

STARLITE

The Award Winning Newsletter for Members and Friends of

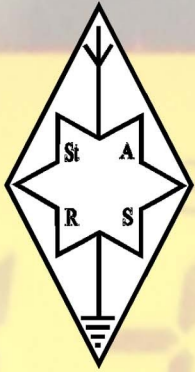
Stourbridge and District Amateur Radio Society

Incorporating

**Old Swinford Hospital
School Radio Club**



Old Swinford
Hospital



G6OI
G6SRS

G4CVK

Issue Number 08/2016

Stourbridge and District Amateur Radio Society

Meetings Held at

Old Swinford Hospital School

Heath Lane

Stourbridge

(8:00pm to 10:00pm)

Visitors always welcome

*The Society holds its full meetings
on the 1st and 3rd Monday each month*

RSGB Affiliated Society

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Word from the President

Well finally we've had some decent weather and some people have actually risked calling it summer, let's hope it stay around for a while (by the time you read this it will probably be raining again!) We had good weather for the BBQ and a good attendance, and there was just enough water left over from the rain for playing in the puddles. If you haven't seen the videos of this, I'm sure Wayne will be happy to show you.

The last few meetings have also seen a lot of use of the radios and the club actually getting on air. You will be aware that I said we'd have a competition and I'd try and arrange a prize for the person making the most contacts. Rather usefully, we have also been donated a prize that is now looking for a winner. So make sure you're getting on air and racking up the contacts. The winner will be based on the shack log entries, so make sure you log everything and make a note of the operator in the log books.

Coming up soon we have lots happening and being arranged. We're going up on the roof again to do some more aerial work on the 30th July, so if you're reading this before then and want to help out, give us a shout and come along.

John is going to invite Steve Turner (who did the medical Imaging Technology talk in June) if he'll come and give us the follow up talk - if you missed the first talk, he was very good, so don't miss this one. Hopefully, he'll be here for the September or October talk night. I'll let you know as soon as this is confirmed.

SSB Field day is also coming up in September, so be prepared to be volunteered to help with that - hopefully the weather will hold and be another great weekend like last year.

We're also looking at the possibility of running a special event station for International Air Ambulance week which is 17th to 25th September.

More information on these events will be emailed out to you as they are confirmed.

Oh and I left the best bit until last - "What is this prize?" I hear you ask....

Well it's a really good one. Moonraker Limited have kindly donated to us a super little dual band radio – MT-270M (see Issue 07/2016) - so get yourselves on the rigs and get those contacts made.

The views expressed in STARLITE may not be those of the committee - Stourbridge and District Amateur Radio Society

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Editors Comments

Not a lot for me to say this month I think that Tim has beaten me to it.

The smart phone seems to have acquired a new use. Once upon a time it was just for phone calls, now its main use seems to be Pokemon hunting. I did not believe this until James (G7HEZ) supplied me with two recent club phonographs.

A master class in how to track Pokemon down using a HF rig,



It was only a rumour but someone said there was a Piikachu (google it if you don't know what this is) by the phone box!



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Brush up your theory

Answers to last month's:

Question 1	B.	Question 2	C.	Question 3	C.	Question 4	C.
Question 5	C.	Question 6	C.				

This month's questions:

1. When tuning in CW mode you receive a S9 signal which is unmistakably speech but too squawky to be intelligible. As you continue to tune, the speech becomes audible over two very sharp tuning ranges. Assuming a properly aligned receiver, the station is transmitting in:
(a) AM.
(b) SSB.
(c) RTTY.
(d) FM.
2. All radio receivers contain a:
(a) demodulator.
(b) loudspeaker.
(c) frequency multiplier.
(d) audio amplifier.
3. A USB signal is received when switched to LSB. The result is described by:
(a) the demodulated signal is unintelligible.
(b) only some parts of the signal are unintelligible.
(c) the S-meter does not indicate a signal.
(d) the tone of the demodulated signal is low.
4. A receiver is tuned to an FM telephony signal. If the squelch control is reduced, the effect will be:
(a) the same as increasing the RF gain.
(b) the same as reducing the RF gain.
(c) to reduce the S-meter reading.
(d) the tone of the demodulated is low.
5. A multimode receiver has a narrow bandwidth facility of 500 Hz. For which mode of reception would it be used?
(a) AM reception.
(b) FM reception.
(c) SSB reception.
(d) CW reception.
6. Which of the following frequencies of tone would be for receiving Morse code?
(a) 800Hz.
(b) 50 MHz.
(c) 10 kHz.
(d) 10 MHz.

