



# Chelmsford Amateur Radio Society

## Newsletter

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**Next meeting: 7th February - 7.30pm, Oaklands Museum**

**Diplomatic Wireless Service of the FCO - Peter Scrimshaw, M0HSG**

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- Essex RAYNET at Jaywick
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- More help wanted
- Harwell Radio & Electronics Rally



**Essex RAYNET help out at Weeley during the Jaywick flood mitigation programme in January. Full report by Pete, M0PSX inside.**

**Club Nets - Tuesdays 20:00h**  
**Net Controller: TBD**

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

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



Contact details for the newsletter: [editor@g0mwt.org.uk](mailto:editor@g0mwt.org.uk)

## Editorial

Hello again, and welcome to the latest edition of this newsletter. The fuss has died down now, the turkey has been rendered to various versions of sandwiches, curry & soup, the tinsel and decorations have been put back into the attic, the pets are no longer being terrorised by over-enthusiastic small children, the relatives had left you in peace and it's time to get on with the real world. Will the Sale period bring about any new purchases, or are you still paying off the festive extravaganza? When is the right time to put those unwanted Christmas presents on eBay? Do you allow a decent interval or do you just hope that your rellos don't know your eBay username? Wouldn't it be embarrassing if one of them bought from you?

The Canvey Rally is upon us so there may be the chance of some older kit being turfed out as the new stuff you bought yourself (well, Father Christmas said you could) takes up the valuable room on the shack desktop/bench (delete as appropriate). Will Waters & Stanton be there and, if they are, will it be a "last hurrah" or will they be back in future years with their 10% off stickers? Who knows?

Maybe I should have bought myself a new rig. I have tried in vain on many occasions to get the new PC to talk to my TS-570D via USB-serial cables with three different chipsets, but nothing works. The old PC has no problem talking to it with an old-fashioned hard-wired serial cable, but won't talk to the rig via the USB-serial adaptors either. Windows 7 & XP on the old PC seem happy with all three adaptors, whereas Windows 10 on the new PC will only see two of them as the Prolific chipset has no available drivers. Ho, hum.

So. Norway have decided to switch off FM and go over to DAB entirely. By the time you read this, they will have already done so. The Norwegian Authorities say that FM is not capable of providing full coverage in their country's terrain so millions of consumers are going to be inconvenienced and subject to some expenditure if they want to keep listening to their trannies or car radios—about 2 million of the latter by all accounts. If you are of a mind, you can read a potted [History of radio in the UK](#) with such gems as **2001**: VideoLogic (now [Pure](#)) launches the Pure DRX-601EX, the world's first portable digital radio. It costs £499.

I wonder what power that consumed. I last changed the batteries in my bathroom FM radio about a year ago and it gets used quite extensively. Those were batteries that had already served a term in other equipment down to about 1.2V/cell, but are still able to run the radio down to about 0.8V/cell. Would that DAB were that efficient in terms of d.c. power as well as RF spectrum. Ho, hum again - **Ed**.

## Dates for your diary

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

Sun. 5th February	Canvey Rally - Paddocks Community Centre, Long Road, SS8 0JA
Tue. 7th February	Meeting - Talk on Diplomatic Wireless - Peter Grimshaw, M0HSG
Mon. 20th February	Skills Night - Danbury Village Hall
Tue. 7th March	Meeting - Classic Computers - Andy Chapman, G7TKK
Mon. 20th March	Skills Night - Danbury Village Hall
Tue. 4th April	Meeting - RF Kits Design & Manufacture - David Powis, G4HUP (hupRF.com)
Mon. 17th April	Skills Night - Danbury Village Hall
Sat. 22nd April	International Marconi Day
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. 1st August	Meeting - Constructor's competition
Tue. 5th September	Meeting - Keith Maton will talk about Radio Caroline

**This month...****Diplomatic Radio Service**

We have Peter Scrimshaw, M0HSG coming to give us a talk on the Diplomatic Wireless Service of the FCO. Colin, G0TRM tells me Peter's subjects will cover the following areas:



World War 2 origins at Whaddon, near Bletchley  
 Post War start up at Hanslope Park  
 Radio Stations used  
 Organisation and Structure  
 Methods of Communication and equipment used  
 DWS Broadcasting at Crowborough and Overseas  
 Demise of DWS due to technological Advances

It sounds like it could be an interesting evening. - **Ed.**

**CQ de Radio Emma Toc !**

95 years ago on Tuesday 14th February 1922, a small group of young, gifted, charismatic - and perhaps slightly irreverent - Marconi employees turned on a medium wave transmitter in a 'long low hut' in a waterlogged field in Writtle, and began a year long experiment which is now regarded as the birth of broadcasting in the UK. Led by the irrepressible Captain Peter Pendleton Eckersley, the 2MT team broadcast regularly every Tuesday evening and what started as a request for a station for 'calibration purposes' for the fast growing number of radio hams, transformed into an entertainment programme like none before.

