



Chelmsford Amateur Radio Society Newsletter

Find us on 

 Follow @ChelmsfordARS

 Follow @TrainWithCARs



Next meeting: 7th March - 7.30pm, Oaklands Museum

Classic Computers - Andy Chapman, G7TKK

Inside this issue:

- Editorial & Dates for your diary
- February Meeting report
- 2MT 95th Anniversary summary
- GB952MT at Sandford Mill
- 90th Anniversary of G6YL
- Simulators—a story
- Dangerous goods
- Reliability
- Bathtub curve
- Diary/Diary II
- Coals to Newcastle?
- Antenna demise
- February Skills night
- The Nixie Project
- Miscellany
- Canvey Rally 2017



Two Emma TOC 95th Anniversary + GB952MT

Club Nets - Tuesdays 20:00h

Net Controller: TBD

- #2 - GB3DA 14th March
- #3 - GB3ER 21st March
- #4 - 80m 28th March
3.756MHz
- #5 - 160m n/a
1.947MHz

**Essex Ham Net
Mondays 20:00h GB3DA**



Contact details for the newsletter: editor@g0mwt.org.uk

Editorial

Last month I reported I was going back to Windows XP on my old PC to get over some software compatibility problems I have been having with Windows 7/10. It has been a long time since I have used XP in anger and I hadn't realised that so many products are now not just unsupported on XP, they variously will not install, will not function fully or some will even actively uninstall if you try to update. To cap it all, my old PC has two available SATA ports for HDD use, so the obvious choice would be to install one OS on one HDD and another on the next and dual boot using the BIOS option but, unfortunately, this has a dedicated HP-Compaq BIOS and it will only allow booting from one HDD and that always has to be the lowest port number. I have tried dual-booting in the classic manner (installing one OS after another on two partitions) but that is not foolproof either. I'm not sure I know why, as I used to be able to boot in this manner several years ago. Something must have changed in the interim.

I bought a new Logitech K330 keyboard and M215 mouse wireless deskset recently. I physically broke the USB dongle on my old Trust deskset and the deskset was a bit beaten up anyway, so I binned it. Some of you may recall that both my cheapo Trust and expensive Microsoft 3050 desksets suffered quite badly from EMC problems when plugged into USB 3 ports and neither would drive the SDRPlay software properly under any circumstances. This Logitech kit works perfectly in all respects on any of the ports, whether it be USB2/3, or via a hub. After crapping out so often with PC related problems recently, at least I seem to have won on that front!

After the January Skills event, I installed Log4OM on my PC and eventually got that working with Terry, G4POP on the other end of a phone "talking me in" with the mysteries of that and Omnirig. Various software programs would decode digital signals and at last, it looked as though I would be able to participate in digital transmissions. Sadly, though, this proved not to be the case. I finally realised that my TS-570D would only work with a serial interface that has bipolar signals (+ve/-ve going) whereas USB-serial converters are unipolar (0v/+ve going) only. Also, the accessory port on the rig will accept PTT signals but, for reasons I don't understand ('cos I haven't really looked in detail) I couldn't get it to accept audio through the same port although I was certain that pinouts and levels were satisfactory. There is an analogue switch in circuit. Maybe that had become damaged in some way. The rig was second/third hand and I don't know its history, so anything could be responsible - **Ed**.

Dates for your diary

Please note: the dates may be subject to change...

Tue. 7th March	Meeting - Classic Computers - Andy Chapman, G7TKK
Mon. 20th March	Skills Night - Danbury Village Hall
Tue. 4th April	Meeting - Talk by RSGB President Nick Henwood, G3RWF
Mon. 17th April	Skills Night - Danbury Village Hall
Sat. 22nd April	International Marconi Day - Operating from Sandford Mill using GX0MWT
Tue. 2nd May	Meeting - Tricks with Coax - John Regnault, G4WSX
Mon. 15th May	Skills Night - Danbury Village Hall
Tue. 6th June	Meeting - Table top sale
Mon. 19th June	Skills Night - Danbury Village Hall
Tue. 4th July	Meeting - Dr. Brian Styles, G3NSD, A Century Not Out (plus other talks)
Tue. 1st August	Meeting - Constructor's competition
Tue. 5th September	Meeting - Keith Maton will talk about Radio Caroline
Tue. 3rd October	Meeting - CARS Annual General Meeting
5th December	Meeting CARS Christmas Social Night.

February meeting report

For the February meeting CARS were pleased to have Peter Scrimshaw visit us from Verulam (St. Albans) ARC to give a talk on the former Diplomatic Wireless Service (DWS) of the Foreign & Commonwealth Office (FCO). An audience of around 40 including several visitors heard a wonderful and little known tale of this 'Secret' wireless service, whose work covered FCO-Embassy Communications, Broadcasting and Wireless Security (including cypher machines and sweeping for bugs).

The DWS evolved from its WW2 origins to set up at Hanslope Park (right) as a semi-autonomous part of the Foreign Office, and was quite distinct from its brethren such as GCHQ and MI6. Led by Richard Gambier-Parry it built its staff up from wireless operators and a number of Philco staff.

During WW2 the MI6 radio network included a receiving station at Whaddon Hall, and a transmitting site to its south. Afterwards, the FCO took over, Whaddon was closed, and some staff retained relocated to Hanslope Park (which was a former WW2 Radio Security Service base) which also acted as a receiving station). Whilst the DWS name has gone, the park is now home to HMGCC.

Richard Gambier-Parry who was a sales manager at Philco in the 1930s (and an amateur) worked for MI6 during WW2 at Whaddon Hall. He became the first director of Communications at DWS until 1955. (He retired to run a Casino in Malta and died in 1965). At DWS he was joined by another Philco man Harold Robin who was Chief Engineer until 1971.

Part of DWS was a production unit (formerly at Borehamwood until 1965) for cypher machines (such as Rockex) and radio bugs. The diplomatic radio network served embassies in communist countries (whereas US and Western Europe could use Telex etc.) Morse and teletype were used but by 1975 CW had declined and the circuits were being converted to Piccolo. DWS developed Piccolo which uses 32 Murray code digits each 10 Hz wide (and a sync. tone) and was transmitted as SSB in an audio range of 320-660 Hz and sent at 100wpm. As such, Piccolo was a pioneer of modern multitone data modes (MGM) that are superior to CW.

Piccolo (advanced receivers, right)

- Can be sent at 100 words per minute.
- Narrow band on SSB was very reliable and proved to be more reliable than Morse.
- Call up system. Embassy operator leaves his transmitter and receiver on. Hanslope can send a signal which rings in the Guards' office. Cancelling the ringing sends a signal back to the base station.

Eventually satellite communications and other technological changes came along as did the end of the Cold War in Europe.



Consequently HF usage and much of the foreign broadcasting declined. The last HF communication was on 4th July 1993 to the Tehran embassy.

Peter also included some detail on MI6 comms (inc the Gawcott-Tx and Poundon-Rx sites) which were separate from DWS, though there was some cooperation. This used 5 digit codes to agents in the field and other overseas centres. The famous 'Lincolnshire Poacher' numbers station from the MI6 site Cyprus continued until 2008. MI6 abandoned HF and other sites when it moved to its new Vauxhall Cross HQ in London 1994.

Another item was the little known story of William Marshall, a 24 year old DWS radio operator at the British Embassy in Moscow. He was passing info to the KGB until spotted by MI5 (see article).

At rather higher power was the Broadcast section of DWS based at Crowborough East Sussex. They operated large MW and SW transmitters in the UK and overseas in liaison with the BBC World Service. The Crowborough Tx was replaced in 1982 by one at the Orford Ness site. The latter ran BBC-WS on 648 kHz until 27-Mar-2011. Other sites included Cyprus (MW+SW), Francistown in Africa and Masirah in Oman. The remaining sites were taken over by BBC Engineering in 1986, which subsequently was privatised and became Babcock in 1997.

After the talk, at the break we had some goodies to eat, homemade by Ann Salmon, followed by the raffle. Chris, G0IPU then presented a CARS speakers' mug to Peter.



Thanks to Murray, G6JYB for the use of this write-up which appears on CARS website under the February meeting heading. - Ed.

RADIO MAN ARRESTED ON SECRETS CHARGE

LONDON, Sun.—William Martin Marshall (24), a wireless operator in the British diplomatic wireless service, was charged in London yesterday with having communicated to a Soviet Embassy official information calculated to be useful to an enemy.

Marshall was arrested on Friday night and charged under the Official Secrets Act.

It is alleged that he communicated information to Povel Kuznetsov, second secretary to the Soviet Embassy.

Marshall told the magistrate that he would prefer to remain in custody.

His mother, who had headed the queue for the public gallery, broke down and wept when the magistrate announced that he would be remanded in custody for a week.

British authorities are unable to take any action against Kuznetsov until judgment is pronounced.

It is generally assumed that should Marshall be found guilty Britain would ask for Kuznetsov's recall.