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Ofcom Online Licensing is back

The Ofcom online licensing system has been offline for over 2 weeks but the new system is now available

First time around you will need to re-register with exactly the same email address you used to use on the old system so they can match you up (old passwords are not carried across).

The new Ofcom Amateur and Ships Radio Licensing Portal is available at <http://licensing.ofcom.org.uk/radiocommunication-licences/online-licensing-service/>

The Ofcom website says: If you have forgotten or changed your email address, please contact us on 0300 123 1000 or 020 7981 3131 or email spectrum.licensing@ofcom.org.uk

First Radio Hams



First Radio Hams / Amateurs

The foundations in history of amateur radio or ham radio starts were set in place with some of the early discoveries.

Just before the end of the 1800s, there was a high level of interest in the new and almost magical demonstrations of wire-less technology. This interest played a significant role in the history of amateur radio.

There were even public demonstrations and this fired the interest of a number of private people, some of whom would become the first radio amateurs.

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First radio amateur

Around the turn of the 19th / 20th century, wireless was totally unregulated. Even scientists were struggling with how it worked and what it could be used for. As a result, unlike today, no licenses were required. Anyone could build a transmitter and receiver and experiment.

In view of this freedom, people started to build their own equipment and experiment. It is difficult to ascertain with exact certainty who was the first radio amateur because no records were generally taken.

However the first recorded "amateur radio" station could have been that of M.J.C. Dennis in London, UK in 1898. He heard about the experiments being conducted by Marconi and as a result he set up his own station at Woolwich Arsenal in East London.

Dennis claimed that his was the first non-professional wireless station in the world - and in this way he was the world's first radio amateur. This claim appears not to have been challenged. Later Dennis held the call DNX and afterwards he moved to Eire. Here he held the call EI2B and was reputed to also have been the first Irish amateur radio station. He also became the first president of the Irish Radio Transmitters' Society, IRTS.

Magazines inspire first radio amateurs



The interest in wire-less transmission spawned a large number of magazine articles and books giving practical details of how wire-less equipment could be built.

In January 1898 a magazine entitled called "The Model Engineer and Amateur Electrician" included an article by Leslie Miller AIEE which gave details of experiments for amateurs. In it there were details of basic transmitting and receiving apparatus.

Model Engineer & Amateur Electrician January 1898

The article was entitled "Some Interesting Experiments for Amateurs" and it starts by saying: "When amateur electricians read in the daily newspapers that a special grant of money was asked for in Parliament for carrying out experiments with Marconi's apparatus for signalling without line wires and that a skilled staff had all the resources of the British Post Office at command, they probably thought trials on their own were out of reach."

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Miller uses the article to describe this was not so and that radio amateurs, or as he referred to them, amateur electricians, could still take part and perform amateur experiments on their own.

Miller went on to publish more articles in later editions, indicating that he too was one of the first radio amateurs or first radio hams.

Although there is no record of him claiming to be the first radio amateur or to have the first ham radio station, he was certainly amongst the very first amateurs, if not the first along with M. J. C. Dennis.

Within the USA the interest started to arise and this can be seen by the publication in the American Electrician dated July 1899 in which an article entitled "The Apparatus for Wireless Telegraphy" by Professor Jerome J Green. In this article, Professor Green detailed the apparatus required for a transmitter, a receiver (using a coherer) and the antenna.

Book publications

A book called "Wireless Telegraphy and Hertzian Waves" by S. Bottone published just after the turn of the century gave a comprehensive explanation about the subject as well as detailing how the necessary apparatus could be constructed. Typically a coherer could be made from a glass tube, a couple of corks for either end, some iron filings and two copper wires. Descriptions for making transmitting apparatus were also included.

These very practical explanations of how to build wire-less equipment further fuelled the public interest.

Who was the first radio ham?

It is very difficult to ascertain who really was the first radio amateur. At the time there was no definition of what a radio amateur was, let alone anyone recording the records. Some say it could have been Marconi, when he started experimenting at home as he certainly was not a professional then. Others even say it may have been Professor D E Hughes who made a spark transmitter at home without knowing the medium that enabled him to detect sparks in a remote receiver. Was it M.J.C Dennis DNX, EI2B who set up an amateur station in East London, or was it Leslie Miller who wrote for the Model Engineer & Amateur Electrician. It could even have been somebody else.