A small group of us would like to celebrate the 100th anniversary of 2MT - 'Two Emma Toc' - in 2022, but being an impatient bunch we've decided to have some fun on the upcoming 95th anniversary ! We are not attempting to re-create 2MT, more a case of paying tribute & testing what we could aim for in 2022. So, providing atmospheric conditions, aerials, transceivers, and the wonders of the internet / 'wired wireless' (Peter Eckersley's 1930's vision of cable networking) all behave themselves, then we will be operating amateur radio & an internet radio station at various times from Sunday 12th to Tuesday 14th February.

Further details will be posted on the CARS website nearer the time, & also are available at our website [www.emmatoc.com](http://www.emmatoc.com) where there is a 3 day schedule of our proposed broadcast.

We invite you to join us on the bands or on 'wired wireless' to remember 2MT & pay tribute by having fun on the radio.

**Jim Salmon, 2E0RMI**

See over for flyer - **Ed.**



# Radio Emma Toc

**CELEBRATING WIRELESS STATION 2MT**

## CQ de Radio Emma Toc!

You are cordially invited to listen in to 3 days of broadcast radio & amateur radio transmissions to celebrate the 95th anniversary of **2MT** - the UK's first regular broadcast service.

♪ **STATION CALL - 'RADIO EMMA TOC'** ♪

♪ **LOCATION - A 'LONG LOW HUT'** ♪

*The Programme, as arranged at present, is indicated below :-*

**DATE :** Sunday 12th - Tuesday 14th February 2017

**TYPE OF TRANSMISSION :**

Telephony, Streaming Wireless Fidelity

Information regarding reception will be appreciated, and communications will receive individual acknowledgment.



**LISTEN IN !**



Organised by a group of 'long low people', from Chelmsford Calling, Chelmsford Amateur Radio Society, & Sandford Mill Museum.

**OFFICES & WORKS / [www.emmatoc.com](http://www.emmatoc.com) / WEBSITE**

**TELEGRAMS / [emmatoc1922@gmail.com](mailto:emmatoc1922@gmail.com) / E.MAIL**

*There may be some atmospherics, there may be some jamming, there may be some oscillation*



Sat 22nd Apr, 2017 will be...

## INTERNATIONAL MARCONI DAY

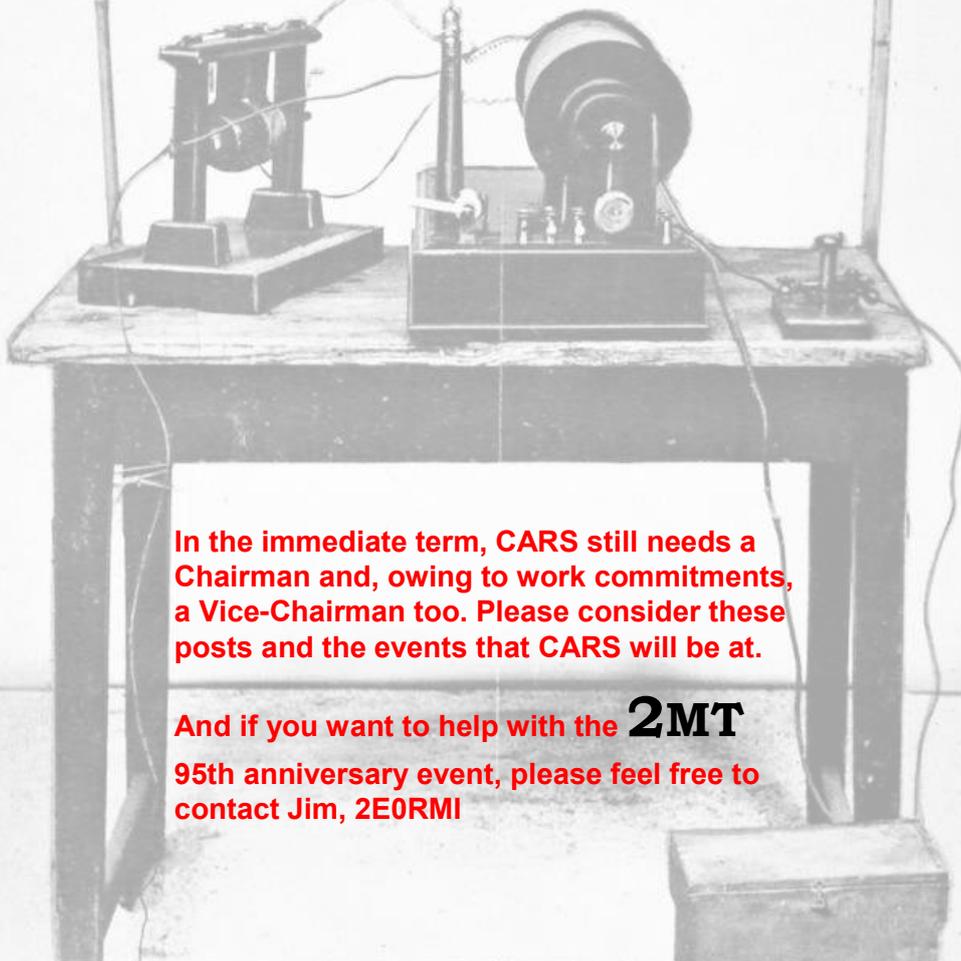
But before that,

### SEARS' CANVEY RALLY

Takes place.



