

Operating Procedures & Practice (op2/3)**Natural and Manmade aids to communication**

Radio communication usually just involves two operators but they often take advantage of natural features:

HF long distant contacts use signals refracted by the ionosphere.

VHF operators manage to get, normally line of site signals to go around corners by reflecting them off hills, cliffs etc. It is even possible to reflect VHF signals off the surface of the moon to reach distant parts of our earth!

However, many Amateurs communicate using artificial aids, built by fellow Amateurs, such as repeaters and satellites. (Foundation Licencees may not use satellites)

Repeaters

A repeater is a relay system. It receives a signal and re-transmits it on another frequency.

Repeaters were introduced to increase the range of mobile communication. There are many repeaters around the country and they operate mainly in the 144 MHz and 430 MHz Amateur Bands.

Split Frequencies

There are 8 repeater channels (R0 - R7) in the 145 to 146 MHz band. There is 600 kHz between the repeater input frequency and the repeater output frequency.

For example, a repeater that is allocated R1 would receive on 145.025 MHz and re-transmit on 145.625 MHz. Therefore Amateurs wishing to use this repeater must use a transceiver that can transmit on 145.025 MHz and receive on 145.625 MHz.

In the case of repeaters in the 430-440 MHz Amateur Band the repeater frequency split is -1.6 MHz, in this country.

The repeater receiver is switched on continuously but its transmitter is only activated when the repeater is correctly accessed.

Channel names of R0 to R7 applied to 25kHz channel spacing. In the new scheme of 12.5KHz channel spacing the names are in the range RV48 to RV62

Actification of a Repeater

An Amateur, wishing to have a conversation via a repeater, should use a transceiver that with a repeater access tone of 1750Hz. The tone is sent for about half a second at the beginning of the transmission. This is either activated automatically when the microphone PTT is pressed (in repeater mode) or manually by pressing a 'tone' button.

This access system has been in use for many years, and as the number of repeaters has increased, has exposed a disadvantage...

If an Amateur is in range of two repeaters on the same frequency then would both be activated; one unnecessarily. This happens even though repeaters, on the same frequency, are spaced as widely as just eight repeater channels permits.

CTCSS

Recently another access system has been developed using very accurate low frequency tones.

The frequency allocated to the intended repeater is fitted to the Amateurs transceiver. This LF tone is continuously superimposed on the transmitted speech. The tone activates the repeater transmitter but is not normally heard as it is lower than the usual range of speech frequencies.

There are ten CTCSS tones ranging from 67.1 Hz to 118.8 Hz.

The repeater network is planned so that those on the same channel utilise a different CTCSS frequency.

Thus only the repeater that is fitted with the identical CTCSS tone as the user will be activated.

It is not permitted to use a secret access code that would restrict the use of the repeater to the few in the know.

Usage of repeaters

Repeaters were designed to improve mobile to mobile (or mobile to fixed) communication over difficult terrain. Fixed stations can use repeaters to contact other fixed stations on the understanding that priority should be given to any mobiles that appear on the frequency. In all cases, a gap should be left between one person finishing to speak and the other person starting. The repeater will then (normally) send a "K" in Morse. This resets the repeater timer and encourages a gap for newcomers to announce their presence.

Repeater Ident & Close Down

A repeater, being an unmanned transmitter, must identify itself regularly. This is usually in Morse code but it could use synthesized speech. As with other unattended operation there must be a quick procedure for tuning off the repeater if a problem develops.

Satellites

Amateur satellites are "repeaters in the sky"!

Unlike domestic TV satellites they are generally not geo-stationary. IE, as far as we on earth are concerned, Amateur Satellites move.

An Amateur wishing to use an Amateur Satellite needs to study details about its orbit. This is necessary to be able to predict when it will be in range and which direction his aerial should be pointed. The aerial is then moved slowly to track the satellite across the sky.

Transponders

Amateur Satellites receives a band of frequencies in one Amateur Band and transponds it to another Amateur Band.
Each band can accommodate many Amateur conversations.

Satellite Power

There are no 13 Amp 3 pin sockets in space! The radio transmitter and receiver are powered from batteries charged by solar cells.
The transmitted power is proportional to the strength of the received signal.
Many Amateurs can use a Satellite at the same time as a broad band of frequencies is transponded. However, the transmit power is shared by all those using it.

To conserve power, the preferred modes of communication are CW or SSB. For the same reason Amateur satellite operators should not use high transmit power.

[QUESTION 7]

The main purpose of an Amateur repeater is to:

- A) extend communication from home address
- B) improve mobile to mobile communication
- C) reduce the size of home station aerials
- D) to allow the use of low power

[QUESTION 8]

A repeater can be accessed with a tone burst of:

- A) 1750 Hz
- B) 1750 kHz
- C) 1570 Hz
- D) 1570 kHz

[QUESTION 9]

A repeater operating with a transmit frequency of 145.650 MHz would have its receiver tuned to:

- A) 144.650 MHz
- B) 144.050 MHz
- C) 145.050 MHz
- D) 145.650 MHz

[QUESTION 10]

Amateur Satellites are usually:

- A) in geostationary orbits
- B) powered by solar cells
- C) activated by access tones
- D) expected to have 50 year life

[QUESTION 11]

An Amateur Satellite:

- A) could transpond from 144 MHz band to 28 MHz band.
- B) can be returned to earth for its annual routine tests
- C) requires an access tone of 1750 Hz
- D) is often energised by wind power

[QUESTION 12]

A typical callsign allocated to an Amateur repeater is:

- A) G5KS
- B) GR3KS
- C) RP3KS
- D) GB3KS

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Operating Procedures & Practice (OP3)

The Phonetic Alphabet

Face to face communication is not just a case of listening to what is said. The effects of extraneous noises can be mitigated by a degree of lip reading and attention to body language.

With radio communication the receiving operator is restricted to what is heard. Under difficult reception conditions it can be impossible to distinguish similar sounds.

This is particularly true for callsigns and when it is necessary to spell out words.

The letters B, C, D, E, G can sound the same, as can J & A and Y & I. This problem is overcome by using a phonetic alphabet.

There have been various versions but the following is recommended:

| | | | | | |
|---------|------------|-----------|-----------|----------|-----------|
| A Alpha | B Bravo | C Charlie | D Delta | E Echo | F Foxtrot |
| G Golf | H hotel | I India | J Juliett | K Kilo | L Lima |
| M Mike | N November | O Oscar | P papa | Q Quebec | |
| R Romeo | S Sierra | T Tango | U Uniform | V Victor | W Whiskey |
| X X-ray | Y Yankee | Z Zulu | | | |

An example of Phonetics in use is Golf Four Echo Golf Quebec....

Q codes

In order improve the efficiency of Morse code communication, throughout the world, Q codes are used.

They are a series of codes, all commencing with Q, that represent a statement or question. Each Q code, there, has two meanings.

For example, "QTH..." means my location is...

"QTH?" means what is your location?

Q codes are not designed to be used in speech communication but they often creep into Amateur (slang) conversation.

Abbreviations

There are a large number of other abbreviations used (correctly) by Amateurs during Morse communications.

For example FER is used instead of FOR. An "E" in Morse code is a single dit whereas "O" is 3 dashes. This speeds up this frequently used simple word.

Radio Amateurs should be familiar with the Q codes and Morse abbreviations that are listed in Radio Amateur Examination Manual.

[QUESTION 13]

Spell your home town phonetically.

[QUESTION 14]

What is the meaning of: QRO; QRT?; QRZ?; QTR.

[QUESTION 15]

What is the meaning of:

GM OM. HW WX? XYL CLD FER lunch. CUAGN 73 Pete

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