What is certain is that many people started to experiment towards the end of the 1800s, and this interest began to grow - the history of amateur radio shows at this point the hobby started to become established.

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Digital Voice Communication (Part Two)

By Philip Cadman G4JCP

Voice Fidelity

Let's be honest, digital voice at 2,400bps does not sound wonderful. And the AMBE vocoder suits some peoples' voices better than others. However, as for intelligibility, in some circumstances digital voice can beat analogue f.m. Because the AMBE and similar vocoders isolate the characteristics of human speech, you get transmit noise reduction for free. In noisy environments - like in a vehicle - this noise reduction can help make the received signal easier to listen to. Furthermore, the received audio exhibits no discriminator noise like you get when receiving a weak analogue f.m. signal. At the limit the received audio either breaks up into an unintelligible racket or the set goes silent.

In short, with strong signals analogue f.m. will give the best fidelity. And at the very limit, analogue f.m. may be copyable whereas digital voice will fail. But where the signal is just so-so, digital voice can be more intelligible, and due to the lack of both transmitted and discriminator noise, it can be easier to listen to for long periods.

System Fusion

System Fusion is relatively new and so I have little personal experience of it. However, looking at the specification and seeing what other amateurs have said about the mode, it appears to be an improvement over D-Star. Figure 1. applies equally to Fusion as to D-Star, the only significant difference is the modulation method. Whereas D-Star uses two-level f.s.k. (GMSK), Fusion uses a version of four-level f.s.k. called C4FM. That's short for Continuous 4-Level Frequency Modulation. Instead of the bit stream being transmitted one bit at a time, the bits are grouped into pairs and transmitted two bits at a time. So the symbol rate is half the bit rate.

To mention some numbers, transmitting '00' causes the carrier to shift +900Hz, '01' shifts the carrier +2,700Hz. And '10' and '11' cause the carrier to shift -900Hz and -2,700Hz respectively. The total transmitted bit rate is 9,600bps, but the symbol rate is the same as D-Star: 4,800 symbols per second. However, because the maximum frequency shift (5,400Hz) is around double that of D-Star, the transmitted bandwidth just about doubles too. Even so, the bandwidth is comparable to a 12.5kHz analogue f.m. transmission.

Fusion uses a slightly improved version of the AMBE vocoder which should give a marginal improvement in fidelity. Actually, this newer AMBE vocoder generates a pure voice bit rate of 2,450bps mixed with 1,150bps of FEC, giving the same combined bit rate of 3,600bps. Another difference is the amount of user and system data that can accompany the voice data, that goes up from 1,200bps to 6,000bps. Unfortunately, around half of that 6,000bps is used by the system overhead. Actually, Fusion has two voice modes that use the 3,600bps voice data rate. It also has a data-only mode where no voice data is sent, and a further 'high-quality' voice-only mode. In this last mode the AMBE vocoder produces pure voice data at 4,400bps with 2,800bps of FEC, making a combined voice data rate of 7,200bps. This voice mode apparently provides noticeably better audio fidelity than either D-Star or DMR.

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The formatting of the voice and data frames sent over the air is a lot more complicated than D-Star, so I won't cover it in any detail. But like D-Star, a Fusion transmission begins with a header, then there are repeating voice and data frames, and finally a terminator. The repeating voice and data frames are grouped into blocks of five, each block taking exactly 100mS to transmit. Each block begins with a synchronising pattern and some system information. In addition, source, destination and routing callsigns are included in some of the block's data frames. So even if the transmission's header is lost, the receiver will - after a short time - be able to lock onto the transmission and route it to its destination. There's one exception, this isn't the case when the high-quality voice-only mode is used.

DMR

Both D-Star and Fusion - and all amateur analogue communications - are classed as Frequency Division Multiple Access (FDMA) systems. Basically, if you want to talk, find a clear frequency and get on with it. In other words, it's one conversation on one frequency at a time. With DMR, you can have more than one conversation on one frequency and that's called Time Division Multiple Access or TDMA.

Again, Figure 1. shows the digital voice parts of a DMR transceiver.

