



**ESSEX  
REPEATER  
GROUP**

**AN INTRODUCTION TO  
ERG's REPEATERS**

**GB3DA 2m  
GB3DB 6m**

**GB3ER 70cms  
GB3ZP 23cms**

**and**

**GB3CMS 10GHz Beacon  
G7GAN Packet Node**

**Essex Repeater Group on the Internet  
<http://www.essexrepeatergroup.org.uk/>**

# Introduction

## ESSEX REPEATER GROUP

ERG's roots go back to the inaugural meeting held on Jan-10 1975. It is a voluntary body wholly reliant on subscriptions and donations, whose aim is the provision and running of repeaters and beacons in Essex. ERG is affiliated to the RSGB and operates under the auspices of the RMC, and the RA to which it has statutory responsibilities.

In 1975 notable leading lights were Secretary Bill Pechey G4CUE, Treasurer John Rollason G3WCO and Chairman Colin McEwen G3VKQ. The first repeater GB3ER on 70cms (originally to have been called GB3MT) started operation in Sept 1976, followed by GB3DA on 2mtrs in Oct 1980.

For many years the equipment (which required much maintenance, care & attention) was based on the Marconi Tower on Little Baddow/Danbury Ridge. This site was lost (and is now no more) and the systems closed down there on Nov-2 1996.

Increasingly professional hardware has been used to achieve good performance and reliability. Whilst off air in 1996/7 a major rebuild led by Mike G4ZPE resulted in the present 19" racked format for DA/ER and a set of backup radios. Operation from the current site was approved on 22-Jul 1997

With the turn of the Millennium ERG has tried to expand interest and coverage by putting new systems on 6m and 23cms. ERG hopes you find this guide useful and informative.  
- and a form is included if you wish to support the repeaters and their running costs!

## ACCESS

- CTCSS** All ERG voice repeaters can be accessed with CTCSS Tone-H, 110.9Hz
- Toneburst** DA and ER can be accessed with 1750Hz toneburst of at least 250mS
- Shifts** Pay attention to the shifts - they vary in direction.
- Deviation** Do not over-deviate, especially on 2m and 6m
- Timeouts** All repeaters have a timeout. Warning pips on the output occur if you talk too long and exceed this, after which the audio is eventually cut. Access is then only possible after the carrier is dropped.

### **Ready for CTCSS Only ?**

The latest RA specifications state that as from Jan 1st 2004 all new UK Voice repeaters will only be accessible by CTCSS (as per the current 6m & 10m practice), and many others already require this. Please bear this in mind when considering older equipment, along with the requirements for narrowband FM operation etc.



## **ESSEX REPEATER GROUP**

## **MEMBERSHIP FORM**

**CALL SIGN** \_\_\_\_\_

**FULL NAME** \_\_\_\_\_

**ADDRESS** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**PHONE** \_\_\_\_\_

**E-MAIL** \_\_\_\_\_

Please complete the above and send a cheque or postal order for the sum of £9 (or £5 if you are a SWL or under 18yrs old) which should be made payable to ESSEX REPEATER GROUP to:-

Hon.Treasurer ERG  
Clive Ward G1EUC  
'White Wickets'  
6 Hopping Jacks Lane  
Danbury  
Essex CM3 4PN

Please include an SAE for confirmation and membership card

Please indicate if you do not wish your details to be held on computer (for ERG use only)

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# Voice Repeaters

<b>GB3DA</b> <b>2m</b>	<b>Input:</b> 145.125MHz	<b>Shift:</b> 600kHz
	<b>Output:</b> 145.725MHz	<b>BW:</b> 12.5kHz
	<b>Channel:</b> RV58 (R5)	<b>Ack:</b> 'K'

Now the lead system, GB3DA started operation on 2-Oct-1980 on the old Marconi tower on Danbury Ridge using ex GB3EL kit. Since then it has seen quite a change with logic, cavities and aerials all being replaced at least a few times. In 1996 it went off air when the old site was lost, whence it was extensively re-engineered into the current 19" rack format along with GB3ER. The revamped system resumed service on its present site in the summer of 1997.

In the late 1990s GB3DA was migrated from 25kHz to full 12.5kHz channel operation. The narrower IF bandwidth filters will cause unadjusted 25kHz users to be distorted or chopped out. The new channels created by the 12.5kHz changes are now in use by new repeaters bordering DA's coverage, and elsewhere around the country.