CARS needs your help with both events. Operators and other helpers for IMD and backup for CARS' famous table top sale at Canvey. You may even get a bargain at the latter. You will certainly want one of the bacon rolls (tough luck if you are a veggie!)



In the immediate term, CARS still needs a Chairman and, owing to work commitments, a Vice-Chairman too. Please consider these posts and the events that CARS will be at.

And if you want to help with the **2MT** 95th anniversary event, please feel free to contact Jim, 2E0RMI

## January Meeting report

Our presentation at Oaklands Museum last month was entitled "Riding the radio-waves" and we were pleased to welcome Jane Humphreys OBE to give the talk.

Jane works for the Civil Service in charge of the spectrum allocation and gave a very interesting talk on all things to do with the radio spectrum, which is her specialised subject.

The spectrum brief covers all aspects from Radio to Road Traffic management and it would appear few government departments are not involved in some way with the use of spectrum. Thus Jane could gain leverage and hold sway with some arguments.

In the first part of the talk Jane gave a brief historical overview from Heinrich Rudolf Hertz who discovered electrical waves, to Marconi and then to the present day's use of the many frequency bands.

The history and use of the mobile phone bands was then described, starting with British Telecom and Vodafone in 1983. Who knew Vodafone stood for voice and data? We then went on to the 3G auction in the year 2000. The department had decided to auction off the bands to the highest bidder. Rather than in previous years, when governments had chosen winners and given licences in a so-called beauty contest, it had been decided that companies who were prepared to bid for a licence were more likely to expand and push the networks out at a faster rate so as to recoup their investment.



### Heinrich Rudolf Hertz

(1857 - 1894)

German Physicist

Discoverer of "electromagnetic waves" or, as they are also known:

"Hertzian Waves"

*"I do not think that the wireless waves I have discovered will have any practical application"*



### UHF band: mobile 'phones - five main frequency bands

**790/862MHz – licensed 2013 for 4G**

**880/915 and 925/960MHz – licensed 1983 for 1G**

**1710/1880MHz – licensed 1989 for 2G**

**1920/1980 and 2110/2170MHz – licensed 2000 for 3G**

**2500/2690MHz MHz – licensed 2013 for 4G**

Five phone companies bid for the licences raising a total of £22,477,400 which caused some excitement in Whitehall.

The next government auction for 4G was in 2013 this raised a further total of £2,368,273,322.

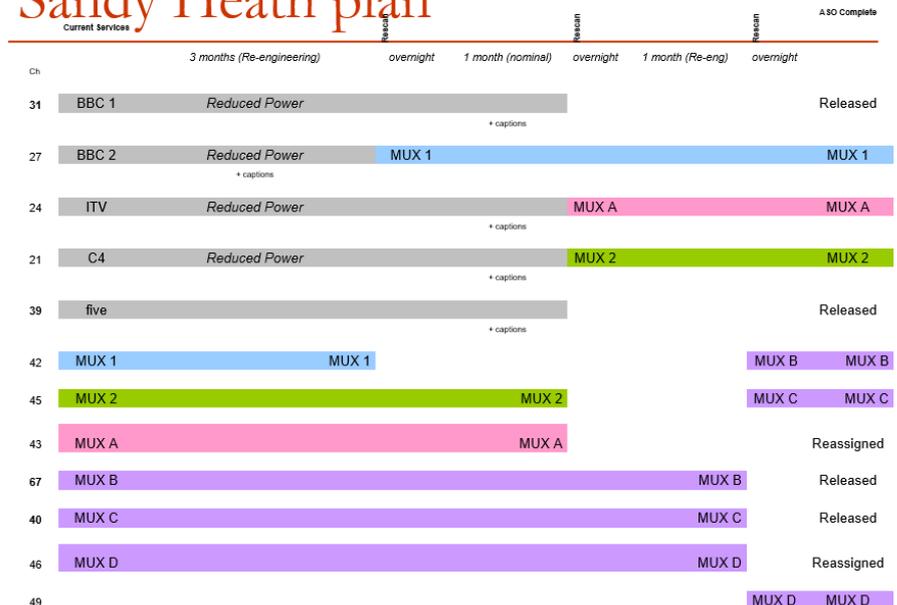
Jane then went on to describe how her department rationalised the frequency allocations.

Changes were made to the television bands and old historical radar frequencies were tidied up. To use her phrase: it is now being realised that spectrum is a precious resource and finite.

