Don't forget that advertising is free to members, and even a short piece on your favourite (radio related) subject could be of interest to a wider audience.

I look forward to hearing from you, and in the meantime wish you all the best for the festive season and a happy New Year.

73 de Terry GOUIO

A handwritten signature in cursive script, appearing to read 'Terry Gouio', with a horizontal line underneath.

PS The date for the CRG Rally 2003 is Sunday the 6<sup>th</sup> April at Bottisham Village College. Please note that there are currently no plans to hold an auction this time, due to a reduction of interest from visitors, but we will be keeping an eye on demand for future years.

	GB3PI	GB3PY	GB3PX	GB3PT	GB3PS	GB3PV	GB7PX	GB7PX-1	GB7PX-7
Operating Channel									
First Operational	R6 May 1972	RB8 April 1975	R88 Barkway, Herits	439.7125MHz October 1978	RM3 1985	RMT12 June 1987	144.950MHz August 1987	1299.425MHz October 1990	439.825MHz October 1993
Location	Barkway, Herits	Madingley, Cambs	Barkway, Herits	Barkway, Herits	Berkway, Herits	Madingley, Cambs	Madingley, Cambs	Madingley, Cambs	Madingley, Cambs
ORA Locator	IO02XA	JO02AF	IO02XA	IO92XA	IO92XA	JO02AF	JO02AF	JO02AF	JO02AF
Mode	Speech	Speech	Speech	9600bps data	Speech	FM TV	AX25	AX25	AX25
Polarisation	Vertical	Vertical	Vertical	Vertical	Vertical	Horizontal	Vertical	Vertical	Vertical
Transmitter:									
ERP	25W	19W	18W	20W	10W	25W	5W	25W	25W
Frequency	145.750MHz	433.200MHz	50.780MHz	439.7125MHz	1297.075MHz	1316.00MHz	144.950MHz	1299.425MHz	439.825MHz
Aerial Type	2x2 ele yagi	Stacked dipoles	Dipole	Stacked dipoles	White stick	Alford slot	Dipole	15+15 yagi	8 ele yagi
Direction	North	South-east	Omni	Omni	Omni	Omni	Omni	315	315
Height (a.g.l)	58m	30m	37m	42m	52m	30m	31m	30m	15m
Height (a.s.l)	210m	93m	189m	194m	204m	93m	94m	93m	78m
Receiver:									
Frequency	145.150MHz	434.800MHz	51.280MHz	430.5125MHz	1291.075MHz	1249.100MHz	144.950MHz	1299.425MHz	439.825MHz
12dB SINAD at	0.18uV (p.d)	0.19uV (p.d)	0.175uV (p.d)	N/A	0.18uV (p.d)	N/A	0.32uV (p.d)	N/A	N/A
Squelch opens at	0.13uV (p.d)	0.17uV (p.d)		N/A	0.18uV (p.d)	N/A	0.34uV (p.d)	N/A	N/A
Aerial Type	As TX	As TX	(single ant. vkg)	As TX	As TX	As TX	As TX	As TX	As TX
Direction	(single ant. vkg)	(single ant. vkg)	(single ant. vkg)	(single ant. vkg)	(single ant. vkg)	(single ant. vkg)	(single ant. vkg)	(single ant. vkg)	(single ant. vkg)
Height (a.g.l)									
Height (a.s.l)									
Access method	1750Hz tone plus speech	1750Hz tone	Continuous CTCSS	Valid data	1750Hz tone	Video signal (Sync)	Packet repeater	Packet link	Packet link
CTCSS (77Hz) access?	Y	Y	Y	N/A	No (planned)	N	N/A	N/A	N/A
CTCSS (77Hz) on transmit?	Y	N (planned)	Y	N/A	Y	Y (When accessed)	N/A	N/A	N/A
Timeout	2 minutes	5 minutes	None	None	10 minutes	10 minutes	N/A	N/A	N/A
Reaccess after timeout?	Y	Y	N/A	N/A	N	N	N/A	N/A	N/A
Reaccess period	85 seconds	5 minutes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logic: Type	CMOS	Microprocessor	PIC	Microprocessor	Microprocessor	Microprocessor	TheNet X1-H	TheNet X1-H	TheNet X1-H
Designed by	G4HXH	G4BIK	G0VQH	G6COQ/G6GZH	G4XHM	G4XHM	DARC/G8KBB	DARC/G8KBB	DARC/G8KBB
Battery backup?	Y	y	Y	Y	N	Y	Y	Y	Y

# Cambridge Amateur Radio Astronomers

*Various Authors*



Welcome to the Cambridge Amateur Radio Astronomers. We are a group of people, mainly from a radio and computing background, with an interest in radio astronomy. Initially our focus is on restoring part of the One Mile Telescope at the University of Cambridge's Mullard Radio Astronomy Observatory to full working order.

An important goal of the project is to allow public access to the telescope, for example, for schools or interested amateur astronomers, either remotely or through site visits.

There may also be possibilities for real research using the telescope, although we recognise that there may be limited opportunities here, the sky being fairly well understood at the frequencies accessible with the telescope.

We intend to make full use of modern technology, in particular the ability to control and get data from the telescope using the Internet.

## **Present and Future Plans**

The current specific objectives of the project include:

- Updating or replacing the receiver equipment. This has largely fallen into disrepair or lags behind modern standards.
- Updating the control mechanism of the telescope to allow observations to

be set up, and data to be retrieved, remotely over the Web.

- Generally to replace obsolete or worn-out parts of the telescope.

In the first phase of the project we are renovating or replacing the dish feed components of the central aerial, leaving the rest of the control system as it is. Once this has been done the second phase will consist of developing a system to allow the remote control of the telescope.

In addition, we intend to perform a number of specific investigations with the telescope, for example:

- Examining the hydrogen-line spectrum.
- Monitoring bright radio sources.
- Observing bright pulsars.
- Moon bounce at 430 and 1296 MHz in conjunction with an off-site 2.9 metre dish belonging to a member of the group.
- Observations of the Sun and the Moon.
- Lunar occultations.
- Variable source studies.
- SETI.

Initially we intend to concentrate on moon bounce and pulsar observation.

## **The One Mile Telescope**

The One Mile Telescope was built between 1962 and 1964, and was first used for astronomical observations in November 1963. It consists of three separate 18 metre dish aerials, one mounted on rails, to allow the use of aperture synthesis techniques, in fact it was the first such telescope in the world. It was built to allow observations at 408 and 1410 MHz but has been used for frequencies up to 5 GHz, at which point small inaccuracies in the dish surface become significant.

Currently only the central, stationary, aerial is known to be functional, and only at 408 MHz. It was last used in early 1999, to observe the well-known pulsar in the Crab Nebula. The telescope was built to a high mechanical specification and is generally in good shape. However, the electrical systems are old and need replacing. Spare parts are also a problem in many key areas.

We will initially concentrate on this central aerial, though a longer term goal is to attempt the full restoration of all three dishes.

## **Renovation of the One Mile Telescope Focus Box No 2**

This particular focus box houses a 1420MHz antenna, nested within one for 408MHz,

these being located at the lower end of the structure shown. The large top canister houses all remaining electronics. Four vertical angle irons are used to mount the assembly to the dish arms. An electric motor housed within the top canister was used to rotate the antenna mount.