The modulation is very similar to that of Fusion and is known simply as

4-Level f.s.k., usually shortened to 4FSK. The only real difference is the deviation, which is plus and minus 648Hz and plus and minus 1,944Hz. So the deviation is a little less than that of Fusion but the symbol rate matches Fusion exactly: 4,800 symbols per second. DMR also uses the same AMBE vocoder that Fusion uses. That's where the similarity ends.

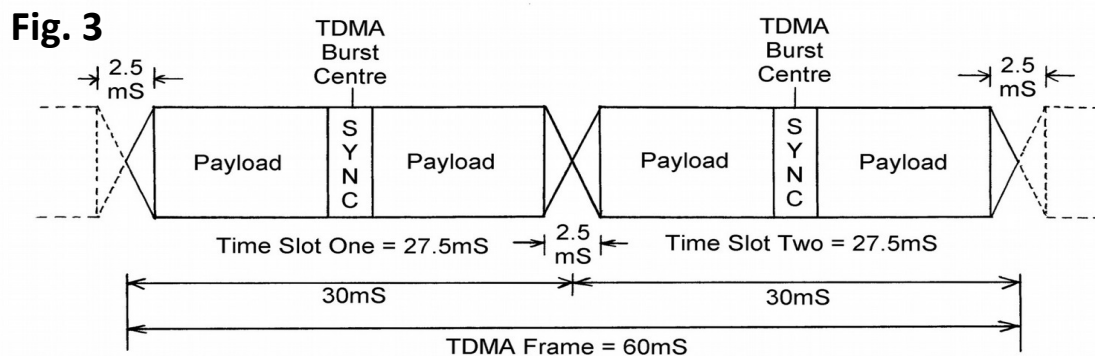


Figure 3. shows diagrammatically one 60mS TDMA frame as viewed from the vantage point of a mobile or portable transmitter. These frames are repeated continuously while a transmission takes place. The 60mS frame is divided into two halves called Time Slot One and Time Slot Two. Each time slot is 30mS long but the active part - that's the part which carries data and synchronisation bits - is 27.5mS long. The 2.5mS gap between successive time slots is there to allow TX/RX switching to take place.

Each time slot is split into three sections. At the centre is a sync. pattern which is used to synchronise the distant receiver's demodulator to the incoming time slot. That's surrounded by two payload sections which carry the actual voice and user data. One thing to remember is that a mobile

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or portable transceiver can transmit in Time Slot One or in Time Slot Two during a transmission, but not in both. Nor can the transmitter switch between Time Slot One and Time Slot Two during a transmission.

So let's get this clear. The transceiver transmits for 27.5mS and then switches back to receive for the other time slot. When Time Slot One (or Two) comes along again, the transceiver switches from receive to transmit for another 27.5mS. Yes, the transceiver is switching between transmit and receive every 60mS. That's just under seventeen times per second. And that's why when you listen to a DMR transmission on an analogue f.m. receiver it sounds like a rough buzzing noise. DMR repeaters receive both time slots and always transmit both time slots even if they're not in use. As the repeater's transmitter stays on all the time, the 2.5mS gaps between the time slots can be used to transmit additional data to the mobile and portable stations which are listening.

Because DMR is a purely commercial system it cannot handle amateur radio callsigns. The radios are uniquely identifiable, but a look-up table is needed to convert the radio's identifier to an amateur callsign. This table does exist (on the Internet) and part of it can be stored in an individual radio, but it's clearly not ideal. Furthermore, the radios themselves do not operate like normal amateur radio transceivers. Every channel you wish to use has to be available in a memory, and to program the memories you usually need a computer. Consequently, many radios sold to amateurs are supplied with memories ready programmed.

Unlike D-Star and Fusion, it's not possible to turn an analogue f.m. transceiver which has a 9600 Packet port into a DMR transceiver. Outboard units do exist for D-Star, and somebody will surely do the same for Fusion, if one doesn't exist already. With TDMA, the requirement for TX/RX switching times to be in the order of 2mS prevents this approach with DMR. In all, for commercial users DMR offers significant advantages over analogue but I feel it really isn't that suited - as it exists now - to amateur use. To be fair to DMR, it is a robust system. And TDMA operation has potentially significant advantages over FDMA operation, but unfortunately, DMR as it is at the moment doesn't realise these advantages.

