



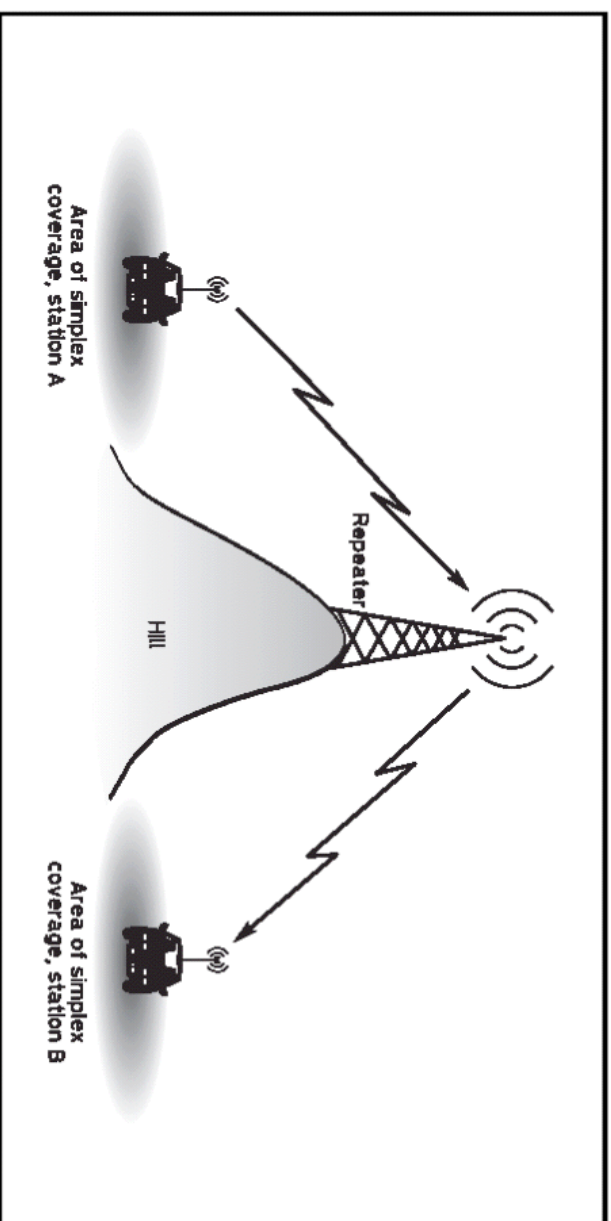
Chelmsford Amateur Radio Society & Essex Repeater Group

Foundation Course Repeaters/CTCSS



Repeaters - Introduction

- Repeaters extend ranges across counties, over hills etc.
- Most useful for handheld and mobile users.
- The UK has over 300 Voice and 50 TV Repeaters
- Some may also be linked via the internet



How a repeater can increase the distance the can be covered.