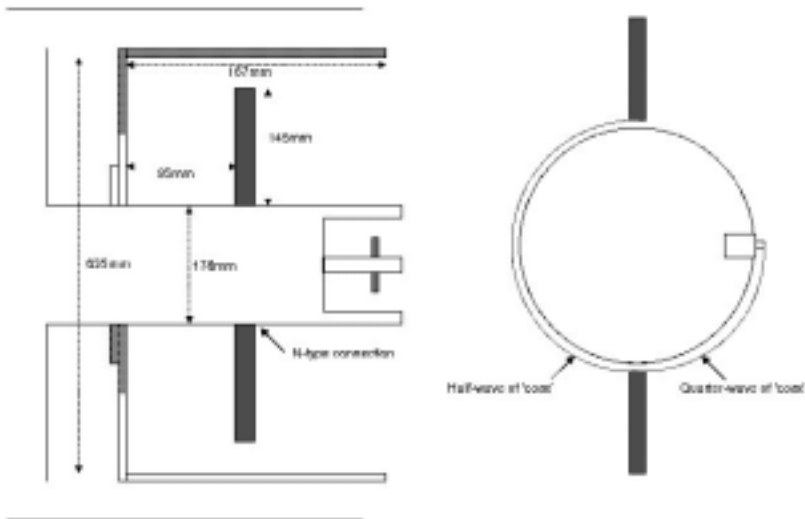
There is some bad corrosion in places, but this has only affected the rotating system, which is beyond repair. An aluminium girdle plate, though 6mm thick, has been completely eaten away in places (as has the aluminium gear drum). There has been no breach of the top canister, and all the electronics is in excellent condition. Although there are two tears in the thin radome material, the only corrosion within the antenna drum is some minor pitting of the drum lip - everywhere else is surprisingly bright.



# The Antenna Drum

Each arm of the (both 408 and 1420MHz) antenna is connected to the other via a half-wave section, with the 'N' type feed connector feeding one arm via a quarter wave section. The phasing sections are fabricated within a slot milled into the supporting drum mount. 408MHz antenna.

As a schematic:



It was proposed that a second dipole be added to the 408MHz aerial 90 degrees rotated (to make a cross). The new elements were to be 1/4 wave back. However this would have the effect of mis-matching the new elements because of its proximity to



the rear of the reflector, and the illumination pattern would be narrower than the front element.

Therefore we have added the new element next to the existing elements (still rotated by 90 degrees) and delay the signal through a 1/4 wave of semi-rigid coax.

The 1420MHz aerial will be untouched.

## Connection of aerials to Low Noise Amplifiers

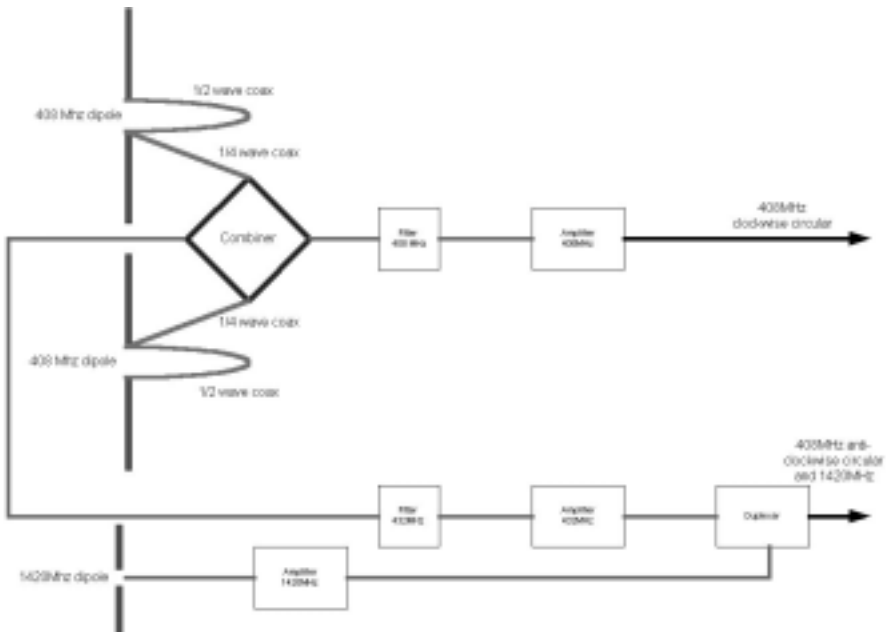
Below is a diagram showing the two 408MHz dipoles at 90 degrees, combined to



give circular polarisation. The clockwise and counter-clockwise components can then be filtered at 408 and 432 MHz before amplification. The need for this filtering is debatable, and we could risk intermodulation/blocking problems and work without filters. The aerial response is flat over the 408/432 frequency range. The combiner should be flat over this range (to be tested).

There are two coax feeds from the dish to the control room. We can duplex the 1420Mhz feed into the 408MHz feed as shown below:

To provide circular polarisation, a further pair of probes were added at right angles to the existing pair. In fact, the 'existing' pair had to be replaced because the feed arrangement (fabricated line within the boss) would have mechanically prevented



the second pair from being fitted. For a similar reason, the feed was changed to semi-rigid coax. The original probes, and their position within the drum, seem to have been designed to present a nominal 100 ohm - much simplifying the feed arrangement.



I would like to thank all the people who have been helpful and generous with equipment and advice over the last year. It is much appreciated.

Brian.  
G1RVF

**CAMBRIDGESHIRE REPEATER GROUP  
MINUTES OF ANNUAL GENERAL MEETING ON 28TH  
NOVEMBER 2001  
HELD AT STOW-CUM-QUY VILLAGE HALL**

**THOSE PRESENT:** G0ANV, G0HEM, G0LUC, G0WVE.  
G1ZPU.  
G3KKD.  
G4JRC, G4NBS, G4WIA.  
G7DIU, G7SRK.  
G8KMM.  
M1AQP, M1CKO.  
M5PYE (exG8CRN)

15 MEMBERS PRESENT

**1. CHAIRMAN'S INTRODUCTION.**

The Chairman, Gerald Gardner G0HEM, opened the meeting at 20.00 hours. Only fifteen members being present this did not represent the 40% (of 112 members) necessary for a quorum. The Chairman suggested that the meeting should proceed under the Chairman's vote rule 10(1b). This was officially proposed from the floor by G0ANV and seconded by G1ZPU and carried unanimously by those present.

**2. APOLOGIES FOR ABSENCE.**

Apologies were received from: G0UIO, G1YFF, G4LKF, G4YHN, G6FKS, G6KJR, G7JSB, G8JHE, 2E0ASU, 2E1CRK, 2E1HLF, 2E1HLH.

**3. MINUTES OF PREVIOUS AGM.**

Minutes of the previous AGM were available at the meeting. There were no matters arising from these minutes. G0ANV proposed and

G3KKD seconded that these minutes be accepted. Passed unanimously by those present.

#### **4. CHAIRMAN'S REPORT**

Gerald, G0HEM, noted that the change to a Wednesday night for the meeting had been dictated purely by availability of the hall and this mid-week meeting may well be responsible for the low attendance.

The committee had suffered from health problems and family illness and bereavement which had made for a difficult year with consequent delays in Newsletter production and replacement equipment for GB3PI. He thanked the members of the committee for their regular attendance at committee meetings and the Secretary for his prompt production of minutes. The Treasurer had once again maintained the accounts and membership records in an exemplary manner for which his thanks and also to Sheila, M1CKO and Ebony, 2E1HLF for their help with distribution of membership cards and newsletters. Also the Rally Organiser and his family for their hard work with the April Rally at Bottisham.