The Future

The AMBE vocoder used by all the current digital voice systems used by amateurs is disliked because it's proprietary. We amateurs like to tinker with our radios, but legally, we can't tinker with the AMBE vocoder. An Australian amateur, David Rowe VK5DGR, has produced an Open Source vocoder - called Codec 2 - which apparently outperforms the AMBE vocoder at the same bit rate. It can also produce good results at 1,200bps. It's free to use and it's free to modify. The software is available to run on a personal computer and it's now available embedded in a small add-on unit - the SM1000 - that behaves like a speaker-microphone. This unit converts speech to Codec 2 and Codec 2 back to speech, and it includes a modulator. It can be used with just about any sideband transceiver. The mode - that's Codec 2 plus the modem - is known as FreeDV. But soon there'll be more. Hopefully.

Bruce Perens K6BP and Chris Testa KD2BMH are working on a 'HT of the Future', called The Whitebox. This will be a software defined transceiver for v.h.f. and u.h.f. What makes it exciting is that it could potentially run all current amateur modes - both analogue and digital that are used at

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v.h.f. and u.h.f. And that includes Codec 2. In addition, the Whitebox will be able to operate TDMA. Not DMR but a new mode which will allow full duplex communication on a single frequency and repeater operation on a single frequency. Note that DMR could operate this way but the manufacturers have not implemented such operation in their transceivers.

All one transceiver has to do is transmit in Time Slot One and receive in Time Slot Two. The other radio does the reverse. Of course, they have to synchronise to each other but that's easy enough. But what if the second radio, instead of transmitting local voice in Time Slot Two, retransmits what it heard in Time Slot One. If all other stations transmit in Time Slot One and listen to Time Slot Two, you have a repeater that operates on a single frequency. Hardware-wise, a repeater can be the same as an ordinary transceiver, so every radio could operate as a single-frequency repeater if needed. And there's no need for expensive duplexers.

Digital voice may never completely replace analogue voice communication - I hope it doesn't - but it does offer certain advantages over analogue. And the best may be yet to come.

Getting Started with Amateur Satellites 2016

The 2016 edition of the book **Getting Started with Amateur Satellites** is now available from the AMSAT-UK shop



This excellent book is written by G. Gould Smith, WA4SXM and Friends.

This year's edition has been thoroughly updated and the book is now 176 pages long, covering all a beginner (and an experienced operator) needs to know about getting set up, listening to, and operating through the amateur satellites.

With information on, AO-73, UKube-1, the upcoming Fox-1A, Fox-1B, Fox-1C, Fox-1D, and Fox-1E, it also includes information on several satellites of interest to radio amateurs expected to be launched in the coming year.

As last year, AMSAT-NA and the authors have very kindly allowed AMSAT-UK to print copies in the UK, and make them available from the AMSAT-UK shop at <http://shop.amsat-uk.org/>

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UK Rallies

Rallies/Events over the next month around the UK

31 July 2016 Horncastle Summer Rally

Horncastle Youth Centre, Horncastle, Lincs. LN9 6DZ.

Open 10:30. Admission £1.50. Details: Tony Nightingale, G3ZPU, 01507-527835, tony.nightingale@yahoo.co.uk

7 August King's Lynn Amateur Radio Club 27th Great Eastern Radio Rally

Gaywood Community Centre, Off Gayton Road, King's Lynn, Norfolk. PE30 4DZ

Open 09:00. Admission £2. Free parking. Details: Ted G4OZG, 01553-768701, Mob 07946-838656, g4ozg@raynet-uk.net Web: <http://www.klarc.org.uk>

14 August Flight Refuelling ARS Hamfest

The Cobham Sports & Social Club Ground, Merley, Wimborne, Dorset, BH21 3DA.

Open 10:00. Entry £3.50. Details: Tony Baker, G3PFM, hamfest@frars.org.uk
<http://www.frars.org.uk>

20 & 21 August Tokyo Ham Fair [Saturday/Sunday]

Tokyo International Exhibition Centre, 3-11-1 Ariake, Koto-ku, Tokyo, Japan 135-0063.

Info: <http://tinyurl.com/zc7kykv> (JARL)

21 August Rugby Amateur Transmitting Society Annual Radio Rally

Princethorpe College, Princethorpe, Rugby, Warcs. CV23 9PY.

NGR: SP395710 52.336N 01.421W. Open 10:00 (08:30 sellers) to 16:00. Admission £3. 07759-684411, rally@rugbyats.co.uk Web: <http://www.rugbyats.co.uk>

28 August Milton Keynes Rally 2016 [*** Change of Venue ***]

MK Irish Centre, Manor Fields, Watling Street, Bletchley, MK2 2HX. NGR SP885337.