Last, but not least, the talk moved on to the future and the next move - towards 5G. Television bands have been moved to accommodate the new mobile phone plans and 5G is planned to develop mobile communication in many as yet unrealised applications.

We then moved on to WiFi and 5Ghz. Twenty two million homes and business's use WiFi mainly on 2.4GHZ and with 5Ghz catching up.

## Sandy Heath plan



5Ghz in Europe currently has 19 x 20MHz channels and there is a proposal to add 125MHz between 5725 & 5850MHz to enable 2 x 80MHz channels at 5GHz to co-exist with services. Existing users are weather, defence, PMSE (programme-making and special events), intelligent transport systems, fixed satellite and drone racers.

#### **PMSE:**

A long-established secondary user of spectrum: needs localised frequencies at specific times

Audio shares with TV, but as TV occupies fewer frequencies PMSE is squeezed out

March 2016: audio PMSE to share with aeronautical radionavigation at 960-1165MHz

Video newsgathering

Jane's talk ended up with a discussion on DAB radio and an overview of the future of mobile phone usage including farming, hospitals and the home.

Jane then took questions from the floor and was able to answer them all, demonstrating her complete grasp of the subject and we would like to thank her for a very interesting evening.

**Oliver, M0WAG**

*Here are some of Jane's slides, relevant to our interests, condensed somewhat and reformatted - Ed.*

#### **5G Mobile:**

Not 'just another G' – an aspiration to give you the bandwidth you need wherever you are

- 3 distinct use cases being developed:
  - enhanced mobile broadband – for virtual reality; streaming mobile video; live TV; in-car infotainment
  - ultra reliable/low latency – mobile cloud; safety-related automotive/ autonomous cars; remote surgery/ robotics
  - M2M – automated industrial processes; vertical applications in smart cities, transport, energy, healthcare

#### **5G Spectrum:**

Expect it will require a mix of frequencies to give flexibility for distance and capacity

- Europe working on 3 pioneer bands:
  - 700MHz
  - 3400-3800MHz
  - 24.25-27.5GHz
- All existing mobile allocations likely to migrate to 5G eventually

#### **WiFi and 5GHz use:**

- Ofcom consultation summer 2016 attracted 100+ responses
  - 22 million homes use WiFi + shops, stations, libraries....
  - 2.4GHz band most used; 5GHz catching up
  - 5GHz in Europe currently has 19x20MHz channels at
    - 5150-5250MHz – indoor only
    - 5250-5350MHz – indoor only
    - 5470-5725MHz – indoor and outdoor use
  - Propose to add 125MHz at 5725-5850MHz to enable 2x80MHz channels at 5GHz (or more smaller channels)
  - Coexistence with other services key – international coordination on agenda (again!) for WRC19
  - Existing users– weather, defence, earth exploration, PMSE, intelligent transport systems, amateurs, fixed satellite, drone racers

### Digital Radio Switchover:

- Criteria remain for DAB to match FM coverage, and listening to exceed 50%
  - BBC national DAB coverage exceeds 97%, including 85% of major roads
  - RAJAR Q3 2016 – listening 45.5%
  - Government will ‘consider the merits of switchover once listening hits 50%’ [Matt Hancock, September 2016]
  - Not primarily about efficient use of spectrum
  - FM uses 87.5-107.9MHz, DAB/DAB+ uses 174-240MHz
  - Potential alternative uses with Internet of Things
  - Primary driver for switchover would be economics of transmission, and potential new services

### Radio Energy Use:

- All types of radios used less power in 2013 compared to 2010.
- In 2013:
  - DAB radios used 46% less power compared to 2010 (6.96W reduced to 3.75W).
  - Analogue radios used 26% less power (6.34W reduced to 4.69W)
  - Internet radios used 66% less. (14.75W reduced to 4.98W)
  - Standby power consumption reduced from 2.44W to 0.84W
- In 2010 DAB models used more power than analogue models, however in 2013 DAB models used 20% less power than analogue models.
- Testing by Intertek for HMG in 2010, 2011 and 2013 – 299 products tested in total.

### And also...

- Internet of Things (Machine to Machine/ M2M)
- Transforming health services – accessing medical services in your home
- Modern farming – crop and stock control
- Unmanned Aerial Vehicles (drones)
- Flight tracking, including disasters

### Radio Spectrum is:

- Finite – but technology is helping us to use it better
- Valuable – worth over £50 billion every year to the UK economy
- Exciting! – transforming public and private services

*It's perhaps worth mentioning that Jane reported a complete lack of interest in anything electronic or related thereto in her youth, except for the fact that her father (pictured) was a Marconi employee and, as part of her foray into the world of spectrum management, when she landed upon the doorstep of GEC-Marconi Electro-Optics at Baisildon, she was asked if she would like to see his old office.*

*She took them up on the offer and at one point in the talk she wondered, having attended a function at Villa Griffone, the Marconi Museum site in Italy as part of her official duties and given this same talk at the Hall Street radio factory, what were the chances of such a privileged coincidence taking place.*

*She claims that she is still not technical... Ed.*

## A Marconi employee



## Technology? Huh!

Why is it that banks, those H-U-G-E institutions that acquire vast sums of money by various means, fair or foul, then throw it away in payment of fines cannot see fit to pay people to deal properly with their software and other automated systems—never mind their customers? Up until recently we had two joint bank accounts (let's call them 1 with a name like a West Yorkshire town and 2 that has a black horse as an emblem). We then decided to open one with a major High Street name (owned by a Spanish company) because they were giving some of that money away in terms of cashback and interest that was simply streets ahead of the competition.