The Groups repeaters have continued to operate throughout the year with no major problems and any minor faults being quickly rectified. GB3PY had embarrassingly failed on the day of the Cambridge and District ARC's Rally but was swiftly rectified the same day by G4BIK. The Barkway site has been fitted with a new bank of standby batteries.

Repeater abuse has been minimal over the year but we have received one letter of complaint from an M1 callsign operator who felt that he had been excluded from the conversation on GB3PI. It is essential for the future of Amateur Radio that we make special efforts to welcome all legal users to our repeaters with especial efforts to encourage newcomers who may not yet have achieved the same confidence in operation of the everyday users.

North Herts RAYNET had made use of GB3PY for their Sunday evening net during the summer (with the full knowledge and agreement of the committee). They have now reverted to a simplex net but we are pleased to have been of help during a time of equipment problem for them.

Our relationship with NTL, the current operator of Barkway and Maddingley sites, has remained stable and unlike most other groups our rental charge has remained within bounds. Many thanks to Roger, G7SRK for his efforts in maintaining good relations such that this year's rental stayed constant with no increase.

Our Repeater Keeper, G4NBS continues to shoulder a tremendous responsibility as it **his** licence at risk from any violations of the rules.

The annual rally suffered from a late change in date brought about by the RSGB Rally & Convention at Bletchley using our original date. The weather on the re-scheduled date was cold and wet in the morning and final profits reduced from the previous year. However all rallies are suffering from reduced support. Once again Paul, G0LUC and his family did a great job of ensuring that everything went well.

Finally, all members will have appreciated the efforts of Terry, G0UIO who, despite overseas visits and less pleasant visits to hospital, has continued to produce a newsletter of ever-increasing content.

## **5. TREASURER'S REPORT.**

Roger, G7SRK presented the accounts for the year comprising the Rally Account, the Income and Expenditure Account and the Accounts for the year 31/10/00 to 1/11/01. These accounts have been audited by Graham Philips, G0KRB. This is the third consecutive year that the audit has been completed *before* the AGM. Many thanks to Graham for his help as the time between the end of our financial year in October and the usual timing of the AGM is so short.

- There was a slight loss of £145.83 over the year.
- Rally: profit on the event was 29.6% down at £493.99 compared with £701.62 last year.
- The accounts for the year show income: £1290.62 (last year: £1464.15)  
expenditure: £1436.45 (last year: £1616.28)  
a balance of: £12189.71 (last year: £12335.54)

The balance is held in a Nationwide Business Investment Account.

Due to a change in accounting period by NTL the site rental, although remaining at the same rate, increased to cover an additional three month period (i.e. 15 months instead of 12 months).

In view of the healthy balance it considered that no increase in membership subscription can be justified.

Acceptance of the audited account was formally proposed by G0ANV, seconded by M1AQP and approved unanimously.

Retention of the services Graham, G0KRB for audit of next years accounts was proposed by G3KKD and seconded by G8KMM and agreed unanimously by those present.

## **6. RALLY ORGANISER'S REPORT.**

Paul, G0LUC confirmed that the rally had suffered from the late change in date due to the RSGB taking our original slot and the Picketts Lock event being the preceding week. A cold, wet start to the day did not help either. Car parking on the field was acceptable despite the wet morning weather. Once again, many thanks to all the helpers without whom the rally could not take place.

Next years rally will be either Sunday 31st March or 14th April 2002 again at Bottisham Village College.

## **7. SECRETARY'S REPORT.**

Dave, G7DIU noted the effect of the paperless society by the extensive use of e-mail. Unfortunately for him this meant taking some 200 odd hard copies for the records over the year.

## **8. TECHNICAL.**

Reports on the repeaters were given by Eddy, M5PYE (ex G8CRN). All repeaters have been maintained in service.

**GB3PI** has operated satisfactorily this year.

**GB3PY** has performed excellently since the change of Tx last year.

**GB3PX** remains in operation but is under-performing expectations. This may be due to either or both: low antenna height/pager interference.

**GB3PS** continues in operation with relatively low occupancy. It is now vertically polarised.

**GB7PX** (packet nodes). 23cm beam antenna has been redirected from the defunct GB7HXA at Huntingdon to G6GZH's QTH at Over but has not been used as GZH's 23cm. equipment is on loan to G7RAZ at Wisbech. 2m and 70cm. nodes continue satisfactorily.

**GB7PT** the high speed data link is now in 24 hour use linking packet BBS's.

**GB3PV**, the ATV repeater, continues to operate well despite an intermittent logic fault. CADRC are now using the repeater on Friday evenings and another couple of new operators have appeared during the year. Ian, G3KKD reported that this repeater has logged 55,714 hours of operation since 1994.

G1ZPU reported his investigations of the possibility of hard linking GB3PX and GB3PS. Also initial consideration of Internet linking for any suitable repeater.

Phil, G8MLA had commenced work on replacement hardware for GB3PI to better suit 12.5 kHz channel spacing operation but unfortunately Phil has experienced a health problem that has made it impracticable for him to continue at the moment. Our thanks and best wishes to Phil.

## **9. ELECTION OF COMMITTEE.**

Gerald, G0HEM (Chairman) and Roger, G7SRK (Treasurer) are both standing down from the committee for family reasons.

On a proposal from G0HEM, the available committee members plus G1YFF and G1ZPU were elected en bloc on a unanimous show of hands. The remaining committee members were again proposed to continue on an en bloc basis proposed by G0KRB, seconded by G0DKE and again unanimously agreed by the meeting. Office holders were agreed unanimously as below.

The committee for 2001 - 2002 is

G1YFF	Jake Bevan	Chairman
	Jane Dyke	Treasurer
G7DIU	David Leech	Secretary
G0LUC	Paul Dyke	Rally Organiser
G0UIO	Terry Bickell	Newsletter Editor
G1ZPU	Rob Compton	Technical Support.
G4NBS	Tony Collett	Repeater Keeper
M5PYE	Eddy Boyd	Technical Support

## **10. ANY OTHER BUSINESS.**

A letter of proposal for a change to the concessionary subscription conditions has been received from John, G6HKQ: "Scrap both the above concessionary rates (student under 18 and family members) and replace with concessionary rates for senior citizens and registered disabled and

blind who are not gainfully employed in full time occupation.”

Discussion followed during which the following points were made:

- our rates have not gone up over many years and are now only 9.6 *pence per week!*
- the current subscription rate does not cover the cost of the newsletter and postage.
- our main source of income is from the annual rally not subscriptions.
- students and any other young people are to be encouraged.
- most second family memberships are relatively inactive.
- G4JRC stated that from his working experience there is now no “registered disabled” category.
- most senior citizens today are better off than students under 18 not in receipt of a grant.
- the concessionary rate is a saving of only £2 per person.

GOHEM then put the proposal to the meeting in three stages:

1. Scrap concessionary rates for students and family members. ***This was unanimously rejected.***
2. Allow concessionary rate for senior citizens.  
***This was unanimously rejected.***
3. Allow concessionary rate for disabled and blind.  
***This was unanimously rejected.***

The meeting was closed at 21:15 hours.