**Popular Voice Repeater bands are
145MHz (2m) and 430MHz (70cms)**



Repeaters

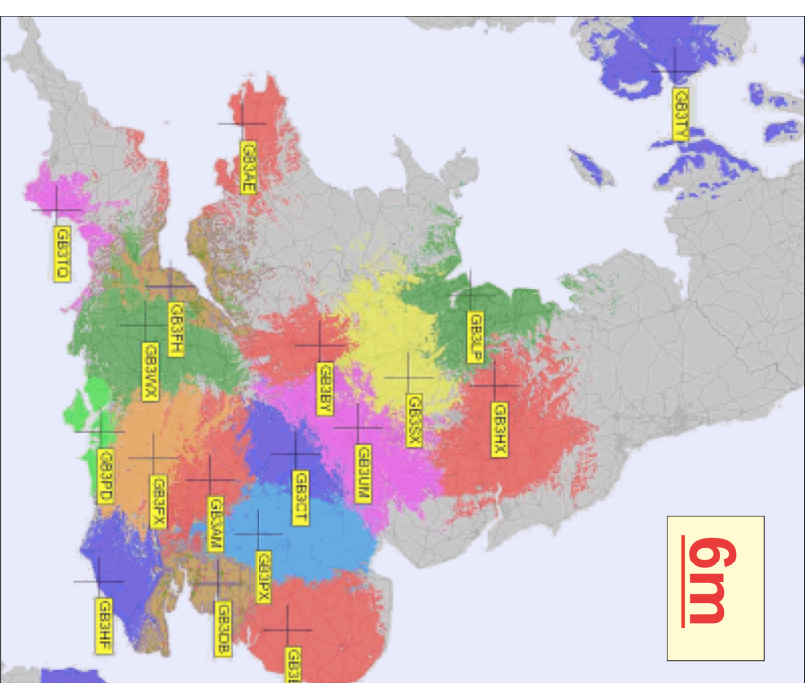
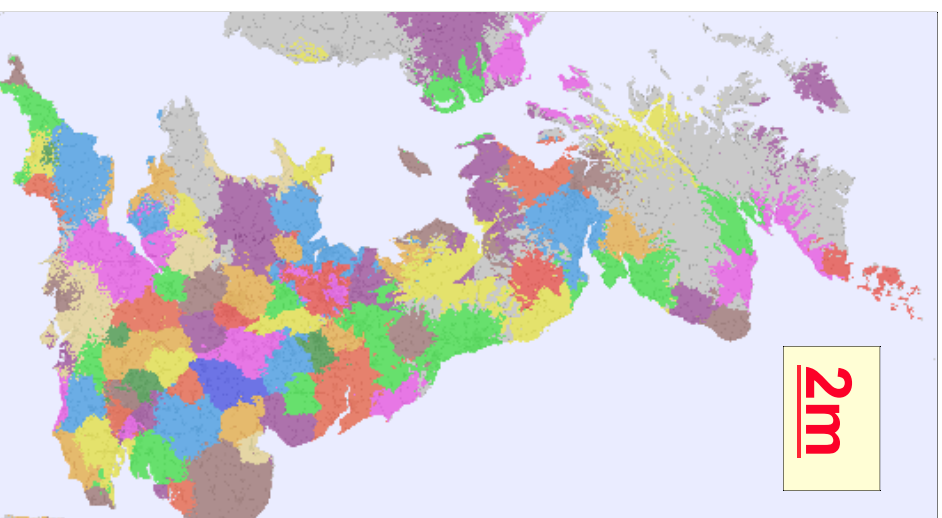
- Foundation Syllabus requires only a limited knowledge of CTCSS and how to access an analogue FM repeater.
- These slides enhance this as you will find Repeaters useful for extending range at VHF/UHF, especially when handheld/mobile.
- All repeaters are run by volunteers under special permits/NovS from Ofcom and coordinated by the RSGB-ETCC*
- Repeater frequencies, listings and maps are in the RSGB Yearbook and on the ETCC Website at www.ukrepeater.net

* RSGB Emerging Technology Coordination Committee



Repeater Coverage

- Coverage by 2m and 6m Repeaters
- On 70cms there are lots !
- TV is mainly on 23cms
- Same colours show how frequencies are re-used





FM Repeater Basics

- Repeater have a frequency difference between Input and Output so they can transmit at the same time as receiving. For example:
 - 2m Repeaters transmit 600KHz above their input frequency
 - 70cms Repeaters transmit 1.6MHz or 7.6MHz below their inputs
- The frequency offset direction varies with different bands
 - Up or Down - check the listings on the web or RSGB Yearbook
- Repeaters have control 'Logic' to detect valid accesses, generate regular Morse idents, timeout lengthy overs etc
- Audio tones control access so that the repeater does not accidentally re-transmit unwanted/interfering input signals
 - 1750Hz Toneburst or CTCSS will be needed



Accessing Repeaters

- **Accessing a repeater requires radios to be set up for:-**
 - Suitable RF frequency offset or 'shift'
 - Appropriate audio access tone (CTCSS or 1750Hz Toneburst)
 - **Your Radio is nominally set to the repeater output and then applies an offset or shift when you transmit. Example:-**
 - Repeater GB3DA is 145.125MHz Input, 145.725MHz Output
 - This is a 600KHz offset
 - Users Radio is set to 145.725 with a -600KHz RF shift and a CTCSS audio tone to access it
 - **Best to set Local Repeaters up in Radio Memories !**
 - **It is good practice to give your callsign on most overs.**
 - **Repeaters time out and cut audio - keep overs to 2mins!**
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Repeaters In Essex

