



# **ESSEX REPEATER GROUP**

## **AN INTRODUCTION TO ERG's REPEATERS**

**GB3DA 2m  
GB3DB 6m**

**GB3ER 70cm  
GB7ZP 70cm D-Star**

and

**MB7IDA 2m Echolink  
GB3CMS 10GHz Beacon  
GX7GAN Group Call**

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

**Twitter: @EssexERG**

# 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 RSGB-ETCC, and Ofcom to which it has a number of obligations.

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 Wheaton 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 developing new systems on 6m, 23cms and D-Star. 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!

## REPEATER ACCESS

- CTCSS** ERG FM voice repeaters can be accessed with CTCSS Tone-H, 110.9Hz
- Toneburst** This is being phased out. GB3DA and GB3DB are continuous CTCSS-only
- Shifts** Pay attention to the frequency shift - they are different on each system.
- Deviation** Do not over-deviate, especially on 2m and 6m
- Timeouts** Repeater 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 specifications state that CTCSS is the primary means of access for all UK FM Voice repeaters. Many are now only accessible by CTCSS (as per the current 6m & 10m practice. Please bear this in mind when considering older equipment, along with requirements for narrowband FM operation etc.



## ESSEX REPEATER GROUP

## MEMBERSHIP FORM

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

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

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

**PHONE/MOBILE** \_\_\_\_\_

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

**DATE** \_\_\_\_\_

Please complete the above and send a cheque for the sum of **£12** which should be made payable to ESSEX REPEATER GROUP to:-

ERG Membership Secretary  
Joel Alderman G0URK  
9 Wiggins View, Chancellor Park  
Chelmsford  
Essex CM2 6GP

Please include an SAE for confirmation and membership card

**PayPal:** You can also pay online on the ERG website via PayPal – but please remember to include your full contact details/address to help our records.

Members of the Group need to abide by the ERG Constitution and are entitled to vote at the AGM. Further information on the group is available on our website:-

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

Note that details are stored on a database for purposes of administration and will NOT be disclosed to any 3rd party.

# Voice Repeaters

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

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. In July-2013 access was migrated to CTCSS-only after toneburst was disabled.

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. A more modern development, DA-3, is based on a pair of ADI AR-147 radios.

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

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 June1991-Nov1992 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 de-sense 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.

A newer generation of hardware is used in ER-3, which is based on a pair of ADI AR446 units and is CTCSS-only like GB3DA.

# Voice Repeaters

<b>GB3DB</b> <b>6m</b>	<b>Input:</b>	<b>51.270MHz</b>	<b>Shift:</b>	<b>500kHz</b>
	<b>Output:</b>	<b>50.770MHz</b>	<b>BW:</b>	<b>10kHz</b>
	<b>Channel:</b>	<b>R50-6</b>	<b>Ack:</b>	<b>'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, up to 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. It is one of the first repeaters to use Mk3 G8CUL Logic. Antenna gain and efficiency is a real challenge at 6m. GB3DB makes a major effort at this to compensate as far as possible for low gain verticals used by users/mobiles.

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

<b>GB7ZP</b> <b>70cms</b>	<b>Input:</b>	<b>430.4875MHz</b>	<b>Shift:</b>	<b>9MHz</b>
	<b>Output:</b>	<b>439.4875MHz</b>	<b>BW:</b>	<b>12.5kHz</b>
		<b>D-Star Digital Voice</b>		

D-Star (Digital Smart Technologies for Amateur Radio) is a new standard originating from JARL in Japan. GB7ZP is ERG's newest system, providing D-Star Digital Voice capability. Originally planned for Mike G4ZPEs Rettendon qth, the application was updated to a more central location at G1EUCs Danbury qth and first licensed in September 2008. In 2015/6 it moved to Chelmsford after the sad passing of G1EUC

GB7ZP is based on a pre-assembled unit courtesy of Icom-UK and W&S. This has had some attention applied to raise its sensitivity. The first phase of its career was as a standalone rf repeater.

D-Star has particular benefits when it is Internet linked. Work on a professional 1U 19" Linux Gateway subsequently got underway, as did considerable IT modernisation on site and the Gateway was commissioned in time for the London 2012 Olympics.

The gateway uses the Icom G2 software and linking requires that the user be registered on the D-Star network for internet links. The ERG webpage for GB7ZP includes a quick D-Star guide and links for the gateway status and 'lastheard' user list. Overall - D-Star has the highest coverage of any DV mode in Essex with a number of other repeaters and gateways available.

# Other Systems

<b>GB3CMS</b> <b>10GHz</b>	<b>Output:</b> 10.36896GHz	<b>Keyer Output:</b>
	<b>Location:</b> JO01GQ09	Mode: F1A CW ID
	<b>NGR:</b> TL 730 039	

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.

The 100km Charing Cross radius, limited its original transmitter power to 30mW. However even at these levels, favourable conditions could give reports from the continent and west of London. A power increase was approved in May 2007 leading to a further upgrades assisted by G8ACE & G4DDK. In 2016 it moved to Chelmsford with GB7ZP and MB7IDA

## GX7GAN Call, MB7IDA Echolink, MB6CE D-Star

ERG acquired the callsign G7GAN in Feb-1990 as a general group callsign for use on packet, group events or trials. After a long dormant period G7GAN was reused in 2001 for a packet node. More recently GX7GAN is used as a Group call, or for test work.

MB7IDA Echolink (Node 265297, operating on 145.3375MHz, 110.9Hz CTCSS) was originally operated by. Clive G1EUC at Danbury and supported by ERG. Since his sad passing, ERG now run this from the same site in Chelmsford as GB7ZP

MB6CE in Chelmsford is run by Joel G0URK and is on 144.8125 MHz, complementing GB7ZP and other D-Star systems

## 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/>

and follow us via Twitter: @EssexERG

# Equipment

## EQUIPMENT

Repeaters are unmanned slave stations that 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. ERGs FM 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. GB7ZP utilises a smaller commercial Procom set.

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.

### **Control Logic**

The logic now in use on all the FM voice repeaters is of the G8CUL variety. In total, ERG has five CUL units. A pair of Mk2s run GB3DA/ER, and a spare Mk2 is normally configured for DA. The 6m and 23cms systems were 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

GB3DB: 'B' dah-dit-dit-dit

GB3ER: 'R' dit-dah-dit

GB3ZP: 'Z' dah-dah-dit-dit (not in use)

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 FM repeater systems in Essex are in Clacton/Colchester(GB3CL/TE). A wide-spaced 70cms repeater is operated by the Braintree club (GB3BZ), whilst W&S is home to D-Star system GB7SS at Hockley. Other digital systems include DMR and Fusion