Well-informed people said that it was understood that the man with whom Marshall was walking in the park was a foreign embassy official who claimed diplomatic immunity and disappeared.

It is understood that the official concerned was a member of the staff of the Soviet Embassy, whose chief, the retiring Ambassador (Mr. George Zarubin) left yesterday for Moscow before transfer to Washington.

Messages

Officials in London said that Marshall's duties consisted in the transmission of Foreign Office messages from the Foreign Office radio station at Hanslope (Buckinghamshire).

The messages were in cipher, in code and in clear.

It is understood that Marshall would not himself have access to ciphers or codes in the course of his duties.

He joined the Foreign Office as a temporary civil servant in 1948.

He was posted to the Middle East and Moscow among other places abroad and returned in December, 1951.—Reuters.

Park Incident

Chief Inspector William Hughes, of Scotland Yard's special branch, who arrested Marshall, said that he saw Marshall on Friday night in King George's Park, Wandsworth, with another man, and arrested him as he was leaving the park.



2 Emma Toc - 95th Anniversary Broadcast - Summary

From Sunday 12th February to Tuesday 14th February 2017 we celebrated 2MT with an internet radio service including various live programmes from the original 2MT 'Long Low Hut' now preserved at Sandford Mill Museum here in Chelmsford. Whilst in the hut, we were joined by members of the Chelmsford Amateur Radio Society who were operating a special event amateur radio station using the callsign 'GB952MT'. We therefore for the first time in 95 years actually broadcast, and transmitted, from this historic building.

Radio Emma Toc

celebrating wireless station 2MT

Our purpose for this project was to celebrate the UK's first regular broadcast station and raise awareness of current technology and amateur radio. We are happy to have been able to expand on the 2MT story and bring this to a new audience, paying tribute to all those involved.

There were many high points during our broadcast including being interviewed on BBC 5 Live and BBC Essex; however, for me the main highlight was at 7pm on Tuesday 14th February, exactly 95 years on from when 2MT started transmissions. At this time we raised a glass and drank a toast to (1) 2MT and all involved, (2) radio hams past, present and future, and (3) Captain Peter Eckersley. We were joined in the hut by amateur radio and museum friends and colleagues, and we are sure the spirits from the past were looking on...!

A poignant moment during the three days was on Tuesday afternoon when we were visited by Shirley, the daughter of Tom Eckersley, Peter's elder brother. Now in her 80's, we enjoyed talking about family and history, and I was pleased to be able to play her a recording of an interview with Peter Eckersley, most likely from the 1950's, in which he credits his brother Tom for being the inspiration to him at school to 'be a wireless engineer'.

In summary, I would like to say thank you to everyone involved and in particular everyone who e-mailed

us and interacted with us on social media. We will obviously aim to be back with you for the centenary celebrations, but I have a feeling you may hear from us before then...!

Jim, 2E0RMI

Everyone enjoyed themselves. Honest! - Ed.

Tim Wander, G6GUX
being interviewed



GB952MT at Sandford Mill – Christopher, G0IPU

Back in October I was asked by Jim, 2E0RMI if CARS would like to get involved in putting on a special event station to celebrate 95 years since the first ever transition emanating from the transmitter of 2MT. An HF station was planned for inside the 2MT Writtle hut using the club's IC-756-Pro connected to the 80m doublet via an auto ATU (SGC-230). Most of the operation on the Sunday was on 40m HF with 7.106MHz being the main frequency in use. It was also being tweeted, along with some pictures for Twitter followers.

We were pleased to see a number of visitors and volunteers on this cold afternoon come to help out in the operation of the stations. We also had a small mast set up for 2m inside the museum so that we were on GB3DA for local contacts too. Kristian, M0SSK also brought along his own HF kit that was used into a dummy load, so that we the operators there for the day could get into the log book.

In another part of the Marconi Hut Jim, 2E0RMI was running the internet based (this time) Broadcast Radio Station Two Emma Toc where many interviews took place (some on BBC Essex Radio) with Tim Wander and even me...

Back to the Amateur Radio. There was a contest on, as usual for a Sunday, but we managed to get quite a few contacts in the log. On 2m/GB3DA we were very surprised to have as many as we did; it was well worth the effort and perhaps something that can be built upon.

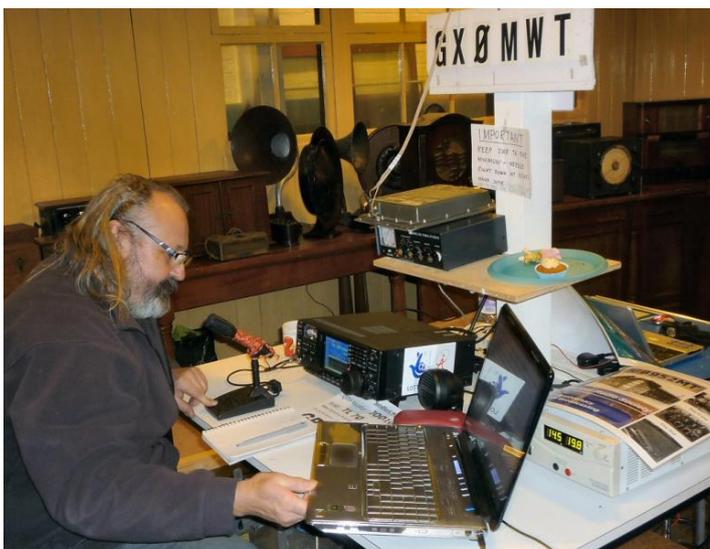
Tuesday 14th was the real anniversary of the event and CARS was there to continue using the GB952MT special event callsign. Again using the same equipment and with the added buffet supplied by Tim, a most enjoyable evening was had. At the witching hour we went silent in the Amateur Radio side so that the broadcast station on the internet, Two Emma Toc,



Tim Wander, G6GUX (Museum Consultant) and Les, G4JDS logging



Bob, G4MDB on the Mic, with Les G4JDS logging



Above: Chris G0IPU (GB95 2MT NoV holder)



Right: Keith, G3WGE with Oliver, M0WAG logging

could relay the events as they unfolded at 19:00 (as this is when 2MT back in 1922 went live). This was all captured by Pete, M0PSX who provided a video stream via 'Periscope'. After that John, G8DET, who had been there all evening, went on the 2m station on GB3DA to run the CARS Tuesday net as GB952MT, just for a change. It has been noted that some rare DX was heard. Murray, G6JYB was on air on both days!, He operated Sunday on 2m, and on the Tuesday with some HF. I missed this rare opportunity, but the picture can't lie... All in all a very nice and easy going event. Perhaps we can do it all again in 5 years for the centenary.



Rare DX — Murray, G6JYB on the mic

Thanks to all who took part; without your input, it would not have happened.

73's de GB95 2MT

Unfortunately, I had other things to do so I was only able to turn up for a brief visit on the Sunday and I therefore missed all the fun. I was surprised to find the CARS remote ATU had gone walkies and Bob, G4MDB was having to work a pile-up with a very poor SWR on 40m.



Peter, M0OFM on HF. Operation was on 40m, 7.106MHz

That said, the ATU was subsequently unearthed and it was pressed into service eventually. Good luck to those who operated and were able to participate in this (almost) historic event. As Chris says, perhaps in five years time, a real marker can be placed - maybe a blue plaque(?) to commemorate the event. - Ed.



Thanks to CARS' web pages for the pictures for this report - Ed.

Pete, M0PSX and Jim, 2E0RMI taking turns on the GB952MT mic, left



John, G8DET & Tim, G6GUX (above) and Kristian, M0SSK on 2m



Jim, 2E0RMI, Kristian, M0SSK and Bob, G4MDB all on GB952MT

90th Anniversary of G6YL

April 13, 2017 marks the 90th anniversary of the UK's first Woman radio amateur, Barbara Dunn, G6YL receiving her licence.

She recalled first hearing Morse code at the age of 10, which would have been 1906. A talk and demonstration of wireless was given at her school and she eagerly volunteered to take part in the demonstration. She remembered sending SOS in Morse and said she was thrilled.

Barbara lived in the Essex village of Stock and in 1923 her father purchased a wireless set to listen to the new British Broadcasting Company transmissions from 2LO in London on 350 metres (857 kHz). In early February 1923 while listening to 2LO she noticed a rasping kind of interference on the transmission. She was unable to tune the interference out so decided to try and find out the cause.

In those days most of the smaller ships operating in the Thames still used spark transmissions which spread over a wide frequency range and it was these spark Morse signals on 600 metres (500 kHz) that Barbara had been picking up.

Fascinated by the signals she decided to teach herself Morse code by copying down the dots and dashes as fast as she could. By March 1923 she was able to copy down quite a bit of slow Morse and by May 1 she could copy at 10 words per minute. On July 10 she was thrilled to be able to copy messages at speeds of up to 20 WPM.