- Repeaters in central Essex are run by **Essex Repeater Group** and sited around Danbury Hill to maximise coverage
 - **FM**: GB3DA - 2m, GB3ER - 70cms GB3ER, GB3DB - 6m
 - **D-Star**: GB7ZP -70cms **
- **ERG website**: <http://www.essexrepeatergroup.org.uk/>
- Repeaters are not funded by the RSGB, they are run by volunteers. Regular users are encouraged to subscribe to repeater groups to help pay running costs, insurance etc
- **Other Essex repeaters are at Clacton/Braintree and Hockley**

****D-Star - Digital Smart Technologies for Amateur Radio - GMSK Digital Voice not FM**



CTCSS

- **CTCSS** - **C**ontinuous **T**one **C**oded **S**quelch **S**ystem
- It is a more modern alternative to 1750Hz Audio Toneburst
- CTCSS is mandatory on 6m systems and newer FM repeaters
- CTCSS is a low frequency tone which is continuously transmitted as part of your Audio (almost sounds like faint mains hum)
- A range of precise tone frequencies are defined and repeaters will only accept their official tone in order to block interference.
- Repeater operators also put CTCSS on their outputs, so users own radios can ignore unwanted signals or idents – Tone-Squelch



CTCSS Frequencies

- Each County in the UK nominally has a Tone allocated to it
- Example: Essex is CTCSS Tone-H 110.9Hz, but do check as sometimes there are exceptions (eg in Clacton)