David Leech, G7DIU - Secretary



# **POCSAG Paging decoder version 1.01**

*D. Norris G7VDI*

Run pocsag.exe preferably from the DOS prompt. I do not recommend doing so from Windows, although it may work on some faster systems. In case of problems, always try restarting in MSDOS mode. You can start directly in DOS (without starting Windows) by holding the F8 key down during booting. The program should ideally run in a single tasking environment, as it needs to run in 'real time'. In practice you may find that it will operate from within Windows, on faster PC's, however it will soon encounter difficulties if you have any background processes running. Certainly you can expect higher error rates than if it had the computer to itself.

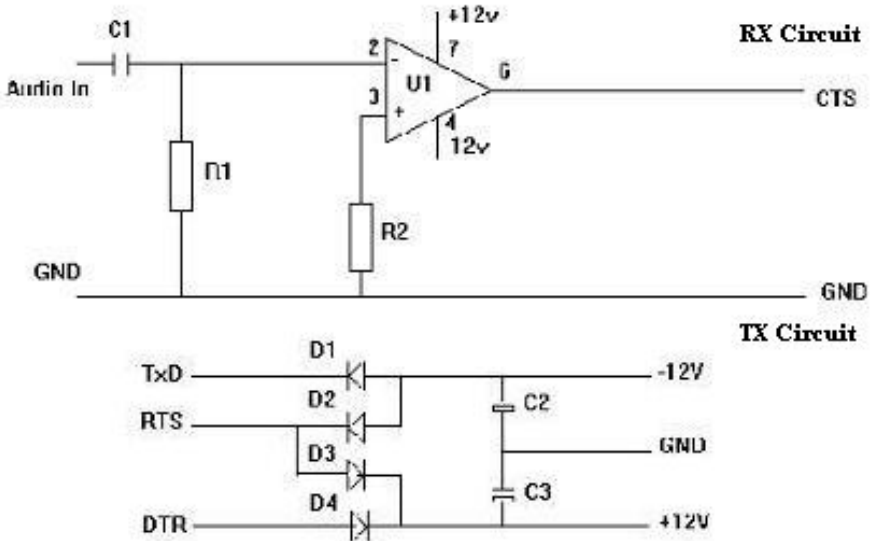
Important: Command line options are available only if run from DOS. You may want to use POCSAG.BAT to customize the program for your own system & preferences. Press any key to exit. (Note - DO NOT use control-C combination - or the serial port won't be free for other applications later otherwise!!!).

This program is written in the 'C++' language and compiled as an MSDOS executable. In case of difficulties, try running in MSDOS mode, and adjusting the volume on your receiver. The frequencies to tune to are from 137.975 to 138.15, 153 - 153.4 and 466.075 MHz (assuming you are operating in the UK). Your receiver should be using narrow-band FM mode, and the aerial positioned away from the computer otherwise you may receive interference from it. An outside aerial is recommended.

Should you have any errors produced (garbage being displayed rather than messages, or nothing at all!) try repositioning the aerial, and checking the receiver is accurately tuned and using NFM reception mode. It is also possible that you do not have the volume correctly set on the receiver, or that what you're tuned to isn't a POCSAG transmission.

# Hardware Requirements

You are going to need to build a special purpose piece of hardware called a data slicer for this program to be of any use. This acts as a discriminator. See circuit diagram (FIG. 1) below. This converts the AF tone of approximately 100mV peak from your radio receiver into a square waveform of ( 3V or so which the serial port can understand. This simple interface circuit may get you started; however are many superior circuits in terms of error avoidance. You may want to try op-amps with a faster slew rate1 in case of problems, as a first idea.



Parts List:		COM Port	25way	9way
U1	741	CTS	5	8
R1	100K	GND	7	5
R2	10K	TxD	2	3
		RTS	4	7
C1	0.1uF	DTR	20	4
C2 3	10uF, 16v	DSR	6	6
D1-4	1N4140 or 1N914			

**Note that the Program does not currently support Encoding; I am planning to add this capability at some stage in the future.**

## POCSAG format

Let's describe the content of each message. First there is a preamble of 10101010.... which seems to always be at least 512 bits long. This preamble is provided to synchronize the pager's clock with that of the messaging system. Next is the sync 32-bit codeword 7cd215d8. The MSB (most significant bit) of this is transmitted first. This preamble always ends with a zero, then comes the sync codeword. After the sync, then comes sixteen more 32-bit codewords (MSB first). Then are the content codewords. This sync + 16 codewords is called a batch. But the transmission need not stop here. Immediately after the sixteenth codeword, the sync codeword can be transmitted, thus indicating that another 16 content codewords are to be transmitted in the same 'data packet'. Failing this, the system will drop carrier until the next frame is to be sent. The paging channel is just as likely to immediately start transmitting a preamble again to start a new batch. This preamble, and thus the forthcoming batch, is usually at a slower bit rate. The bit rates supported are 512, 1200 & 2400 baud.

Each of the sixteen content codewords sent can be classified either as a message codeword or an address codeword, or the idle codeword. The idle codeword has the value 7a89c197. Each codeword has the same familiar format, the first 21 bits contain the data, the next 10 bits contains the error correcting code. The last bit (i.e. the LSB) of the codeword is just a parity bit of the prior 31 bits of the codeword. This data + BCH ecc + parity format is even enforced in the idle and sync codewords: in other words, if the first 21 bits were extracted from either the idle or sync codewords, and from that the BCH and parity were recreated, then the resulting 32-bit codeword would be the same as the original.

The MSB of a codeword indicates whether it is a message codeword (MSB=1) or address codeword (MSB=0). A paging message is started when an address codeword is first recognized. The paging message content for that address is in the forthcoming transmitted codewords, which should be message codewords. A paging message is terminated

when either an idle codeword or another address codeword is received.

Each paging message has an address, this is derived by taking the last 20 bits from the 21 data bits of the previously transmitted address codeword, and extracting the 18 most significant bits from it.

These 18 bits form the most significant bits of a 21 bit pager address. The lower significant 3 bits are derived from the frame number in which the address codeword was transmitted in. (The frame number is found by determining the number of frames transmitted after the last sync codeword. A frame consists of two consecutive content codewords. Thus there are 8 frames in a batch, not including the sync) The remaining two bits in the 21 data bits of the codeword are the source identification bits. They indicate the format of the page - if it is ASCII or binary coded decimal. There are other messages generated by automatic systems.

Like the address codeword, the last 20 data bits of the message codeword contain the paging message itself. Any additional message codewords append their 20 bits of data to the end of this message. The end result can then be deciphered. For an ASCII message, every seven bits is a new ASCII value. ASCII values are printed in the order that they were transmitted. The same could be said for a numeric message - every four bits is a new binary coded decimal value to be displayed in the order they were transmitted.

While binary coded decimal characters are straight forward - the MSB is the first bit transmitted of the four bit binary coded decimal value - ASCII characters are more complicated. For ASCII characters, the seven bit value is encoded in reverse order, i.e. the LSB is the first transmitted of the 7-bit ASCII value, the MSB the last.

## **Commandline options:**

-i will invert the incoming data: try in case of problems.

-h Shows help message

-n instead of decoding everything as ASCII, decode everything as binary

coded decimal, in other words, numeric form.

-c show the codewords rather than decoding them. (for the curious).

-b fixes the bit rate of the pocsag decoding effort. For example using the option -b1200 will set the bit rate to 1200 bits per second. There is no space between the 'b' and the bit rate value. Note, setting the bit rate to zero will put the software into automatic baud mode. (Auto baud mode is the default mode anyway).