Open 10:00-Traders setup from 07:30. Contact details: Roy, G8RCK, 07866-673192: rally@mkars.org.uk <http://www.mkars.org.uk/rally>

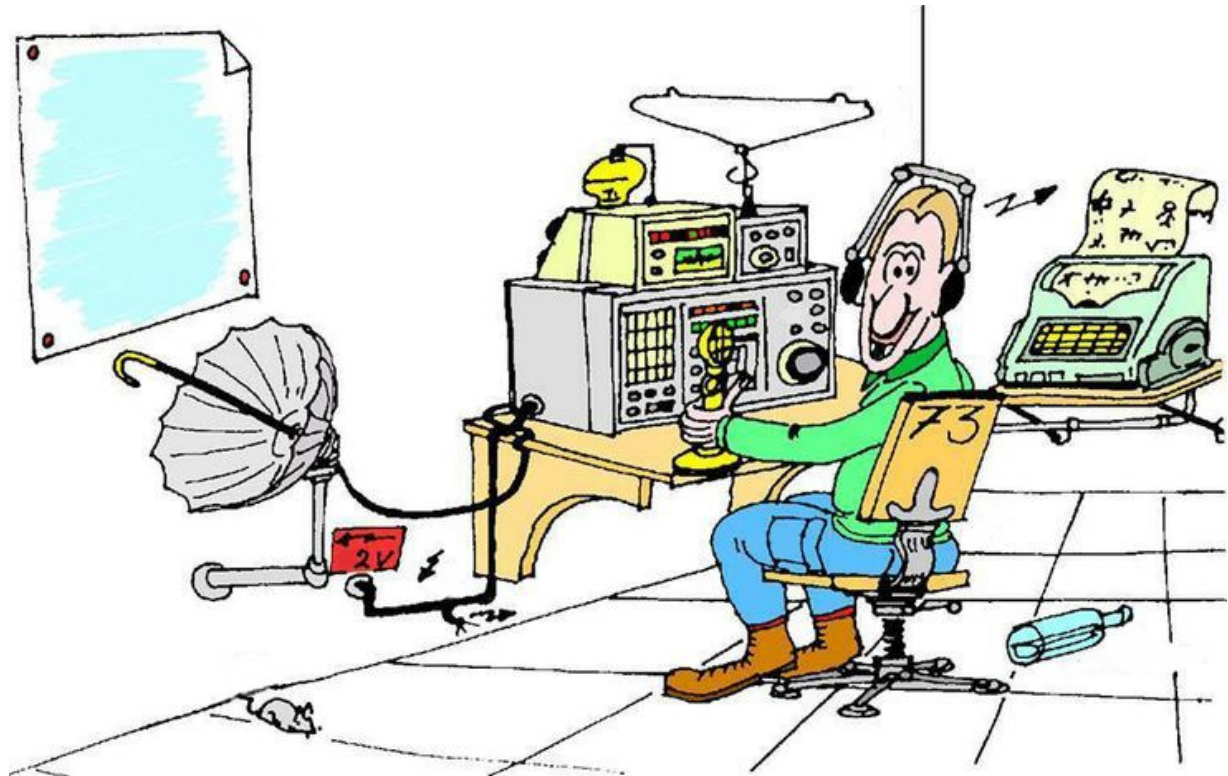
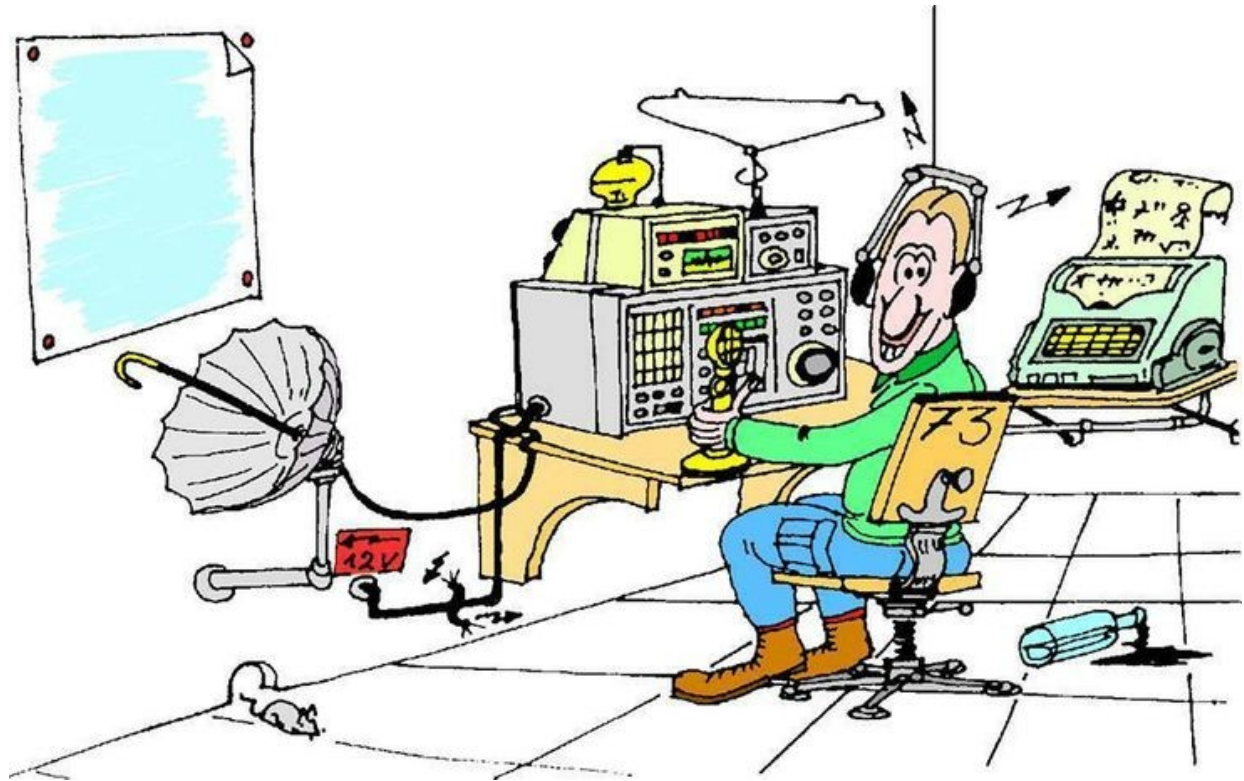
Just a bit of fun