She used her own crystal set and "cat's whisker" so that the main wireless set could continue being used for 2LO reception. Her greatest thrill was when she picked up her first SOS and copied the Latitude and Longitude. Her father was a bit sceptical and took the trouble to visit Lloyds in London the next day to confirm her information. He came back satisfied and impressed.

Her next thrill was in picking up signals from Marconi's yacht Elettra on about 90 metres. As he asked for reports and she wrote to him but, wisely, given the misogyny of the era, simply signed it B. Dunn so as to give no clue to her gender. To her surprise and great joy Marconi answered and asked her to continue listening and reporting.

On December 14, 1925 she bought a 2 valve short wave receiver covering 15-200 metres from F.A. Mayer 2LZ (later G2LZ) of Wickford, Essex.

She recalled that in 1927 she was "bullied" by the "Old Timers" G2LZ and Gerald Marcuse, G2NM into taking her Morse test. G2NM said if she passed he would send her an old split Hartley transmitter which she could keep if she managed to get it to work again.

At the Morse test the examiner gave her a column from The Times newspaper to send. The examiner had to stop her mid-way through because she was sending all the brackets, colons and semicolons in the article, only the plain text had been required. She breezed through the 12 WPM reception test and the examiner even sent her 25 WPM which she copied fine.

She received her transmitting licence G6YL on April 13, 1927 but didn't have her first contact until November 21, 1927 when she worked T.P. Allen, G16YW in Belfast. She initially transmitted on 49 metres but G16YW told her and she retuned to the correct wavelength of 45 metres. Her first transatlantic contact with the USA took place on April 12, 1928 when she was running just 6 watts DC input on 45 metres.

Her father had passed away in October 1926 and this eventually forced the sale of her home Lilystone Hall. On September 1, 1928 she left Stock in Essex to live in Felton, Northumberland.

This item was compiled from the autobiography of G6YL which was published in the April-May 1968 edition of Spark Gap Times.

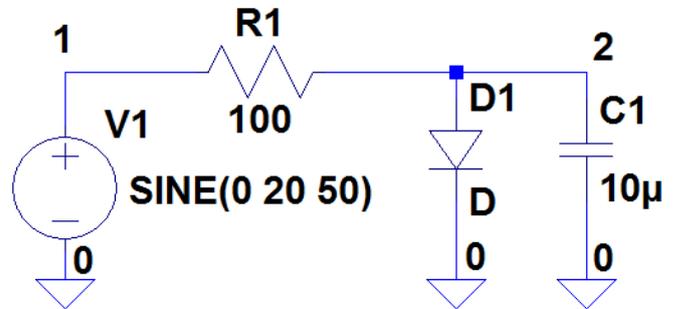


Trevor, M5AKA

Simulators: a story

Do you use one? Some? Several? My first encounter with a “simulator” was when I got a Texas Instruments Ti58 calculator at relatively vast expense in those days. That had a series of example programs and one of them could iteratively work out simple nodal network analyses (if you could be bothered to enter the program). So-called because you entered the network components as existing between numbered nodes, as in 0, 1, 2 here, as in early Spice text-entry card “decks” before graphical editors were devised.

Not long after that I was introduced to Philips’ own in-house developed circuit simulator, called PhilPac. This was described as the first viable modern analogue circuit simulation tool. Then came Panacea, developed by Philips’ CAD-Electronics (latterly ED&T/Analogue Simulation) department. After that was Pstar. This was a powerful and versatile analogue simulator that combined the tried and tested programs Panacea and Espice, Philips’ own version of Spice, developed by Philips Components in Hamburg (I didn’t use Espice).



Nodal network example

The trend thereafter

Following on from those, and with changes of employers, I got to sample Touchstone, Microsim’s Pspice, HP’s MDS & ADS, Analog’s Saber and then AWR’s Microwave office in a professional capacity. Along the way, I used several other simulators including thermal and fluid flow analysis tools. Many are now developed as hobby or training tools, or given away by semiconductor vendors to further their own aims. Some current examples are Linear Technology’s LTSpice & Switchercad, Analog Workbench etc. Now, you can download (possibly) hundreds of open source simulators from SourceForge alone and it’s difficult to keep up with it all. In fact, Linear technology’s LTSpice IV has recently been replaced by LTSpice XVII (for 2017?) and that has been designed to cater for the modern multi-display environment. LTSpice IV will not be obsoleted they say, in line with Linear’s own zero-obsolence policy.

Back in the late 80’s, I worked for the Philips empire and got talking to someone who wanted to start up a department dedicated to semiconductor modelling. All simulators have libraries of these models - they describe the behaviour of devices such as diodes, bipolar transistors, FETs etc. They range from simple (level 1) models that describe the fundamental behaviour of a device and get progressively more and more complex until you get to the likes of the Philips Mextram (Most Exquisite TRANsistor Model) bipolar with (at last count) 90 or so parameters to describe the device behaviours with ever increasing accuracy.

Those days were relatively early in the EDA (Electronics Design Automation) field and several software vendors were finding their feet. The name of the game was models - the more your simulator product included, the better the product, right? Well, no. Not exactly. Vendors wanted to offer huge model libraries and these were expanding quicker than the universe; the name of the game was quantity, not quality and that wasn’t a good. Many were fraudulently mass produced or pirated in various parts of the (under)world.

In simplest terms, a model parameter for a resistor might just be the value of its resistance. You may then chose to add a temperature coefficient or, possibly, a tolerance parameter. You could add a power dissipation limit and then, if your simulator is capable and your needs dictate, you can press all those into service to tell you how close your circuit is to any given design margin and whether or not it will blow up (e.g. over-volt with switching transients, or over dissipate).

This can be extrapolated to semiconductors where the simplest parameter to explain might be the gain, or Beta of a transistor (it seems that most people are only interested in gain, but there is so much more to the common or garden semiconductor than meets the eye). Next, you could describe the technology (e.g. silicon or germanium), polarity (NPN/PNP) and the model physics related to that (bandgap voltage, barrier height or activation energy, depending upon your use of the terminology). You could add input and output resistances, junction capacitances and so on, until you have fully populated the model and thus fully described the device within the limits of the model or simulator software involved.

Here is an example of a SPICE parameter list for a diode:

Diode Model (D)

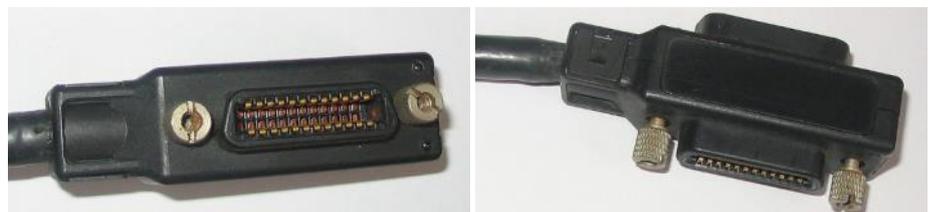
The dc characteristics of the diode are determined by the parameters IS and N. An ohmic resistance, RS, is included. Charge storage effects are modelled by a transit time, TT, and a nonlinear depletion layer capacitance which is determined by the parameters CJO, VJ, and M. The temperature dependence of the saturation current is defined by the parameters EG, the energy and XTI, the saturation current temperature exponent. The nominal temperature at which these parameters were measured is TNOM, which defaults to the circuit-wide value specified on the .OPTIONS control line. Reverse breakdown is modelled by an exponential increase in the reverse diode current and is determined by the parameters BV (breakdown voltage and IBV (the current at that point) both of which are positive numbers.

	name	parameter	units	default	example	area
1	IS	saturation current	A	10fA	10fA	*
2	RS	ohmic resistance	Ω	0	10	*
3	N	emission coefficient	-	1	1.0	
4	TT	transit-time	sec	0	0.1ns	
5	CJO	zero-bias junction capacitance	F	0	2pF	*
6	VJ	junction potential	V	1	0.6	
7	M	grading coefficient	-	0.5	0.5	
8	EG	activation energy	eV	1.11	1.11 Si 0.69 Sbd	
9	XTI	saturation-current temp. exp	-	3.0	3.0 jn 2.0 Sbd	
10	KF	flicker noise coefficient	-	0		
11	AF	flicker noise exponent	-	1		
12	FC	coefficient for forward-bias depletion capacitance formula	-	0.5		
13	BV	reverse breakdown voltage	V	∞	40.0	
14	IBV	current at breakdown voltage	A	1.0e-3		
15	TNOM	parameter measurement temperature	$^{\circ}\text{C}$	27	50	

That might look complex, but you ain't seen nothing yet! You know what *The Hitchhiker's Guide* says of space: *Space is big. Really big. You just can't imagine how vastly, hugely big it is. I mean you may think it's a long way to the chemist but that's just peanuts compared to space. Listen...and so on.* That applies to this subject as well, so let's not get carried away with the bigger models just yet...