-p sets the serial port that your decoder is plugged in to. For example -p3 will make this program expect to use com3 to decode pocsag. (The default is com1). (Try checking this first if no messages displayed!).

-r This is a fun option: between codewords, the program will throw out raw data. If the program is in autobaud mode then this raw mode will also print out a value in parenthesis whenever the bit rate is changed. (The value is the new bit rate).

-u Put the program into batch mode: an end of message is indicated by a line feed. In addition there is no pretty printing or new lines outputted besides the terminating one.

Note: To stop the program press any key but control-C.

There is a noise detection heuristic analysis in this code that is used by both the raw option (-r) and the autobaud option (-b0). It works well for the raw option - raw data that is obviously noise (or is it?) will not be printed to the screen(!). The facility of its use in our automatic baud detection heuristic (described below) is open for debate, however. You can remove the entire noise heuristic if you want, it was put in for channel analysis convenience.

As indicated, there is an automatic baud heuristic. Simply, if the paging channel is not noisy (see above) and we are not currently decoding any batches and the average of the previous bit times is close to the average of the bit times being received now, then change the bit rate to  $1/(\text{average bit time})$ .

Decoded output

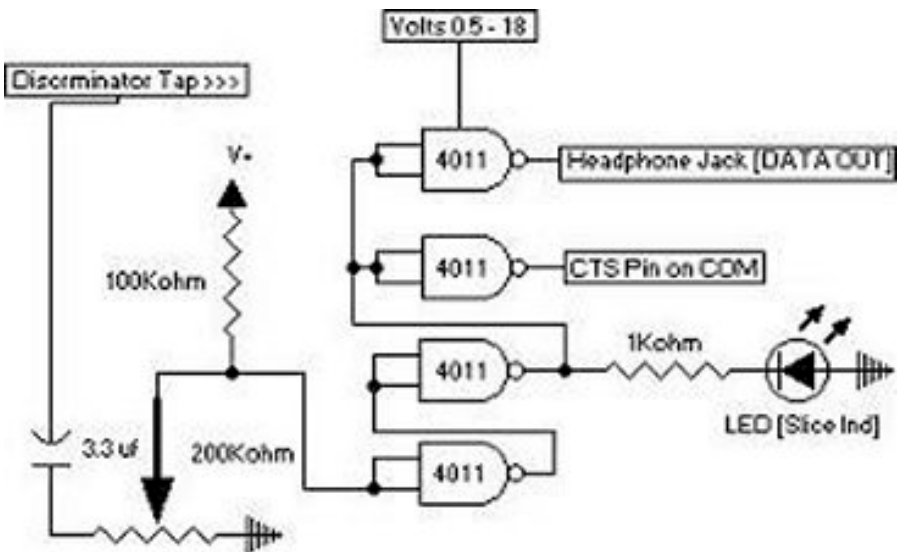
(This output will not be displayed if you used the -c option in pocsag.c)

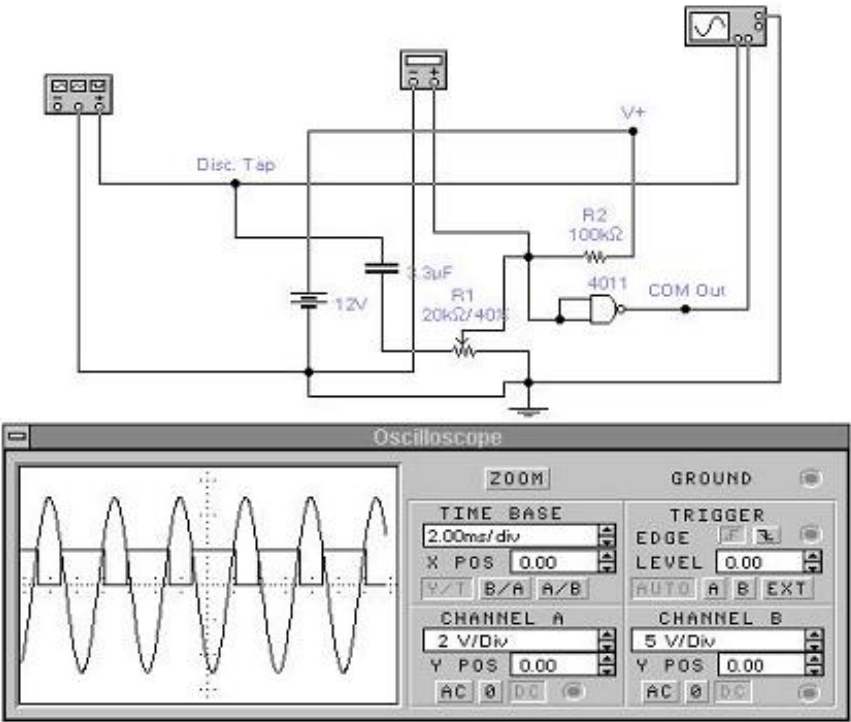
```
error in codewords indicator
/ source address end of message indicator
///
+xxxxxxx x x/xx: ... message text ... <
\\
\\ total codewords in pager message
\ codewords in error
pager address (in hex)
```

note: In ASCII mode, all characters except those less than ' ' will be output as received, the others will be output as the pair ('\\', '0'+ received character). The character '\\ ' is output as the pair ('\\', '\\').

note: a dollar sign will be printed on a line by itself every time

For illustration purposes I have modeled the slicer operation in





Electronics Workbench (Interactive Image Technologies). This is a better TTL based circuit. The conversion of the audio tone (a modulated sinewave derived from the frequency shift keyed carrier wave) is converted into a square wave. Note that in practice the waveform won't be as perfect as this! You may prefer this circuit as a better alternative to that shown above.

Previous page: FIG.2: Data Slicer using CMOS NAND Gates  
 Above: FIG.3: Comparison of input & output from Data Slicer.

1 The term 'Slew rate' refers to the rate at which the output of the op-amp changes in response to changes in input. For best results, this should be as fast as possible. Although I have used a UA741, you may find better results are obtained using a faster op-amp.

For those that don't already have it, David can supply the software to accompany this article. Send a blank disk and stamped return envelope to the address below:

David Norris  
45 Carlton Way  
Cambridge CB4 2BY

---

---

## Let There Be Light V

*John Bonner, G0GKP.*

One of the larger transmitters, running 3 kW of 24 channel fsk, had just tripped its 6kV supply again. After a few such events, each followed by a manual reset to keep the traffic flowing, the (nearly gallon-sized) PA valve was changed. Days later it tripped again and connecting it temporarily to a different rhombic antenna made no difference. By diverting its traffic to another circuit, we could run it "empty" so that a watch could be kept to see if anything became obvious. After more trips and more component changes within the PA stage, the HT supply itself had to be investigated.

The smoothing capacitors were 10kV oilfilled monsters but, being on wheels, removal was easy once their connections in the dark recesses of the PSU were undone. Now, on one terminal, the cause of the fault was plain to see... a very dead rat! In the tropical heat and humidity, as the mould grew, it closed the gap to chassis until a flashover cleared it back for a few days while it grew again!

# **Cambridge & District Amateur Radio Club Rally 2003**

**February 16th  
Britten Arena  
Wood Green Animal Shelter  
King's Bush Farm, London Road,  
Godmanchester**

## **Information for visitors:**

Rally opens at 10am. Entrance £2, £1.50  
concessions.

Free Parking for up to 2000 cars. Two Bars.  
Restaurant.

Animal Shelter. 52 acre site includes Water Garden  
and Lake.