Account 2 was used for small sums associated with clubs and organisations we were involved in and for internet shopping. We would not need three accounts so the station manager, who runs our accounts (and gives me pocket money occasionally) thought we would close the smaller, piggy-bank account (2) and then use what used to be our main account (1) instead as a backup for those activities.

As it happens, those two accounts are co-owned and live together in the black horse's stable. The station manager had a senior moment and entered the wanted bank account number (1) onto the [closure] bank's form (2) and handed it over. A few days later, we were surprised to get an email asking us what we wanted to do with the balance of the money left in our account (1) that they had just closed. What? Phoning the bank, we were told of our mistake and no amount of "OK. Hands up, our mistake; why didn't you query it?" or "That's not what we wanted to do—can you re-open it?" was going to help. No. Despite the fact we handed the correct form to the right bank with the wrong number on it, they were joined at the hip so took the action they wanted and closed the other bank account. Irrevocably. Oh, well. C'est la vie. We had to leave it at that and now just use the remaining dump account (2) as it originally was. We still have other savings accounts with bank (1), so now have to have all three running. Sheesh!

**Next:** It's getting to that time of year when I have to renew my G-QRP Club membership. I used to have a standing order (SO) for the 2nd of January and it all worked fine with our original bank (1). After we changed to the Spanish owned one the automated SO changeover seemed to work well, but some months after the G-QRP renewal had gone out the first time at the new bank, I was surprised to get a membership expiry notice, so I queried it with the membership secretary. Eventually, he was able to find a payment that had arrived with Mara's name (she set the SO up) but no membership number—just a very long string of meaningless random characters spanning about a line and a half—so he could not attribute it to anyone. The SO had the following information on the form: Ref G-QRP Club Membership no. nnnnn (where nnnnn is my number). He accepted my payment then and asked if I would be so kind as to make future payments later in the month next time, as it only confuses his system if the banks take it upon themselves to send the SO before year end as, apparently, some of them do.

I duly logged in to my online bank account (3) and amended the G-QRP SO payment date for the 15th of the month thereafter. Next month, we were surprised to find that the bank had paid the SO **again**. I contacted them to find out what they were playing at and they said that as I had changed the payment **day**, it reset the SO to the month in which I changed it, so it was then paid at the next available opportunity! Clever, or what? Again, this had no reference number, but again had the same random character string.

As it was patently impossible for *me* to reset the SO, I asked if they would please just reset the SO to 15th January next year. Can't do that, they said; we can only change a date a maximum of eight months in advance. (What?) Just call us back near the day and we'll reset it again. I was astounded at the crass software and/or authors they were employing. While I was at it, I asked why my G-QRP membership number used as payment reference was deleted and replaced by the garbage characters. We'll look into it, they said. Weeks later, they posted me some photocopies of the inter-bank payment trail, including the meaningless garbage, saying that the SOs had been paid. I wrote back saying I **knew** they had been paid as the money went out of my account—the question was, why no reference number? Eventually, something like two months later, they got back and said that it was because we had *two spaces* between no. and nnnnn. When the computer found too much white space, it spaced out itself and threw a wobbly—along with a load of garbage characters to boot. Good job their programmers don't work for Microsoft.

Or perhaps they did... I now pay it by PayPal as it's easier for the G-QRP Club to deal with. - **Ed**.



## Identifying DQRM

*Andy, G0IBN sent me this enlightening piece. It is reprinted with slight formatting changes with permission of the Chiltern DX Club:*

A small number of stations generate **Deliberate QRM**, known as DQRM, by transmitting on the frequency of a rare station in order to disrupt the operation. They do so anonymously, not identifying with their licensed call-sign and thereby contravening the terms of their transmitting licence. They do not explain their motives for this anti-social behaviour, so the rationale for DQRM is poorly understood and perhaps can be viewed as anarchy – just disruption for the sake of it. But it can cause considerable inconvenience, even anger, to legitimate DX Chasers and is deemed a serious nuisance. DQRM is becoming an ever bigger problem these days.