The radio units use boards from Tait T198s and the aerial is a 3dB Procom colinear. The original radio unit is known as DA-1 and its younger spare counterpart DA-2. Work on a more modern solution, DA-3, started in 2002 based on a pair of ADI AR-147 radios.

<b>GB3ER</b> <b>70cms</b>	<b>Input:</b> 434.675MHz	<b>Shift:</b> 1.6MHz
	<b>Output:</b> 433.075MHz	<b>BW:</b> 25/12.5kHz
	<b>Channel:</b> RU246 (RB3)	<b>Ack:</b> 'R'

GB3ER was the first repeater to go on air at noon on Sept 5th 1976 on RB-10. It is collocated with GB3DA and provides services to central/south Essex on 70cms.

The early GB3ER required constant maintenance and then had quite a troubled period. It was forced to shutdown and move frequency over June 1991-Nov 1992 due to interference issues. Eventually the current RB3 channel was allocated and approved. When GB3ER returned to service the old cavities had to be replaced, but the new ones proved to be too tolerance sensitive, resulting in a recurring desense problem. This was eventually resolved in Oct-1997 by a new Procom/Telewave cavity set, shortly after the move to the present site. It now operates through a single Procom 5dB colinear antenna.

The other engineering issues were resolved by a comprehensive rebuild whilst off air during the 1996/7 site move. At the same time a copy, ER-2, was also built to provide a backup radio unit. Both radio units are based on boards from Tait T196 radios. In 2002 work started on a more modern ER-3 based on a pair of ADI AR446 units.

When GB3DA was altered to 12.5kHz, GB3ER also had its output deviation reduced to make matters easier for users with adjusted dualband transceivers.

# Voice Repeaters

<b>GB3DB</b> <b>6m</b>	<b>Input:</b> 51.270MHz	<b>Shift:</b> 500kHz
	<b>Output:</b> 50.770MHz	<b>BW:</b> 10kHz
	<b>Channel:</b> R50-6	<b>Ack:</b> 'B'

The first of a new generation, GB3DB provides wide area coverage across Essex on 6m from a domestic site in Danbury. Coverage in fact extends into North Kent, upto Ipswich, and out East to the Dengie Peninsula. It thus fills a key gap in 6m coverage in the South East. Applied for in Sept-2000 and approved on Nov-14, GB3DB commenced extensive on-air tests in Aug-2001, with full operation to follow in 2002/3.

The repeater employs a Procom Telewave 6-cavity duplexer which at these frequencies is 2m tall. The rf unit uses a pair of Alinco DRM-06TH radios donated by W&S - one as receiver, and one as transmitter. As aerial gain is usually in short supply at 6m, it unusually uses LDF450 heliax to minimise feeder losses, resulting in excellent sensitivity. It is one of the first repeaters to use Mk3 G8CUL Logic.

As per all 6m repeaters, access is by continuous CTCSS tone only. Please ensure you do not over-deviate, as 6m channels are in 10kHz steps and adjacent ones are in use by neighbours GB3HF (Hastings R50-5) and GB3PX (Hertfordshire R50-7)

<b>GB3ZP</b> <b>23cms</b>	<b>Input:</b> 1291.225MHz	<b>Shift:</b> 6MHz
	<b>Output:</b> 1297.225MHz	<b>BW:</b> 25kHz
	<b>Channel:</b> RM9	<b>Ack:</b> 'Z'

Interest in 23cms in Essex has a long history. Adding a 23cms output to GB3ER was blocked by the RA in 1977. Interest remained, and occasional requests for a voice repeater were received in the late 80s and early 90s. However action was to await more definite plan and funds in 1999, resulting in an application in Jan-2000.

GB3ZP was the first new repeater to be licensed for a domestic site in the UK. Located on Rettendon Hill, the repeater is being built with the intention of encouraging activity on 23cms, and opening up an alternative to the increasingly under pressure 70cms band. Coverage is expected to shorter range than lower frequency systems, but some tests have shown surprisingly good results as high antenna gains at these frequencies can be easy to achieve.

In common with other ERG repeaters GB3ZP employs a high build standard in a 19" rack format. It also incorporates the first UK application of Procom/Telewave cavities on the 23cms band. As per GB3DB it uses the more recent Mk3 G8CUL logic controller. The transceiver is largely based on G3WDG modules, with separate units employed for Tx drive, Tx power amp and Receive downconverter (which feeds a 2m receiver). The antenna is a Procom 7dB vertical colinear.