A great day out for all the family!

## **Information for traders:**

1650sqm Indoor Arena. Electrical Supply available.  
Direct Vehicular access from 6:30am. Tables 6' by  
3' at £15 each prebooked.

Car Boot Area, £8 per 12foot wide pitch  
prebooked.

Four miles from Huntingdon.

Take the A1198 Godmanchester turn off the A14.

**To book please contact either:**

John Bonner G0GKP Tel: 01954 200072

j.bonner@ntlworld.com

Alfred Grimes G0GVZ Tel: 01223 413401

alfred.grimes@btopenworld.com

**Bigger and better.**

**CDARC are determined that this is a rally that  
will survive.**

**Please support us and your hobby. Bring your  
family as well.**

**[www.cdarc.org.uk](http://www.cdarc.org.uk)**



**CAMBRIDGESHIRE REPEATER GROUP  
MINUTES OF ANNUAL GENERAL MEETING ON 11TH  
NOVEMBER 2002  
HELD AT QUY VILLAGE HALL**

**THOSE PRESENT:** G0HEM, G0LUC, G0UIO, G0WVE  
G1YFF, G1ZPU  
G3KKD  
G4BIK, G4 ETG  
G6FKS  
G7DIU, G7JGQ, G7SRK  
G8IDL, G8KMM  
M1AQP, M1GRT  
M5PYE  
Jane Dyke

19 MEMBERS PRESENT

**1. CHAIRMAN'S INTRODUCTION.**

The Chairman, Jake Bevan G1YFF, opened the meeting at 20.00 hours. Only nineteen members being present this did not represent the 40% (of 56 members) necessary for a quorum. The Chairman suggested that the meeting should proceed under the Chairman's vote rule 10(1b). This was officially proposed from the floor by G3KKD and seconded by G7SRK and carried unanimously by those present.

**2. APOLOGIES FOR ABSENCE.**

Apologies were received from: G0DKE, G0NDY, G0SFQ, G1LTL, G3PTQ, G3WXW, G4LKF, G4NBS, G4YHN, G4WIA, G6KJR, G6RNN, G7JSB, G7JUC, M0BYB, M1CKO, M3MJH, 2E0ASU, 2E1CRK, 2E1HLF, 2E1HLH.

**3. MINUTES OF PREVIOUS AGM.**

Minutes of the previous AGM were available at the meeting. G0HEM noted that the Cambridge Club should have been identified as CDARC not CADRC and also felt that the subject of whether or not to dispense with the auction at the rally had been subject to discussion which was not recorded. It was stated that this may have been the case but it would be discussed further in the Rally Organiser's report in this meeting. M5PYE proposed and G1ZPU seconded that these minutes be accepted subject to the comments from G0HEM. Passed unanimously by those present.

#### **4. CHAIRMAN'S REPORT**

Jake, G1YFF, noted that the change to a Monday night for the meeting did not seem to have had a detrimental affect on the attendance. The earlier date in the month than usual has meant that bank statements had not been received in time to allow audit of the accounts in time for the meeting but this should be achieved in the next two weeks.

Perhaps the most unusual event of the year was the theft of the cavity filters from GB3PY at Maddingley in March. This remains totally unexplained but thanks are due to Phil G4BIK, Bernie G4HJW and Rob G1ZPU for their efforts in getting the repeater back on the air in a few days.

Many thanks are due to Paul G0LUC and his wife Jane and family for their hard work with the April Rally at Bottisham which benefited from favourable weather to provide a very successful event. Jane has also taken on the position of Treasurer which has been quite a task to pick up the bank account and membership and distribution responsibilities.

Our Newsletter Editor, Terry G0UIO, has unfortunately spent much of the year in hospital which has made it impossible to produce newsletters and they have been sorely missed. Fortunately Terry is able to

be with us tonight and he assures us that he has one nearly ready for distribution.

The Groups repeaters have continued to operate throughout the year with no major problems other than PY's filters and any minor faults being quickly rectified.

Our Repeater Keeper, G4NBS continues to shoulder a tremendous responsibility as it **his** licence at risk from any violations of the rules.

## **5. TREASURER'S REPORT.**

Jane Dyke presented the accounts for the year comprising the Rally Account, the Income and Expenditure Account and the Accounts for the year 31/10/00 to 1/11/01. These accounts have not yet been audited. This is because the bank statements for the end of October were not received in time due to the AGM being nearly three weeks earlier in November than usual. We will have to bear this in mind when setting the date for next year's AGM.

- There was a profit of £27.22 over the year.(Secretary's note: this is a corrected figure amended subsequent to the meeting).
- Rally: profit on the event was 58% up at £782.66 compared with £493.99 last year.
- The accounts for the year show:

income:	£1124.09	(last year: £1290.62)
expenditure:	£1096.87	(last year: £1436.45)
a balance of	£12216.93	(last year: £12,189.71)

The balance is held in a Nationwide Business Investment Account. With the changes last year in committee membership it has taken most of the year to sort out authorisation for cheque signatures. The bank

recognizes any two signatures from four which should include Chairman, Treasurer and Secretary. A new form to cover any changes of signatory at this meeting was available to be completed at the end of the meeting. The four authorised signatories for 2002/2003 to be agreed by the meeting after election of officers.

Apologies were offered for the late circulation of membership cards and the apparent failure of meeting notification to reach M1AQP. This was due to the change of responsibilities and the time taken to transfer and assimilate the relevant details, obtain a laminating machine, etc.

There has been a significant reduction in the number of subscription fees collected this year, probably due to the lack of Newsletters mentioned in the Chairman's report and consequent failure to distribute application forms with the new Treasurer's contact details. Every effort will be made to improve on this for the coming year.

Acceptance of the un-audited account was formally proposed by G4ETG, seconded by G0WVE and approved unanimously.

Retention of the services Graham, G0KRB for audit of next years accounts was proposed by G1ZPU and seconded by G7SRK and agreed unanimously by those present.

## **6. RALLY ORGANISER'S REPORT.**

Paul, G0LUC, reported a successful event with much improved profit which was mainly due to the very good number of traders using the boot sale.

In view of low profit from the auction the committee proposed to drop this from next years event. The benefit would be saving cost of one hall and releasing a number of people for other activities. Paul stated that in order to avoid attendees just using the boot sale area

and not paying to enter the main building it would be necessary to take admissions in the car parking area next year. This was put to the meeting and Gerald G0HEM stated that he felt it was bad PR as this was the one item unique to our rally. Paul responded that the committee were open to offers to run and staff the auction! The committee's recommendation was accepted by a show of hands with one abstention. It was noted that G3NAC should be notified in view of his involvement over the years. Also noted was that diversion of items to the bring-and-buy would only benefit CDARC's profits, not ours, as we run the bring-and-buy at each others' rallies!

Once again, many thanks to all the helpers without whom the rally could not take place.

Next years rally will be Sunday 6th April 2003 again at Bottisham Village College.

## **7. SECRETARY'S REPORT.**

Dave, G7DIU noted the effect of the paperless society by the extensive use of e-mail. Whilst saving on printing and postage costs, unfortunately for him this again meant taking some 200 odd hard copies for the records over the year.

## **8. TECHNICAL.**

Reports on the repeaters were given by Rob, G1ZPU. All repeaters have been maintained in service.