### EASSYL – FBDA

One such DQRMer has been identified by the content of his CW transmissions. Over a period of several years this station has caused prolific CW DQRM to DXpeditions on countless occasions, and for long periods. His CW sending is poor so the call-sign used is frequently sent as EAHSYL or FDDA (a varying number of CW dots). It might be that this individual is mentally deranged, yet he is evidently an experienced DXer. His transmit frequency is fairly accurate and he often appears quickly on the frequency when a rare station starts to operate.

His CW sending is distinctive both in terms of his poorly constructed Morse code and the content of his messages so he is easily identifiable, no matter which 'call-sign' he chooses to use on that day. His CW is hand-sent, not computer-derived and is immediately identifiable. Although he uses different 'call-signs' we will refer to him here simply as EASSYL.

### Direction Finding

A small group of determined DXers therefore set out to identify EASSYL, as the first step in identifying a number of persistent DQRMs. The first objective was to locate and identify this individual, then to arrange that he cease his disruptive activities. To achieve the first objective required DF. It was quickly established, some years ago, that the EASSYL signal emanates on a beam heading of about 120 degrees azimuth from UK. It was thought that this station was located in Southern Europe, possibly Italy, Greece or a Balkan country. Refining the beam headings we concluded that he was located somewhere in Italy.

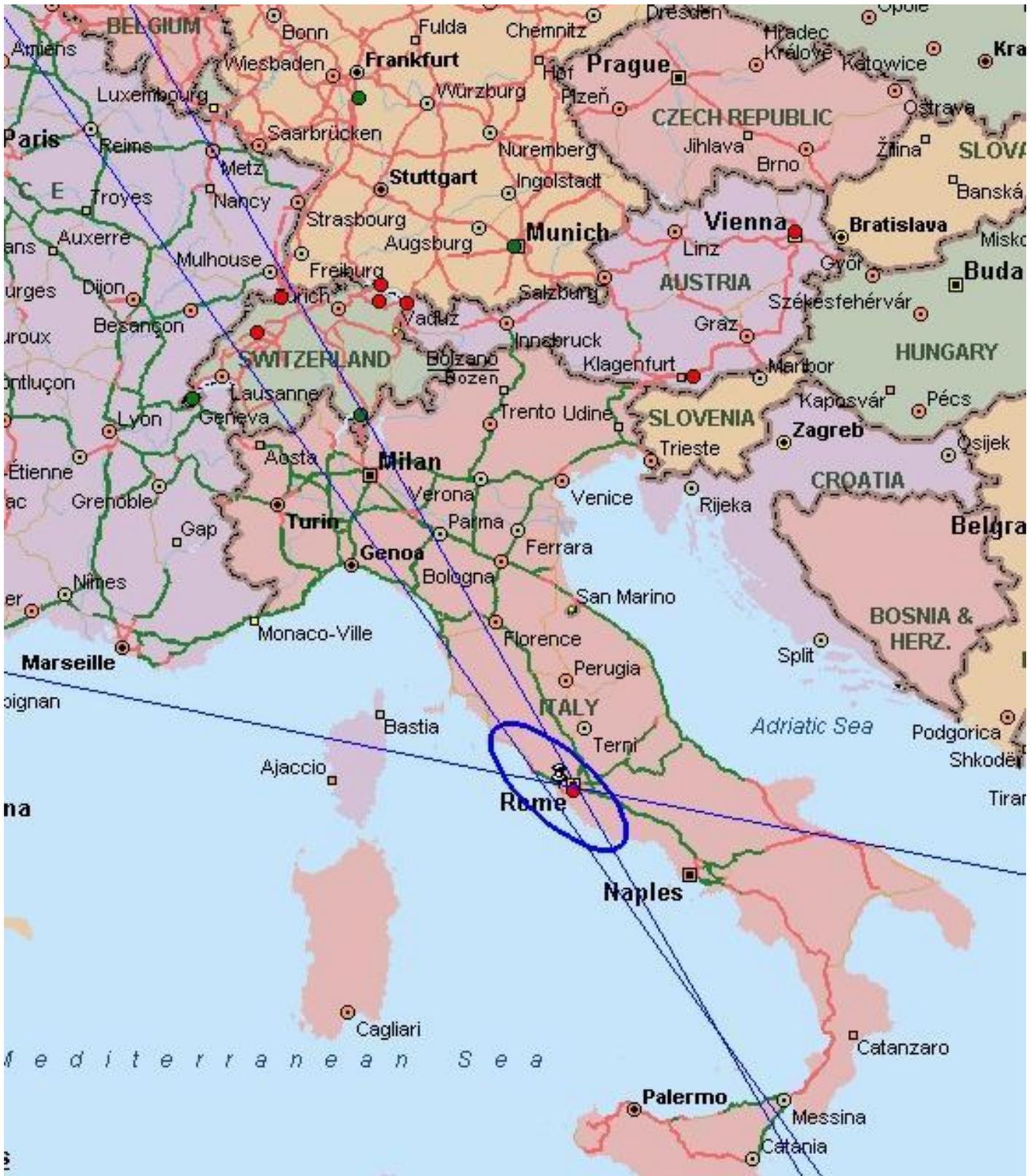
A well-positioned radio amateur DXer is employed in the UK with access to professional DF facilities. He joined our small, ad hoc investigative group and was permitted by his employer to track EASSYL when not otherwise engaged in his professional duties. This facility is extremely accurate, determining a heading to within two degrees azimuth and may simultaneously take automated bearings from several different sources (countries). The headings are automatically drawn on a map and the lines converge on one point, indicating the location of the signal within the range of a very few miles. This facility was used, during 2014, to help locate EASSYL.