Back to work: The secure department I was employed in at the time for was running out of work with defence cutbacks that were taking place. I knew the guy who wanted to set up a Device Modelling and Characterisation Centre (DMCC) and he couldn't find anyone to run it. A chance conversation gave me the opportunity to get in on the ground floor and we were off. Now; this is probably not a good idea, but I will admit that at the outset I hadn't got a clue about the parameter extraction process at that point. I had to learn fast and the learning curve was not far short of vertical. I bought books, studied what literature I could (no internet then) went on courses and set to work.

The department was based upon a suite of software and hardware that was supplied by Hewlett Packard and, in essence, it consisted of a series of power supplies and measurement equipment such as DMMs and network analysers. These weren't just any old bits of kit but very expensive, precision, rack mounted voltage and current sources that were all coupled via the old original 8-bit parallel HPIB (Hewlett Packard Interface Bus) also known as GPIB (General Purpose Interface Bus) and IEEE-488. It was a clunky old thing with huge connectors that could be connected in parallel and daisy-chained around the lab from one piece of equipment to another.



The idea was that a central computer controlled all the peripheral equipment and sequentially (and rapidly) set whatever voltages and/or currents to be applied to the device under test (DUT) so that the various measurements could be taken and then passed across to a suite of software known as TECAP (Transistor Equivalent Circuit Analysis Program). Measurements went from μV or μA to tens of volts and amps

For example, if you wanted to measure the forward gain, you could progressively step the base voltage with a fixed collector voltage and measure both the base current and collector current. If you collected a family of these curves for different collector voltages you could then take a stab at the mean gain, or beta, β_f and the software could then be organised to optimise the value for a certain range of base and collector currents that you could elect to use. You would then go on to the next parameter and continue the measure - estimate - optimise process until the model was completed to whatever accuracy was demanded.

It was a mixture of both easy-peasy guesswork and mind-numbing boredom as the machine went about its stuff and downright hard work, by wringing the last drop out of the model to increase the accuracy of the data. You had to adhere as closely as possible to the datasheet of the device you were meant to be describing whilst all the time bearing in mind that a datasheet is only a typical figure.

Semiconductors are made in their hundreds and thousands on huge wafers and, whilst process control is (presumably) better than it once was, there were large variations in parameters of the devices that were obtained from one edge, across the diameter of the (circular) wafer to another. That is one reason that you get gain variations (e.g. BC107a, BC107b, BC107c etc.) in some semiconductors

Now—here's a thing; I just said that we had to get as close as we could to the datasheet. If we had one, why would we need a model? Because a simulator can't read datasheets, that's why. (Actually, that's very slightly inaccurate as it is possible to use datasheets to obtain parameters but it is all a bit long-winded. This link will tell you more <http://www.youspice.com/spice-modeling-of-a-bjt-from-datasheet/>. As I have been writing this item, I have been looking for suitable datasheets and graphs with which to illustrate it. I was surprised to find that it is almost impossible to find 'clean' graphs for some devices (any to be found multiply scanned from paper copies of old databooks, whilst others are just plain non-existent). Doesn't anyone use, or publish them anymore?

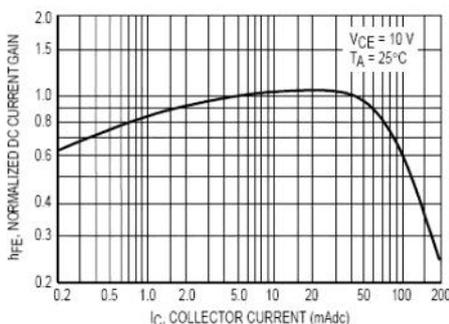


Figure 1. Normalized DC Current Gain

Take a look at the curve on the left. It shows the normalised (or relative) gain of a transistor with collector currents between 200 μA and 200mA. Obviously, the gain is at a maximum at 20mA, but only $1/2$ that at (say) 0.2mA and only $1/4$ of the value at 200mA.

That mostly doesn't matter, as you probably shouldn't be using it at the extremes, but a simple model parameter such as β_f will not fully describe the transistor's behaviour in this respect and if that behaviour is important to you, then much more work has to be done.

Anyway - part of my job was to write the instrument drivers for the suite of hardware we were using and integrate it into the TECAP software. That wasn't too bad, and some of the obvious models

(SPICE standard) were already included, but devising and writing our own behavioural models and incorporating the Philips specific models (including Mextram) was a sight more taxing. One way or another though, we got the job done. And that is when the fun began.

I had been familiarising myself with the basic TECAP software and models from day one, but there were several difficulties. One was that the software kept crashing and I had no idea why. My boss was getting a bit miffed about this and kept on popping his head round the door and demanding when I was going to produce some output. The second issue was the software parameter extraction process demanded that the measurements be made in a particular way. For example, to extract any of the parameters that relied upon I_b vs. V_{be} the measurements had to be made in just that manner (i.e. base voltage held constant or stepped whilst base and/or collector current was measured). Now; if you have ever had any dealing with transistor amplifier design, the first thing you will realise is that the transistor has to be biased in such a way as to make it stable with respect to temperature. This was one area in which the TECAP software spectacularly fell down. As it was compiled (and anyway was hugely complex) I couldn't debug it.

It didn't crash all the time so when it did work, I ran into the thermal stability problem. Some transistor characteristics are very temperature dependent and as the silicon area can be very small (such as in a SOT-23 SMD example), it doesn't take long to heat it when the measurement is taken to, or near, the limits of its intended operation (and occasionally beyond). As a result, the measurements could be invalidated or rendered nonsensical. I was intensely frustrated with this and couldn't understand why the devices couldn't be current driven and the voltages read off the relevant b-e junction.

My boss, increasingly annoyed about all this, refused to pay for the entire station setup until HP sorted it. We had a seemingly continuous stream of application engineers and sales people visit us, telling us it was our fault, it was finger trouble, the LAN cable was picking up interference (one of the sales team even draped it across the top of the office partitions to "get it away from interference") and so on. I was able to demonstrate the crashing relatively easily, but UK staff weren't necessarily *au fait* with the technicalities. Eventually, HP arranged to fly me out to the 'States to make my case, as it wasn't happening there!

HP had assembled a representative set of hardware in their labs so that I could demonstrate the problems but were so confident (in their arrogance) that it wasn't their problem that they didn't even switch it on before I arrived. Pleasantries having been exchanged, we went to the workstation, turned it on and bingo! Crash. Straight away. Oh dear - how embarrassing for them. To cut a long story short, the PCs they had sold us had new-fangled 386 processors to replace the now passé 286s of the older generation. Believe it or not, HP's TECAP software had been compiled with wait states (basically, strategically placed delay loops) to take into account certain timings. What they had not done was account for the faster processor speeds and the timings occasionally went to pot—hence the crashes. The development had been done on the older 286 PCs and for reasons I couldn't fathom, no one seemed to have checked it out on the newer PCs. While I was there, I took the opportunity to explain to them about the thermal runaway problem and they claimed nothing could be done, that the software absolutely had to be written in that manner because of... x, y, z, blah, blah, blah... And so on. I was not best pleased.

Anyway. I spent a pleasant week there and returned with a promise of re-written software and the loan of an old HP 286 Vectra—HP's take on the IBM PC, introduced in 1985 and which range lasted for about 15 years, until the rewrite was complete. If you want to read a bit about the sort of trouble these PCs invited, try this link: https://en.wikipedia.org/wiki/HP_Vectra

Back home I went and the replacement PC was delivered soon after. It was an old lab model of theirs (as it was available at the time) which had been used for various prototyping tasks. Anyway, we connected it up, turned it on and watched it crash. Again. This time HP got really embarrassed. Again, the problem turned out to have a really simple answer. The software needed a DMA (Direct Memory Access) card to work so one had been fitted before the PC was shipped over to us. What no one realised was that the PC, having been used in the development lab, already had a DMA function fitted—not in the normal slot, but hard-wired in by one of the engineers who had used it for a previous application, and the two DMAs were clashing. Once it was realised what the problem was, we only had the thermal runaway to deal with.

After the re-write for the 386's was complete, one of their guys came over from the 'States to commission it and make sure that, this time, there would be no mistakes! With him, he brought a new set of manuals that he showed me in which all the measurement methods and operating procedures had been changed to incorporate my recommendations. He said that after I left, they had given it some thought and then realised that, after all, the information they needed to extract the parameters could indeed be obtained by bi-asing the devices as I suggested and they changed the whole lot to suit. Amazing!

Pete was 2m tall and while he was working with us, kept banging his knees on our crappy old lab benches with our equally crappy chairs, so after he returned to the 'States, he had a brand new work table and "executive" office swivel chair sent over for me by way of some minor compensation.

The end of the story

In 1987, the Saber simulator was launched and our department was sounded out as a possible source of models for the tool. I don't believe we would ever have been able to keep up with the workload and it never came to pass. Instead, we serviced several of the Philips departments; the modus operandi was that they subscribed £x amount per year to the DMCC (Device Modelling and Characterisation Centre) and

then had the right to request data for any devices they wanted modelled. All went quite well until the company I worked for was taken over by another organisation and they closed the department down. "But surely you want access to these tools and models?" I asked. "No, that's not our business. We don't create models and we don't sell ice creams, either" was an executive's answer to my question. Not long after that, I looked around elsewhere and fetched up in Chelmsford. Ho, hum.