Tone A = 67.0Hz

Tone B = 71.9Hz

Tone C = 77.0Hz

Tone D = 82.5Hz

Tone E = 88.5Hz

Tone F = 94.8Hz

Tone G = 103.5Hz

Tone H = 110.9Hz

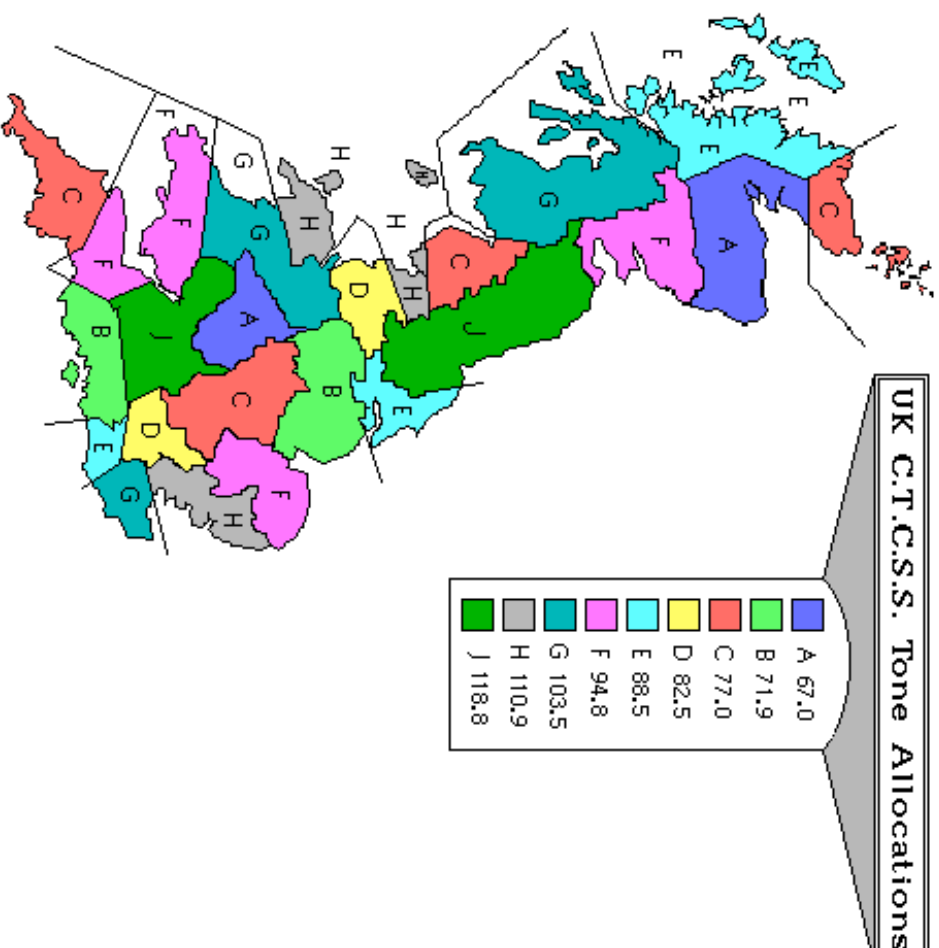
Tone J = 118.8Hz

NB: Echolink systems may also use this system



CTCSS Map

- These are the nominal CTCSS tone allocations:-
- Remember, there are exceptions
- Check Repeater Details on ETCC website or RSGB Yearbook





GB3DA & GB3ER

2m / 70cms

Radios, Cavities & Logic

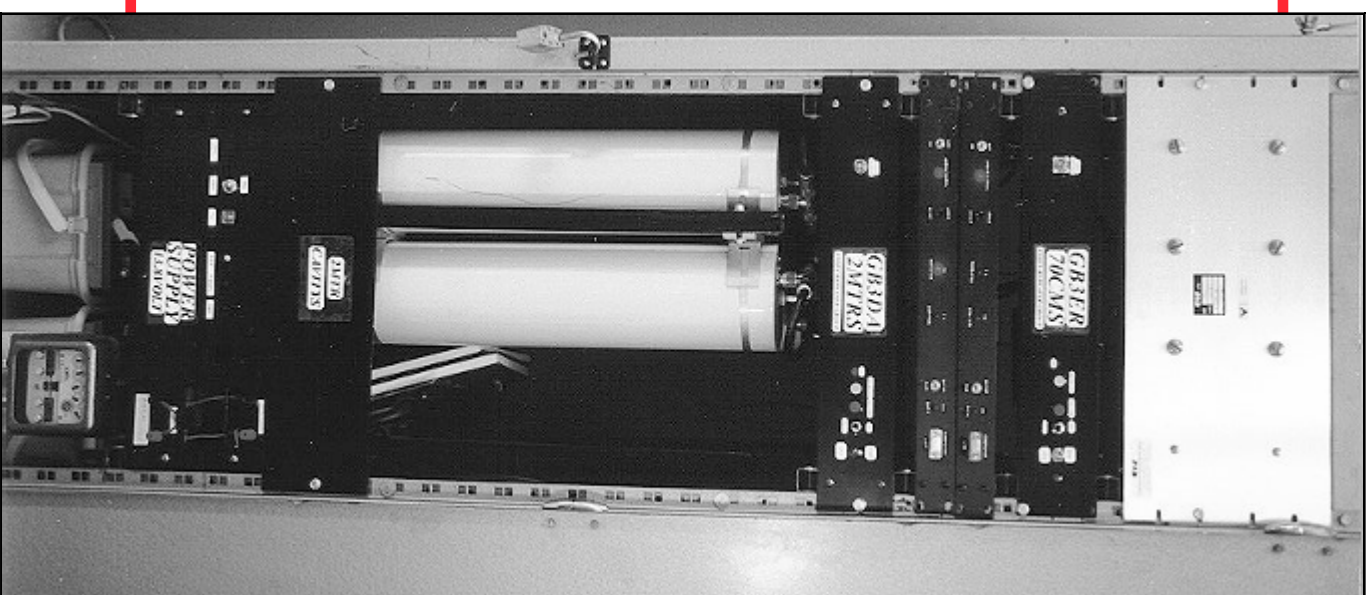
Input / Output

GB3DA: 145.125 / 145.725 MHz

GB3ER: 434.675 / 433.075 MHz

Chelmsford Amateur Radio Society
Foundation Licence Course

Murray Niman G6JYB





**6 Cavity
Procomm
Duplexer:-**

**3 on Tx
3 on Rx**

**Nice
But
Pricey
!**



GB3DB - 6m

In / Out

51.27 / 50.77 MHz