**GB3PI** has operated satisfactorily this year.

**GB3PY** still performs excellently but was off the air for a few days in March when the cavity filters were stolen!

**GB3PX** remains in operation but is under-performing expectations. It is hoped to improve performance shortly by fitting a dual band 6m/70cm antenna at the high GB3PT location on Barkway.

**GB3PS** continues in operation with relatively low occupancy. It is now vertically polarised. Consideration is being given to the use of a new transceiver from one of the major manufacturers.

**GB7PX** (packet nodes). 23cm beam antenna has been redirected from the defunct GB7HXA at Huntingdon to G6GZH's QTH at Over and is now working well. 2m and 70cm nodes continue satisfactorily.

**GB7PT** the high speed data link is in 24 hour use linking packet BBS's. Another high speed link, with 7.6 MHz shift, is being considered.

**GB3PV**, the ATV repeater. Ian, G3KKD, reported that this continues to operate well despite an intermittent logic fault. Details of this fault are appended to these minutes and help from software experts is sought. This repeater has logged 63,300 hours of operation since 1994. Ian put to the meeting a proposal from two of the regular fourteen users that the beacon mode, currently present when there is no user access, be switched out to enable reception of more distant repeaters now that improved equipment and more repeaters are available. This would require agreement of the RMG and is a change from specified operation. Methods of achieving this could be CTCSS or, possibly, remote switch-off by the repeater controller. The matter is referred to the committee for further consultation.

The possibility of hard linking GB3PX and GB3PS is still under consideration but possible equipment changes to PS will take precedence.

Replacement hardware for GB3PI to better suit 12.5 kHz channel spacing operation is now with G1ZPU for assembly and integration but the logic is likely to be the deciding factor on in-service date.

A wide space (7.6 MHz Shift) 70 cm voice repeater is under consideration for the Barkway site with greater coverage than current UHF repeaters anticipated. This is a response to Repeater Management Group initiative to encourage more use.

## 9. ELECTION OF COMMITTEE.

Eddy Boyd has resigned from the committee though still available for tasks on request and Alex Greenland, G7JGQ has been co-opted for his software expertise.

On a proposal from G3KKD, seconded by M1AQP, the existing committee members were elected en-bloc on a unanimous show of hands.

The committee for 2002 - 2003 is:

*G1YFF	Jake Bevan	Chairman
	*Jane Dyke	Treasurer
*G7DIU	David Leech	Secretary
G0LUC	Paul Dyke	Rally Organiser
G0UIO	Terry Bickell	Newsletter Editor
*G1ZPU	Rob Compton	Technical Support.
G4NBS	Tony Collett	Repeater Keeper
G7JGQ	Alex Greenland	Technical Support

\*Cheque signatories were nominated as G1YFF, G1ZPU, G7DIU and Jane Dyke, proposed by G7SRK, seconded by G4ETG and agreed unanimously.

## 10. ANY OTHER BUSINESS.

A letter from Bob Wayne G0NDY noted the general falling-off of 2 metre use and particularly commented that the operating procedures used by the regulars on GB3PI, whilst within the rules, may make it difficult for newcomers to break in and be welcomed. It was recognized by the meeting that PI provides the most mobile-to-mobile contacts of any repeater in the area and thus fulfils its original intention admirably. However, in response to the comment a few operating hints would be included in the next newsletter to remind users of the need to welcome newcomers and the more hesitant operator.

G0LUC proposed that, in view of the considerable travelling costs incurred by committee members with round trips to meetings of some 70 miles, subscriptions be waived during membership of the committee. It was noted that last year the meeting rejected proposals to allow concessionary fees to retired and disabled members. David G8IDL proposed that it would be more acceptable to allow committee members to re-claim their membership fee, if they wished to do so, at the end of the year, subject to having attended the majority of meetings. The options were put to the meeting and the G8IDL proposal accepted by a large majority.

The meeting was closed at 21:20 hours.

David Leech, G7DIU - Secretary



# An effective 23cm ATV aerial

*Sid Robinson G6FKS*

This article describes a method of constructing a 23cm aerial, a design by Paul G8GML. All the local A.T.V'ers use this aerial in various forms. I use both a single element and a dual element, the one I now describe.

It is built on a framework made of ½ inch angle aluminium with triangular strengthening pieces 'Pop' riveted at the junctions of the frame. This framework is covered by a sheet of 1/2-inch wire mesh. A number of 1mm holes were drilled into framework and sections of the mesh was cut adjacent to the holes to which the cut sections of the mesh was poked through the holes and then bent over thus firmly fixing the mesh to the frame. I have bent the unsupported end of mesh at 90° to strengthen it. The elements were made from 14 gauge enamelled wire and bent to shape using a wooden block cut to size.

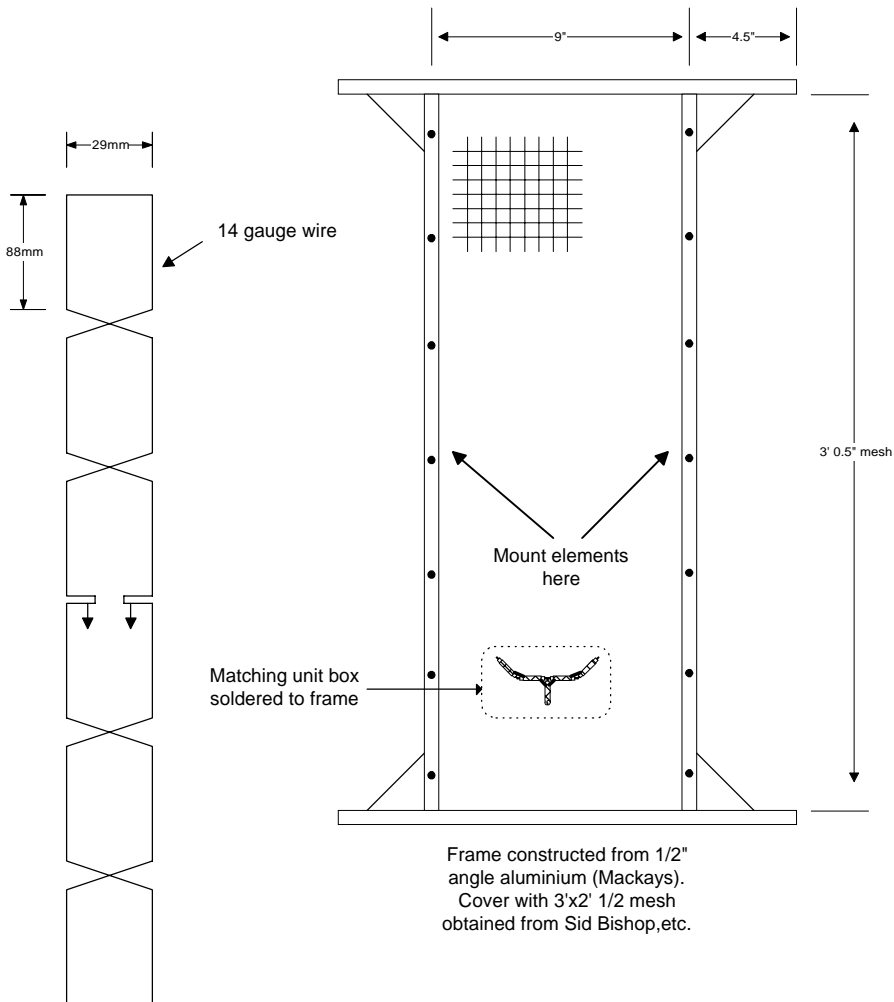
The support for the elements on the frame was made using pieces of inner insulation taken from RG67 co-ax. Holes were carefully cut at the correct spacing (32mm) and then cut to enable the elements to be slotted in. To close the slot a piece of sleeving is slipped over the end. When the aerial is finally complete the this assembly is given a good covering of 'Superglue'