I valued the experience that the DMCC gave me and the chance to understand just what makes a simulator tick and to have the opportunity to play with some of the best analogue and RF tools that I could have imagined.

Like me, the guy I worked for didn't have a degree and described himself as "an unqualified success". I learned a lot from him. He had lots of little sayings, e.g. "you can't ask a book questions" when pointing out the benefit of talking to others and "you don't know what you know", meaning you can't assume others have the same level of knowledge. I am glad he gave me the chance to gain the experience. - **Ed**.

Dangerous adaptor/converter

I bought Mara an iPad for Christmas. I got it because she has undertaken a series of art and textile courses recently and that seems to involve a lot of drawing, photography and editing. The iPad seemed to offer all sorts of benefits with the Apple pencil and various freely available drawing/painting packages. The number of mobile devices had now multiplied and a powerful multi-output charging adaptor was needed. I identified this one: <https://www.amazon.co.uk/Betron-USB-Adapter-Charger-Samsung/dp/B00ZVWM79E> reduced from £20 to about £7. I ordered it and it arrived pretty quickly, so I set about using it.

It is a universal power body with interchangeable plug pins depending upon the market. When I tried to clip on the plug pins, I found it impossible to rotate it enough to lock it into place. There was obviously a design flaw - possibly coupled with a manufacturing defect. It required so much force to rotate it into place I thought I would break the pins and I couldn't guarantee it staying in place if I did get it to lock. It was obviously dangerous, so I decided to return it. What if the plug top had twisted off when it was in the socket?



Amazon didn't quibble, but I sent the vendor a note saying that I thought it was dangerous and shouldn't be sold. I also gave some negative feedback to the vendor who got shirty.

In retrospect, after I sent it back, I looked at the reviews for the product on Amazon and found several saying essentially the same thing. One purchaser had actually put the pins into a mains socket and twisted the body of the charger to lock them. A couple of them had reported it coming adrift in use and one went so far as to say her husband had actually been electrocuted (although not fatally, one assumes).

I couldn't believe that this was still on sale and I contacted Amazon about it. Now, I see that the item is being listed as "currently unavailable" and that the reviews have all been removed. I wonder why? - **Ed**.

Reliability

Yes, yes, I know this isn't about amateur radio, but I am continually being amazed by the crassness of the design of modern products. Our washing machine, which is not yet two years old, has had to have the drum and main tub replaced as the main bearings were on the way out. I talked to the service "engineers" (two of them—health and safety demands that one of them alone is insufficient manpower to lift the parts) about the quality of the bearings. He explained "oh—the bearings would probably never wear out. The water seal wears and lets water in and that's when the problem starts". Classic!

As a washing machine, it does the job, but it has several different wash cycles for different temperatures, spin cycles, wash lengths etc. and it weighs the washing before you start to determine the amount of water to use or to tell you if there is too much.

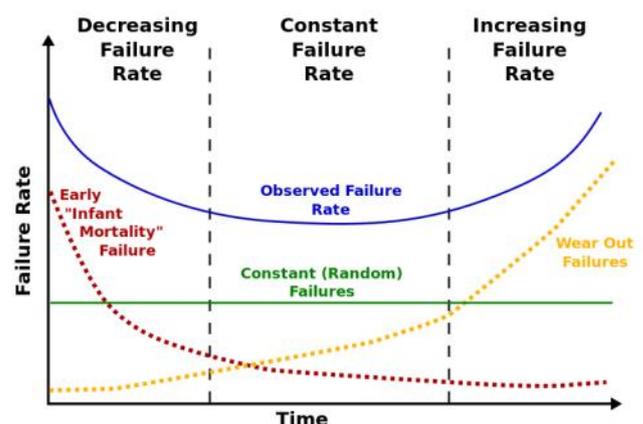
All well and good but if one wash is finished and you want to do another with a different setting, in theory all you need to do is rotate the programme knob to reset for the next cycle. Only it doesn't reset. Selecting a new cycle results in it telling you the maximum weight of wash, but refusing to weigh it or stating that it is overloaded (and I know fine well it isn't). The only way to get the machine to cooperate is to switch it off and it has its own way of powering down. It can't just turn itself off; oh, no. It has to tell you goodbye first and power down gracefully (is it running Windows or summat?) and then you have to reboot it. All of which gives an unnecessary amount of time to get really, *really* frustrated with it.

The other day, I couldn't get the thing to play ball at all. As I operated the touch sensitive buttons to change the program settings, it kept doing things I didn't ask it to. At first I thought I was touching the wrong (adjacent) button but I'm not blind and am reasonably co-ordinated, so I couldn't understand it. Then I spotted a tiny bead of water which was bridging the gap between buttons, which are about 1mm apart. After removing that, it worked OK. It's a washing machine - they use water, for Pete's sake. You'd think they would make it resistant to such, wouldn't you? - **Ed**.

Bathtub curve

From one tub to another. You know about the bathtub curve? It describes the likely failure rate for equipments and components. Having recently dismantled and examined some very old transistorised equipment that is still going strong after very many years, I wonder just how long the timescale on some of these curves could, or will, be.

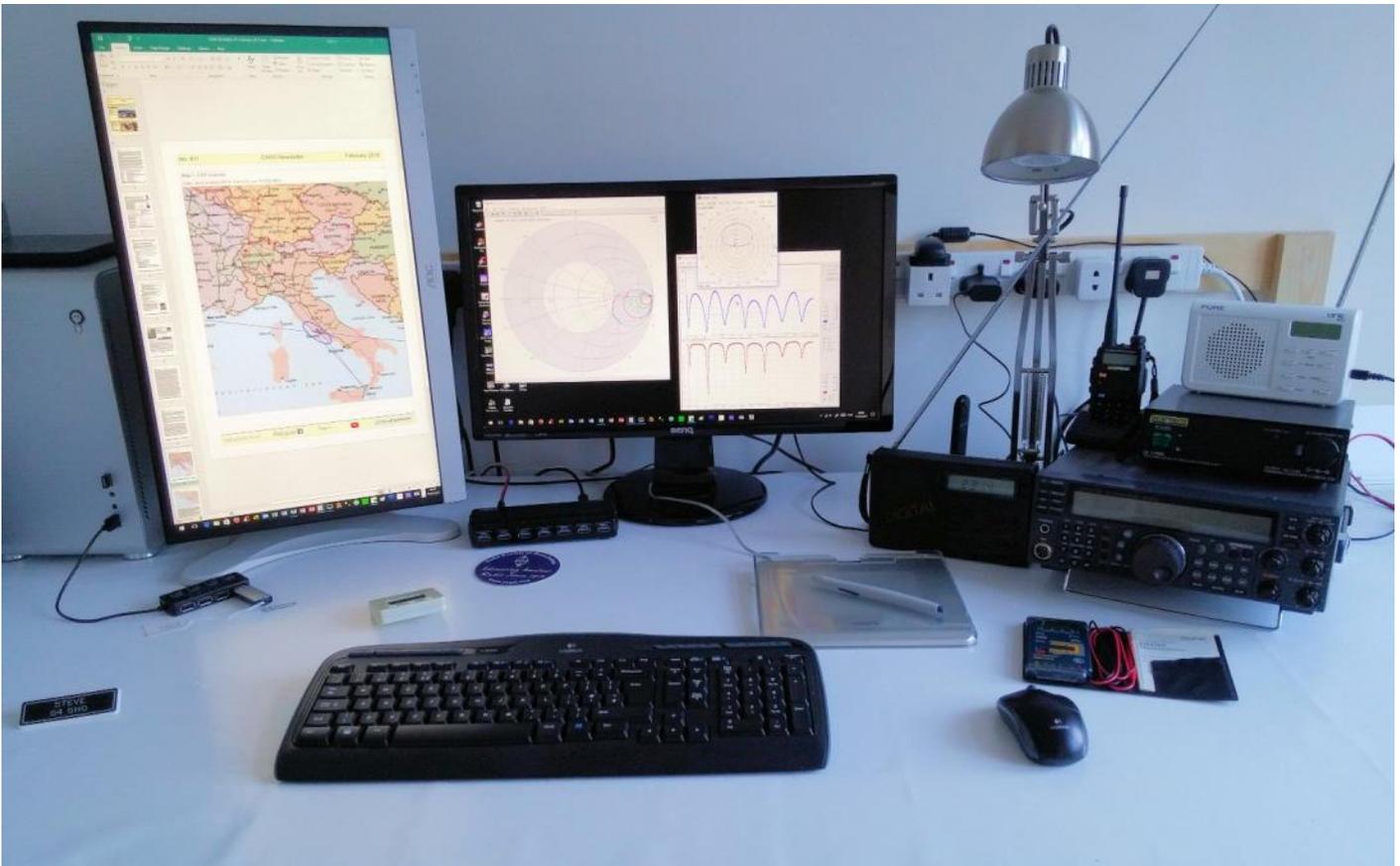
Given that transistors have been in commercial use since the early 50's and that some of those examples are doubtless surviving in working condition in various attics and museums around the world, how long can they continue to function? Granted, some of the earlier examples will not be in daily use (unless there some examples like the mythical/apocryphal lightbulb that has been burning for 50 years). Yes, resistors will burn out or go high value, capacitors will dry, short or leak (inductors should be OK) but if not subject to misuse, the semiconductor is victim only to radiation damage or (possibly) some form of crystal growth, oxidations or unwanted migrations. It's entirely possible that older devices, being bigger than modern ones (by several orders of magnitude?) may be less prone to that than more modern ones. I wonder what the historical footnotes will be... - **Ed**.