The first map shows three sources of DF which converge on a point just West of Rome, Italy. The second map homes in on that area with five DF sources. The ellipse resulting has a small 'pin' at the statistically significant point where the source of the signal is thought to be located. This is a little to the East of Lido di Ostia.

At this stage of the project two local radio amateurs living in Rome, who are DXers and who were well aware of the EASSYL problem, were approached for help. Being keen to assist they collated a list of some sixty licensed radio amateurs in the local area. Within that list they identified a few possible sources of the DQRM by homing in on those who were heard regularly on the HF bands, using CW.

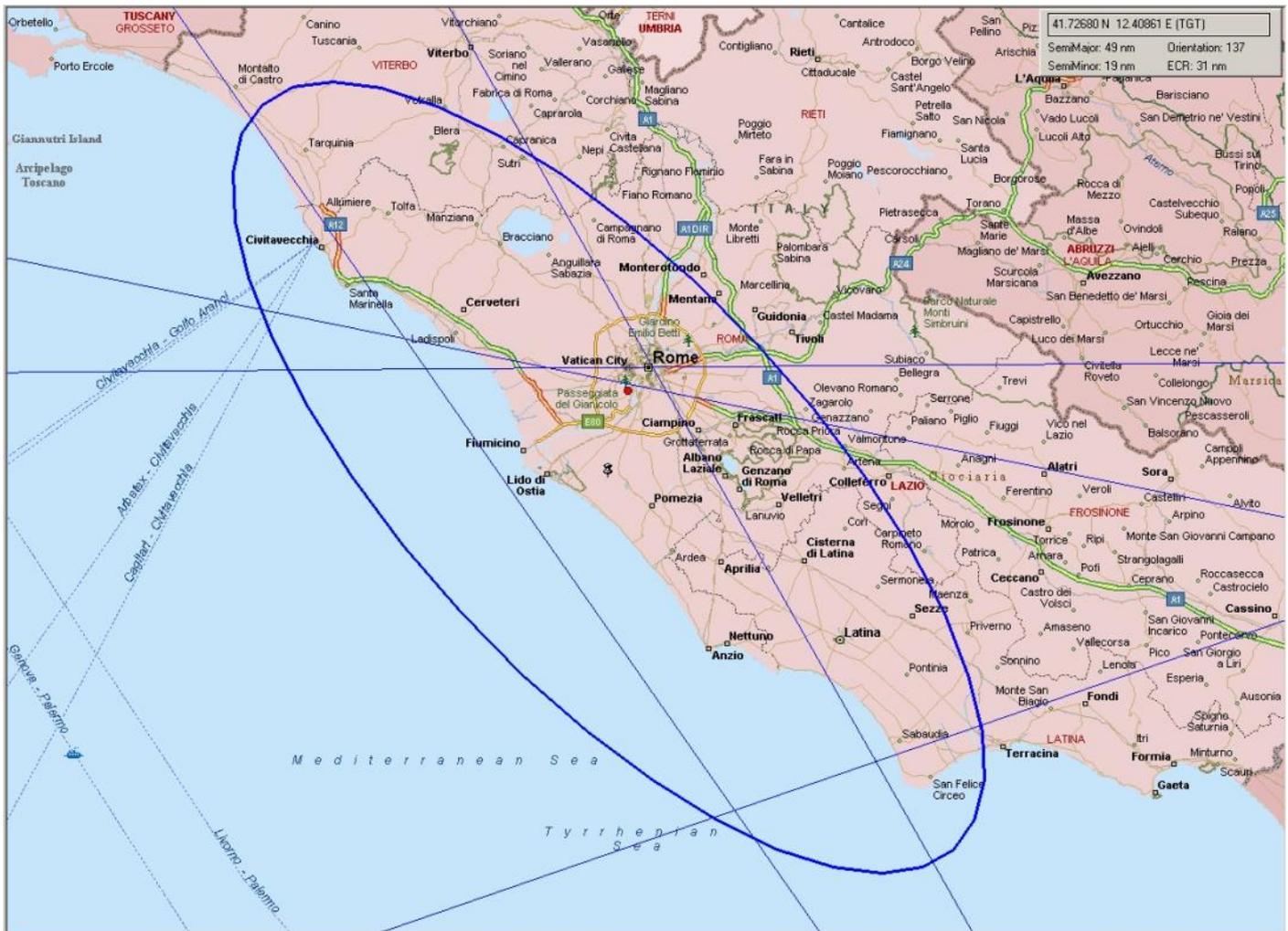
**Map 1: 3 DF sources**

Date: 2nd October 2014; EASSYL on 18.086 MHz



**Map 2: five DF sources**

Date: 8th November 2014, Time: 2045 UTC; EASSYL on 10.115 MHz



To define the target area to within say ten miles with the professional DF facility was the quicker part of the project. To home in on one address was more difficult and time-consuming. Our local helpers in Rome could hear the extremely strong EASSYL signal. From their location they determined with directional antennas that it was emanating from West of Rome, which confirmed the earlier findings of the DF maps. In order to define the precise location of the offending station one member of the team then drove to the address of each possible suspect, one by one, while EASSYL was transmitting. In the car was a receiver but with only three feet of wire as the receiving antenna located inside the car. Our second helper in Rome stayed at his home station, monitoring the EASSYL signal and communicating with the in-car operator by mobile telephone to report the precise moments when EASSYL was transmitting.

They quickly determined, one by one, that the first two suspects were not transmitting at the times when the base station in Rome was hearing the EASSYL signal because while parked outside the target house no signal could be heard with the tiny antenna. But the third target provided an extremely loud signal when the car was at the address. The signal was clearly identified as sending the usual EASSYL content and the building at that address was seen to accommodate several large HF transmitting antennas. Our culprit had been identified, beyond any reasonable doubt. Great care was taken at this vital stage of the research, encompassing numerous car journeys over a period of many months.

Additionally, this EASSYL station has been monitored over such a long period of time that on two occasions he was heard to send his own, real call-sign by mistake on CW and RTTY.

He has also on several occasions been heard operating with his real call-sign and working a DXpedition in the normal pile-up manner of DX-chasing (transmitting on a different frequency to the DXpedition), but then proceeding immediately to commence his DQRM on the DXpedition transmit frequency. We conjectured that having made the contact himself, he then wished to prevent others from so doing.

Having identified the culprit with complete certainty the next step was to build the evidence to prove the case incontrovertibly so that our findings might be deemed legally valid.