# Other Systems

<b>GB3CMS</b> <b>10GHZ</b>	<b>Output:</b> 10.36896GHz	<b>Keyer Output:</b>
	<b>Location:</b> JO01HR	GB3CMS JO01HR S--(mark)--S
	<b>NGR:</b> TL 787 054	

The 10GHz Beacon was the third system ERG put on air in Feb 1990 following an application made in Oct-1988. Original construction was largely by Keith G4FUF. An indoor PSU/keyer unit runs a multicore feed to a masthead microwave Tx unit.

Problems were addressed later in 1990/1 when the rf units were replaced by Sam G4DDK, and later mated to a new omnidirectional slotted waveguide antenna in 1992, designed by Murray G6JYB. Further work took place in 1994/5.

When the old Danbury site was lost in 1996 it was the first system to be re-licensed, and restarted on 17-Jul-1997 from the nearby QTH of G1EUC. Whilst off air new waveguide runs and mods to the keyer unit were made by Mike G4ZPE and G6JYB.

Unfortunately, as it lies within the 100km Charing Cross radius, its transmitter power is severely restricted to 30mW. Despite the low power, favourable conditions have given us reports from the continent and west of London. An application to raise its power was made in May 1999, but like some other beacons, has so far not been approved.

## G7GAN Packet Node

ERG acquired the callsign G7GAN in Feb-1990 as a general group callsign for use on packet, group events or trials. (We also have G0LKW). After a long dormant period G7GAN was reused in Jan-2001 for an ERG packet node under the auspices of Clive Ward G1EUC in Danbury.

In addition to its use for normal packet operation, it offers a Teletext pages service similar in content to parts of the ERG website, where you can find news and info on ERG systems. Other forays with packet occurred in the late 1980s/early 90s inc GB7EP, but this was either terminated or transferred out of ERG as the packet network evolved.

## INTERNET

ERG was one among the first repeater groups to set up a website and make extensive use of email for both internal committee business as well as external contacts. The present website is one of the most extensive available and provides news, technical data, coverage maps and a very colourful gallery of ERG sites, equipment etc. Surf at:-

<http://www.essexrepeatergroup.org.uk/>

If you have a problem try the source at <http://www.swsystems.co.uk/erg>

# Equipment

## EQUIPMENT

Repeaters are unmanned slave stations which relay and amplify inputs signals over a broad area from a high vantage point. Two key features distinguish repeaters:-

- The ability to operate in full duplex (ie to transmit at full power without interfering with its own receiver), ideally with a single aerial.
- The use of Logic and signalling for controlling access, identification, timeouts etc.

Amateur bands are narrower than commercial ones resulting in small Tx/Rx frequency separations and particularly challenging filter requirements. All ERG voice repeaters now use Procom/Telewave 6-cavity duplexer sets and feature single aerial working. GB3DA got professional cavities in mid 1993, ER in 1993 and better ones in Oct-1997.

As per the latest specs, both our 6m and 2m repeaters (GB3DB and GB3DA) are narrow bandwidth operation. Users with unadjusted or older radios with high deviation can find they will get chopped out by the IF bandwidth filters.

### Logic

The logic now in use on all the voice repeaters is of the G8CUL variety. All told ERG has five CUL units. A pair of Mk2s run GB3DA/ER, and a spare Mk2 is normally configured for DA. The new 6m and 23cms systems are amongst the first to use Mk3 units. The logic times out users after a given time, and will not permit access until the carrier is dropped. Approach and expiry of timeouts are indicated by pips and acks on the repeater output. On shutdown and idents the callsign and CTCSS letter (Tone 'H' dit-dit-dit) is sent.

### Acknowledgement Tones

Commonly known as 'acks', most repeaters use 'K's, which GB3DA also does. On other ERG systems this has been modified for the benefit of users with multiband radios so that each repeater has distinctive acks:-

GB3DA 'K' dah-dit-dah  
GB3ER 'R' dit-dah-dit

GB3DB 'B' dah-dit-dit-dit  
GB3ZP 'Z' dah-dah-dit-dit

Additional information and pictures can be found on the ERG website. Committee members are willing to deal with questions, and give talks to local societies.

Other systems in Essex are in Clacton/Colchester(GB3CL/TE). A new 'widespaced' 70cms repeater for North Essex is being introduced in Braintree (GB3BZ), whilst the replacement of the former 70cms system at Brentwood (EB) is under investigation.