Diary

I have mentioned in the past that I had been re-working the shack. Originally, I had a combination of 1m x 0.6m and 1.2m x 0.6m Ikea tabletops arranged in an L shape to give me just over 2m² worktop area. A while back, Peter, M0PSD was kind enough to cut up some of his plywood stock to make me an L-shaped "flatpack" desk/bench top. Owing to the limit in the size of the sheets available, it was laminated and overlapped in two layers. It was good because it gave me plenty of work area but, because I needed knee space under the central working area and it was supported at the ends and back only, after some months of using it, it started to droop in the middle with the weight of the kit on it. In addition, there was a 45° piece that I specified in the corner of the "L" that gave me 2.25m² overall, but that made it very difficult to get at the corner of the room and access the shack window. What with one thing and another, it became more and more unsuitable and I had to have a re-think.

I didn't want to waste the time, effort or materials that Peter put into making the top, so I "re-purposed" it (I hate that phrase). I cut the top to form some shelving that I put into a storage cupboard that had previously been used as a wardrobe. In this way, I was able to put all the items that I had on shelves in the shack into a nearby cupboard with room to spare, making the shack more light in the process.



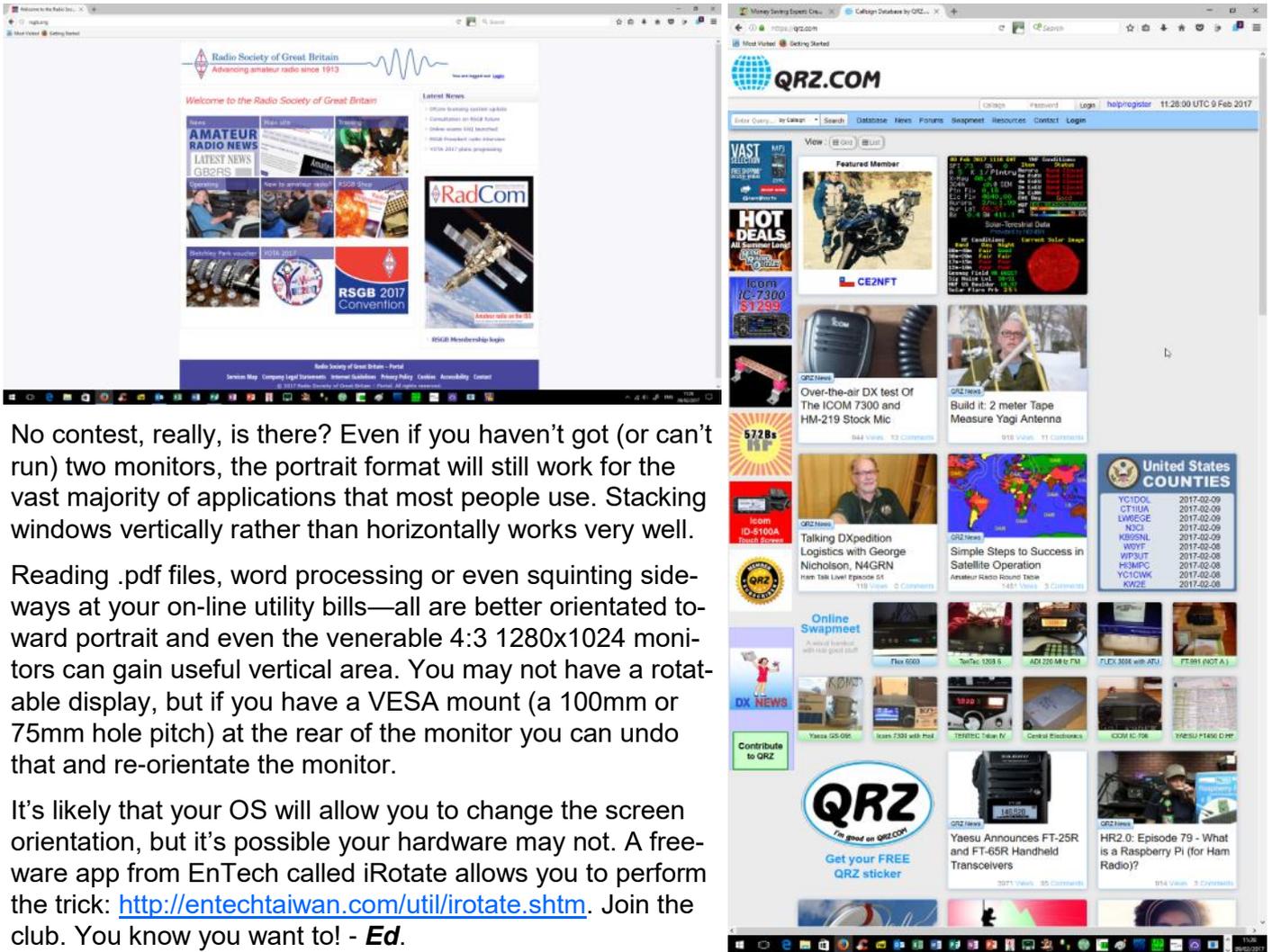
The worktop that Peter had made was also 600mm deep - a standard width for many types of desk and kitchen worktop. With both previous incarnations, it was OK if I only had the PC or the radio on it, but if I wanted them both together, it got a bit crowded.

Eventually I replaced the worktop with a combination of a cheap Ikea dining table that fitted exactly along the length of the room and was 840mm deep and a 1m Ikea tabletop that had formed part of a previous layout, to make up the L shape again. That gave a meaningful extra depth over which I could spread out my junk. Now I had a total of 2.5m² worktop; not much more, but, a much more meaningful desk area and a separate soldering station.

The above picture shows the station setup with my monitors arranged as I use them for producing the Newsletter. For years, I used my monitor at work in a portrait format. For years also, my work colleagues could never understand why I did that and I could never understand why they did not.

If you think about it, just about everything that is document oriented is in portrait format. A4 is a standard pretty much everywhere these days (apart from the USA) and it fits nicely into either HD format or, even better, into a 1680x1050 monitor format. There are loads of them on the market, they have a much nicer aspect ratio and, because they are not full HD spec of 1920x1080, can be picked up quite cheaply.

If you look at the picture on the previous page, you will see that an HD screen can be quite useful for what I use it for—a multi-window simulation environment but, if you are browsing the net, so often you get a narrow strip of information in the centre of the screen and acres of space either side. Compare these:



No contest, really, is there? Even if you haven't got (or can't run) two monitors, the portrait format will still work for the vast majority of applications that most people use. Stacking windows vertically rather than horizontally works very well.

Reading .pdf files, word processing or even squinting sideways at your on-line utility bills—all are better orientated toward portrait and even the venerable 4:3 1280x1024 monitors can gain useful vertical area. You may not have a rotatable display, but if you have a VESA mount (a 100mm or 75mm hole pitch) at the rear of the monitor you can undo that and re-orientate the monitor.

It's likely that your OS will allow you to change the screen orientation, but it's possible your hardware may not. A free-ware app from EnTech called iRotate allows you to perform the trick: <http://entechtaiwan.com/util/irotate.shtm>. Join the club. You know you want to! - Ed.

Diary II

We have long harboured thoughts about moving house before I/we get too old to cope with the garden and maintenance problems that will inevitably occur with a 1930's house. The station manager seems to spend half her life looking at RightMove and we had half-heartedly looked at other properties in the Chelmsford area, but nothing seemed (sensibly) affordable or right for us.

By chance recently she saw a house in Wymondham that looked good and we popped over to see it. In the event, that wasn't right for us either, but it got us looking at the area. To cut a long story short, having sorted the shack, we have now set in motion a chain events that will (hopefully) see us moving to Norwich in April. That said, I will be busy with the move both before and after and, perhaps inevitably, my interests will then lie with the Norwich Club who meet just a mile away from our intended address. I will become a NARC member.

So saying, this may be one of the last meaningful Newsletters I edit, as I guess future editions may be more hurried and somewhat lacking in content. I'll keep you posted, obviously. - Ed.