How did you with last month? Here are the answers to our anagrams

Bridges Tour (1)	-	Stourbridge
Area Aim Tudor (2)	-	Radio Amateur
Driftland Howso Spoil (2)	-	Oldswinford Hospital
Tertials (1)	-	Starlite
Legal Aid Orbit Idiom (3)	-	Digital Mobile Radio
Confidential Ounce (2)	-	Foundation Licence
Usa Fuse Yoni (2)	-	Yaesu fusion
Tab Pond (2)	-	Top Band
Concrete Query Fun (2)	-	Frequency Counter
Mews Terr (2)	-	SWR Meter
Tunic Cut In Rig (2)	-	Tuning Circuit
Secretar Vin (1)	-	Transceiver

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And This Month: a Baker's Dozen (spot the difference, there are 13 to find)



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Dairy of Events

Sept / Oct Talk - Steve Turner - Medical Imaging follow up talk. Date to be confirmed - watch this space.

Sept 3rd - 4th - SSB Field Day.

Sept 17th - 25th - International Air Ambulance week special event station - tbc

21st November - Table Top Sale.

December - The Big StARS Christmas Meal.

16th Jan - A talk on Digital Radio Modes - date to be confirmed.

Your Committee



President	Tim Childe	G7TAC
Vice President	Nick Moss	G6DQN
Secretary	John Clark	M1EJG
Treasure	John Scott	G8UAE
<i>Committee Members</i>		
	Wayne Mocroft	M5LLT
	Geoff Cooper	G0KVK
	Mark Cadman	M0TCG
	Keith Dixon	M0HPY
	Ross Lewis	M6RLZ

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And Finally

My thanks to Adrian (G0NLA), Bob(G4XOM), James (G7HEZ), Tim (G7TAC) ,Wayne (M5LLT), RAOTA and Philip Cadman (G4JCP), for allowing us to use their article and Karen Clatworthy for the help in compiling this month Starlite.

Peter Baker (2E0MVM) – Starlite Editor (editor@g6oi.org.uk)