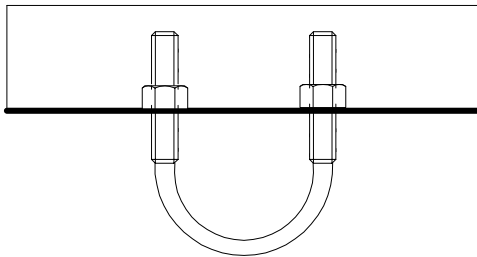
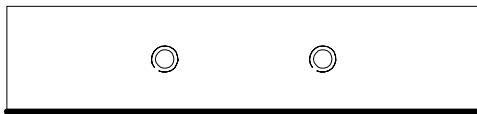
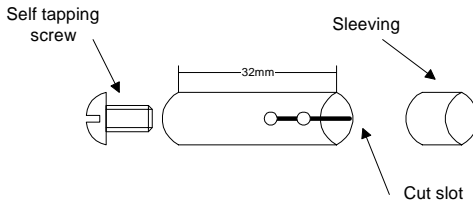
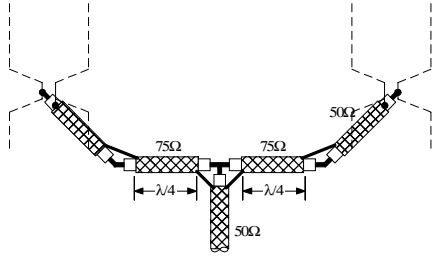
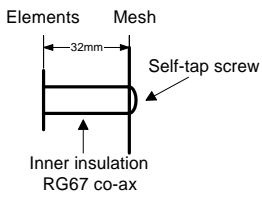
The whole assembly is fitted to the frame with self-tapping screws. The matching unit was made as shown and housed in a tinplate box as it was easy to solder straight onto the mesh. This was then given a good coating of rust resisting paint.

The aerial was fitted to the main pole via two short lengths of heavier gauge angle aluminium riveted to the top and bottom of the frame. Holes were drilled to fit the usual 'U' brackets.

The gain of this aerial is about 18dbd. How many elements would you have to have on a Yagi to give this gain?

The element connection to the co-ax was given several generous coatings of Polystyrene cement (Airfix kit cement) to weatherproof them.





Riveted to top and bottom of frame

# Why Computers Crash....

If a packet hits a pocket on a socket on a port,  
and the bus is interrupted as a very last resort,  
and the address of the memory makes your floppy disc abort,  
then the socket packet pocket has an error to report.....

If your cursor finds a menu item followed by a dash,  
and the double-clicking icon puts your window in the trash,  
and your data is corrupted because the index doesn't hash,  
then your situation's hopeless, and your systems bound to crash.....

If the label on the cable on the table at your house,  
says the network is connected to the button on your mouse,  
but your packets want to tunnel to another protocol,  
that's repeatedly rejected by the printer down the hall,  
and your screen is all distorted by the side-effects of gauss,  
so your icons in the window are as wavy as a souse,  
then you may as well abort,  
and go out with a bang,  
'cause as sure as I'm a poet, the suckers bound to hang!.....

When the copy of your floppy is getting sloppy on the disc,  
and the macrocode instructions cause unnecessary risk,  
then you'll have to flash your memory,  
and you'll want to RAM your ROM,  
quickly turn off the computer,  
and be sure to yell 'IT'S GONE!' ...



## Quiz number 44.

As this is the festive season, I thought this was appropriate.

1. Wobbly infant
2. Wise guys
3. Where refined people live
4. Edible fasteners
5. They might grow on you
6. Nine, ten, eleven
7. Occult perhaps?
8. Alcoholic teeth
9. Fallen fruit
10. Sport for princes
11. 100% metal
12. Tartan granite
13. For being good children
14. Aromatic spheres
15. Royal herb
16. Mothers local
17. All sorts of girls
18. Bovine peepers
19. Tommy rot
20. Shut your mouth
21. Abrushonice
22. A Mediterranean joker
23. A price on your head
24. Any fares please?
25. Truckers ration
26. Gems that grow on trees
27. Belly dancers pleasure
28. Dateline?
29. Shhhhhhh!
30. Item for the agenda

Answers please to Jane Dyke.

# CAMBRIDGESHIRE REPEATER GROUP 2002/3

I wish to apply for / renew my ordinary/ family / student (under 18) membership of the Cambridgeshire Repeater Group. I enclose the necessary subscription (£5/ £7/£3) respectively and agree to be bound by the Groups constitution.

Please Print Capitals


Name.....Callsign\*.....

Any Other Callsign(s)\*\*.....

Address.....

.....

.....Postcode.....

 Email Address (If any).....

Please delete the following if appropriate:-

1. I agree that my details may be held on a computer database, which is not registered Under the Data Protection Act.(If you wish you may have a copy of the information held about yourself)
2. I am willing to have my Callsign included in any list of members which may be issued by the group.
3. I would like my Name and Call sign available on the CRG Web Site(s).

Signed.....

Please make cheques payable to the “Cambridge Repeater Group” and send to  
Hon. Treasurer: - Mrs. J A Dyke, 76 Gaunts Way, Letchworth, Herts. SG6 4PL

Thank you for you support

\* Callsign that will be used on your membership card

\*\* Callsign’s that will be included in any list of members which may be issued by the group or available on the CRG’s Web Site(s)

# A Courtesy Call

In response to a member's letter read out at the AGM, there was a short discussion amongst those present about operating procedures on our voice Repeaters, particularly GB3PI.

With the introduction of the new Foundation licence, amongst other recent changes, many more operators are coming into the hobby; we should all do our best to make them feel welcome.

The problem is that some more experienced operators, who should all know better, are less than sympathetic towards these new licensees. This ranges from not acknowledging them to criticism verging on abuse instead of offering help and advice on how to improve their station. It must be remembered that many of these operators are limited to 10W power, and may be out of the coverage area of the Repeater, or using an inefficient aerial. Another failing is the length of time the newcomer may have been listening in vain, hoping to hear a callsign from users of the Repeater - you know who you are, and so do the friends you are talking to, but a new listener won't have a clue!

I remember when I was first licensed, and the number of mistakes I made. It was only with the help of fellow amateurs that I progressed, even managing to pass the Morse test. Please think back to when you were a newcomer, and offer the help and guidance you appreciated then.

Terry Bickell G0UIO

A handwritten signature in cursive script, appearing to read 'Terry Bickell', with a long horizontal flourish extending to the right.

## Information Wanted

A reward is offered for information leading to the arrest of Eddy Current, charged with the induction of an eighteen year old coil named Millie Henry who was found half choked and robbed of valuable joules. Armed with a carbon rod, he escaped from a Weston Primary Cell, where he had been clapped in ions. The escape was planned in three phases. First he fused the electrolytes, and then climbed the grid in spite of high impedance from the warders. He is believed to have gone to earth in a magnetic field, and has not been seen since Faraday. What seems most probable is that he stole an A.C. motor, but as this is of low capacity he is expected to try and change it for a megacycle, and to return ohm by a short circuit. In the event of capture he may offer series resistance, as he is a potential killer.



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