Coals to Newcastle?

I recently received a circular email from Chelmsford Civic Society, who were instrumental in setting up the Marconi Exhibition at Hall Street factory:

An Italian TV crew arrived in Chelmsford on Monday for a whistlestop tour of all Marconi's legacy locations in Chelmsford - they were escorted by Chris Neale of Marconi Heritage, Peter Turrall of Marconi Veterans and Tim Wander of Oaklands and Sandford Mill Museum. First up was the Marconi statue, then on to New Street to see Marconi's old office then over to Hall Street - the world's first wireless factory; then up to BBC Essex and Princess Elettra's plaque. Next on to Writtle to see Melba Court (the site of Writtle Hut) and All Saints Church to see the stained glass window dedicated to Baroness Platt and Marconi. Not forgetting the new Welcome sign on the A414, followed by a visit to Oaklands Museum and, after dark, to Sandford Mill - Titanic room and Writtle hut. A 60 min copy of the documentary with English subtitles will be sent to us - The film being made for educational purposes.

I hope the crew enjoyed themselves - **Ed**.

That's it, then!

After trying several unsuccessful ways of getting a usable all-band antenna up at my current QTH, I had

settled on the Windom, which worked quite well. This is all that's left of the support mast now.

The main mast consisted of a 3m length concreted in a corner of the garden about 1m into the ground and a 10-bolt plate joiner supporting a 6m length on top of that. Two other 6m poles were attached with swivel joints and set at an angle along two adjacent fences. The ends were pinned into the ground with 1m long steel stakes. In this way, the main mast was supported with 90° orthogonals that acted to hold the mast in tension against any S/SE wind forces and in compression against the pull of the wire and N/NE winds. It worked very well in practise.

When we move, it will be to a place with a small garden which is about 10m square. That'll be big enough to get up some form of antenna, but I don't quite know what, yet. This lot was up on eBay for 99p just to get rid of it. If I have to replace it in Norwich, then so be it.

There's a *Ciro Mazzoni* baby loop in RadCom at a good price... **Ed**.



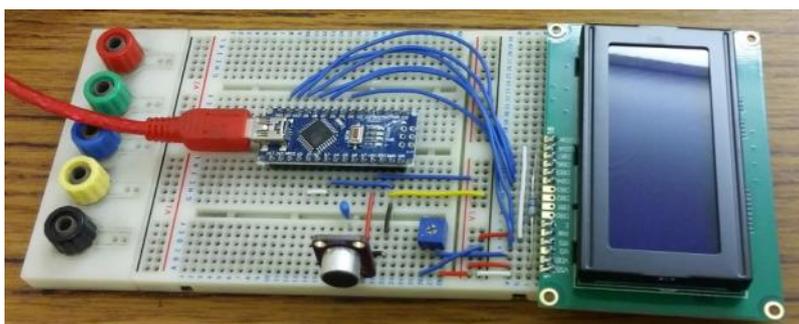
February Skills Night

Once again we had a good turnout for this popular evening and there was plenty of animated conversation. The quiz was a good one - again with a few tricks and obscurities. It makes one realise how little the license document is actually studied in a general sense. You read it for the information you need at the time and don't necessarily care what others are up to. Interesting...



Jim, 2E0RMI and Pete, M0PSX had a nice interactive display relating to the 2MT anniversary station and a "broadcast station" which comprised a running order, sources, mixer, headphones and a mic where you could play at being a DJ/broadcaster.

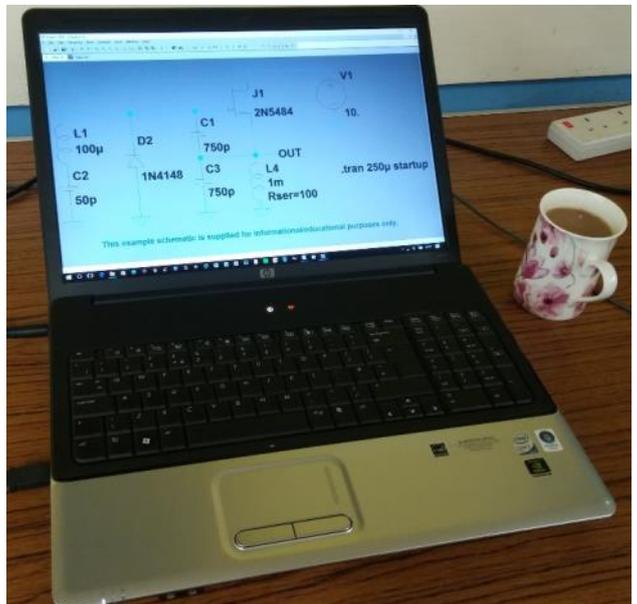
Alan, M0IWZ had an Arduino Nano that he was using to decode Morse audio via a breadboarded mic. He was using his phone to receive a net SDR station and then coupling that to the decoder reading out to the associated display. A simple, useful project. Barry, G7BND and Keith, G3WGE sought Alan's help with an Arduino analyser they are building.





Chris, G0IPU again warmed up an iron and set about building things as a demo and the quiz was just as taxing as it normally is.

Rachel, G6AMY ran the Monday night net on GB3DA and Pete organised a mass QSO. He called into the net and we all said hello. Quite how she noted down the callsigns that were given simultaneously, is anyone's guess...



I had brought along my laptop to talk about simulators, which I was almost able to do. Unfortunately, for reason best known to the software or its authors, it decided to hang on several occasions whilst I was trying to demonstrate. After rebooting the laptop, it all worked fine, but by then, any interest that had been shown had drifted off toward the tea counter.

Ed, G8FAX asked if I could look at a home brew directional coupler he had made as Mike, G4NVT was not able to make sense of it with his equipment. We arranged a post meeting eyeball and I was then able to plot off the insertion and coupled losses so that he could use it as a basis for a high power directional wattmeter.

After we move, I will have to look up the other skills events that (hopefully) will still be held regularly at Ipswich but, unfortunately, that will over an hour's drive away. Norwich club meets once a week, so that will be interesting. I wonder if they will do anything similar. It'll be a change, and I will miss the Essex Skills meetings and the people who attend them, but life has to go on. Thanks for everything, Pete! - **Ed**.

The Nixie Project... life after the cold war

Ok so the title may be a bit dramatic and this piece is no Bridge of Spies or Ice Cold In Alex, doesn't star Tom Hanks and there is no need for code deciphering books to read further (though some might disagree!) - but it does show superbly that even "old" technology can be adapted to work in the present day and also shows that some modern day components have been specifically designed and developed to work with the "old".

You may have had a sneak preview of what I allude to when I brought it along to the last skills night -and you already know that what I allude to is a fabulous collaboration of cold cathode technology and modern satellite time keeping – a GPS based 6 digit Nixie Clock kit I recently built over Christmas, and going by the response for it at the last skills night it seemed fairly popular with the attendees and I had to keep a sharp eye on it as one or two were suggesting it would nice on their shack shelf...

So I thought I'd do a write up of how it came together and throw in some pictures for good measure and also a couple of tips if anyone is thinking of purchasing one (I have built 3 all told, the other two for friends who thought it was awesome to have glowing away nicely at night).

Nixie Tubes

The Tubes are like a blast from the past, I first remember seeing them when playing on a pin ball machine, glowing orange numbers scrolling through 0 to 9 and that for some reason always fascinated me, it's also part of the appeal of this kit - a bit of my childhood on my living room table... a mixture of old and new.

Nixies were first manufactured by a small vacuum tube company called Haydu Brothers laboratories and shown the light of day in around 1955 (shock! I was born 2 years before that) by the Burroughs Corporation (didn't they manufacture office machinery?) who eventually purchased Haydu – Countless millions were made, a large proportion coming from Russia and other Eastern Europe countries including a joint collaboration when the Army and Navy got in on the act in the good old USA.

Nixies shouldn't be confused with a vacuum tube – they contain a wire mesh anode and cathodes shaped into as many digits or symbols as needed, then filled mostly with low pressure neon gas and often a small amount of mercury or even argon is added. Supplying a high voltage to one of the cathode pins makes it glow orange; some had a slight bluish tinge, due to the mercury.

The word "Nixie" comes from "NIX I" an abbreviation of "Numeric Indicator eXperimental No 1". Needless to say, they found their way into countless pieces of equipment such as frequency counters, multimeters, airport clocks and even calculators and were, no doubt, the LED 7 segment display of the time.

A variety of shapes and sizes were available to suit various needs and were still in general production until the late eighties in a multitude of sizes and viewing angles - I'm pretty sure these tubes are not currently manufactured (apart from specialised needs) and any available are from over production and are what's termed as N.O.S (new old stock). The ones used in the kit are from Russia. One oddity of the tubes (these are IN14s and have 18mm digit heights) are that the numbers 5 and 2 are made from the same filament frame - just upside down to presumably to save on costs. (£13.50 each from PV Electronics - Ed.)

The Kit

The kit was supplied complete with superbly machined and anodised aluminium case, all the tubes needed – 6 in this version – and a nicely produced PCB with component screen print, separate packs of resistors, LEDs, IC's, Micro GPS receiver module and a custom software chip that runs the whole shebang and, to top it off, a 12v 500mA switch mode power supply.

Assembling kits is something I'm quite used to and have done many over the years - it's just a shame my design skills are not up to scratch! Nevertheless, putting this together gave me a lot of pleasure, apart from making me realise my eyesight isn't as good as it used to be anymore and, added to that, the old gas ring soldering iron you had isn't quite up to snuff anymore – I can't say this loudly enough - you do need a good temperature controlled soldering iron with a nice small pointy tip to construct this kit and possibly a magnifying glass to read some of the resistor markings. Also, a digital multimeter comes in handy to confirm your initial findings.

A multimeter will also be needed for checking some voltages as the build progresses. Add some .5mm leaded solder and you're ready to go.

Instruction Manual

The Instruction manual, is almost of war and peace proportions when you download and print it out, though it does cover all the set up options the clock has (and it has many!) and they are nothing if not fully comprehensive (the kits have a variety of tube types you can use and some need to be clipped of some of the wires at the base of the tube - the manual covers this very well).

Basic Construction

Construction is fairly straightforward; not beginners fodder, I would suggest, but certainly do-able by most who can use a soldering iron. The biggest thing to watch for is solder bridges, as some of the pads are quite close together - this could ruin your day and leave you with a non working damaged clock... (The inverter onboard delivers about 170v to drive the tubes so care is needed when soldering components in). I still solder using leaded solder as it flows better and is still easily available – ECO solder sucks!

There are 2 test points on the board as you build, one for the low voltage side which, when completed, you check for the correct output of around 12v before moving on to fitting the high voltage inverter circuit. Interestingly, several modern day bipolar transistors have been developed for this job – this kit uses an HV5812 High Voltage Driver IC by Supertex and MPSA92 bipolar transistor to replace the old style 7400 drivers such as the 74141 or the Russian K155ID1 which have long been out of production – an unusual example where an original IC design has been replaced with discrete transistors.

These HV drivers step up the 12v to around 170 volts with the addition of just a few added components and that voltage is required to allow the tubes to strike. Once you have checked that, it's pretty much a matter of just populating the board as per the instructions; do follow these, as I found out it's tempting to fill the board and not leave room for the height adjustments of the RGB L.E.D.s.

Tube Assembly

Assembling the tubes is probably the trickiest part – all those wires..... Hard wiring them to board would be fine, but a nightmare if you have to change one if you have a tube failure later on in life. Fortunately, the designer has pre-empted this and modularised their assembly onto small sub boards which just plug in to the main board... a neat and elegant solution. It also allows for the RGB LEDs to be placed under the base of the tube and glow eerily in any colour of the rainbow you fancy - all programmable in the settings.

GPS

The Clock itself will run just fine without the GPS module, but what the hey - the icing on the cake is old technology that's linked to satellites to keep its time keeping spot on. Although the kit as standard has a supercap back up, this is only good for a few hours, and you would have to reset the time manually if you exceed that. Using the GPS has the added bonus that if there is a power cut of several hours or more - within less than 20 seconds of powering up again it's showing the right time and date once more. (Also, any summer/winter changes are automatically taken care of).

And finally...

Build time was over two nights on the first one - with old age, eyesight not being what it used to be and SWMBO suggesting I actually spend some time with her – but the second night saw a fully working clock in its case and the GPS flashing once a second – which, by the way, has remarkable sensitivity and doesn't require sticking to a window to get a good reception - mine's behind the unit the clock sits on and works just fine. The clock does indicate if GPS is lost.

Interestingly, there are one or two people still making Nixie style tubes with super large digits and these are mightily impressive - as is the price tag - almost £500 a tube! Three grand for a six digit clock? Think I'll stick with mine...

It's supplied by PV electronics www.pvelectronics.co.uk, comes as a complete kit with all the bits I used and costs £189.00 inc. vat and standard postage. I have no affiliation with the them... **Ray, 2E0GVE**





Kit contents above, GPS module top right, colour testing right and finished clock from front and back, below.



Lovely, aren't they? Have a look at a font and video that, as the link shows, is inspired by Nixie tubes.

- Ed.

<http://www.evilmadscientist.com/2016/nixin-a-font-inspired-by-nixie-tubes/>

Interesting...

“The self-resonance and self-capacitance of solenoid coils.” You may have given this some consideration at some point, but I’ll bet you haven’t given it as much thought as David Knight, G3YNH who publishes this article on his website <http://www.g3ynh.info/>. It is a fascinating study of the subject and well worth a look. The page is headed by pictures of low-pressure gas ionised by the electric field of a resonating inductor. see: [coil resonance experiments](#) where there is a rather prettier html version of his .pdf article which can be found here: http://g3ynh.info/zdocs/magnetics/appendix/self_res/self-res.pdf. It is all reminiscent of practical work done on HF loops by Mike Underhill, G3LHZ and that in itself is a very nice study.

David also has a nice article about using the SGC-230 ‘Smartuner’ in a balanced antenna configuration. Just the sort of thing that has been done at Sandford Mill... - **Ed**.

Interesting?

I was looking at BangGood’s website recently for antenna analysers and wireless equipment and the result of one search was this: “[Plus Size Sexy Wireless Lace Bra Gather Soft Thin Vest Bra For Women](#)”. Well, yes, I suppose it would be for women unless you have some gender re-assignment issues. I also imagine that “wireless” means that it is not underwired (ask the station manager). You would think they would employ better heuristics on their engine. - **Ed**.

Jodrell Bank (and more)

Colin, G0TRM sent me a link to a website that describes Jodrell Bank in a nice compact manner. It gives a potted history <http://www.engineering-timelines.com/scripts/engineeringItem.asp?id=439> that is very readable and one point to note is In 2012, Jodrell Bank became the headquarters for analysing data from the Square Kilometre Array (SKA) — the world’s largest radio telescope (construction 2016-24).

Everyone “knows” about JB but the SKA is just getting going. Looking at their website and their intro video, they talk about it being built in South Africa and Australia “far away from noise and radio interference.

When you think about the distances and levels of signals that they will be receiving, it makes you wonder just how much man-made QRM will queer their pitch. Granted, the dishes will have a very narrow beamwidth and the sidelobes will probably be engineered to minimise any local pickup, but I’ll bet that someone, somewhere will start to curse that there hadn’t been better controls placed upon the random generation of “HF smog” that seems to pollute the spectrum universally these days.



The SKA is an amazing project, and if you want to know a bit about how they are going about it, look at the technical documents here: <https://www.skatelescope.org/key-documents/>. I can just squeeze this in:

The SKA will generate enough raw data to fill 15 million 64GB iPods every day. The processing power required will be absolutely enormous and they reckon the SKA Computing, technology and infrastructure will rival the fastest and most complex on Earth. The total collecting area of the SKA will be well over one square kilometre or 1,000,000 square metres. This will make the SKA the largest radio telescope array ever constructed, by some margin. To achieve this, the SKA will use thousands of [dishes](#) (high frequency) and many more low frequency and mid-frequency [aperture array](#) telescopes. Rather than just clustered in the central core regions, the telescopes will be arranged in multiple spiral arm configurations, with the dishes extending to vast distances from the central cores, creating what is known as a [long base-line interferometer array](#). Look it up, please do. - **Ed**.



Canvey Rally 2017

I'm fairly sure that the event in February was be the last I will attend, as may be the case for Waters & Stanton. They officially shut down their business at the end of March and that's when I'll be off, too.

The pictures, taken in the calm before the storm, suggested that there was no shortage of stallholders and that good trade was anticipated. The crowds arrived and the event was well attended; CARS' totally inadequate table space was groaning under the weight of donations and other junk that was offloaded onto an unsuspecting public (only joking!)

The bacon baguettes lived up to their reputation and a nice hot cup of tea is welcome at any time, so the kitchen staff should be thanked for their efforts. Dorothy, MOLMR was amongst them.

Clive, M0GHH took advantage of the quiet to breakfast in style whilst he minded the shop.



I am going to a smaller house and won't have anything like the storage space I have now, so I managed to divest myself of myriad unfinished projects, old and duplicate equipment. On the strength of that I bought an IC-7300 as a housewarming present to myself. I have no idea what the local noise level is like in Norwich and am hoping that with modern underground cable installations, I shall be free(er) of the absolutely appalling QRM that I suffer from here in Chelmsford, with the plethora of overhead power and phone lines surrounding my current house. Gwyn, G4FKH lives only about 200 yards away from me and his services are all underground. He doesn't suffer anywhere near the noise levels that I do, so that is the basis of my hopes. So: It's goodbye to all that, to CARS and those whom I have met whilst living in Chelmsford. It's been interesting! - **Ed**.