### Identifying Evidence

**Log:** a log had been kept of the EASSYL (and his various other 'call-signs') transmissions whenever he was heard on the air. This clearly is not a complete log of all his activities, only when we heard him. This demonstrates his persistence over a long period of time: a period of one year is described, starting from when it was decided that we would require a log. His DQRM is known to have started several years earlier.

**Maps:** as shown above.

**Recordings:** audio and video recordings were made from the car, immediately outside the house which show the date, time, street name, house number, transmitting frequency and signal strength. With only a tiny antenna wire and by introducing 18 db of receiver attenuation the signal is loud enough to be sure that the origin is very close indeed.

**DX Cluster:** archives show that some DXers already believed that this was the identity of the station generating the DQRM, during a period of some 13 years! It is not known how they traced EASSYL's real identity.

**Reverse Beacon Network (RBN):** we correlated our log of EASSYL with instances when the DQRMer was reported by RBN using his real call-sign. On 12 of the 25 occasions he was also reported by RBN on that date. On three occasions his call-sign was recorded by RBN in a closely correlated time-frame. On the other 13 occasions it may have been that he chose at that time NOT to send any CW with his own call-sign so he was not identified by RBN.

### Action Taken

This is a serious case of DQRM which has persisted over such a long period and caused so much unprecedented levels of interference and inconvenience to many DX-Chasers. IARU Region 1 wrote to 'EASSYL' explaining that the offending station had been located very close to his address and asking for his help to identify the culprit. The reply denied blame but we noted that this source of DQRM then completely ceased.

The final objective of dissuading others from causing DQRM may be partly achieved by publication of this story. We have shown that even anonymous signals can be identified.

### Future

This case study shows that effective action can be taken to identify and locate DQRM. The work is made much more effective by the availability of local volunteers who can help with "the last mile". Based on this experience, the core team and IARU Region 1 intend to repeat the process on other "characteristic" DQRM. The long range DF takes only a second or two, and so a short carrier from a DQRMer can result in a trace to his location. Thereafter, the local volunteers will need to be willing to invest some serious time in local work to narrow the source down to a street and a house. But the EASSYL experience shows it can be done, and this should serve as a warning to others who may feel that DQRMING is a smart thing to do. IARU Member Societies will be encouraged to invoke the help of their national regulators once a DQRMer has been localised to a small area. In this way, we hope we open the way to prosecution of offenders and we hope that slowly, the scourge of DQRM will be eliminated.

**Roger Western, G3SXW** e-mail: g3sxx(at)btinternet.com

## Modelling the MFJ-971 portable ATU

I obtained one of these when I got back into AR after a long lay-off and used it in the workshop (garden shack) where I could access a reasonable ground and my vertical, inverted L and long wire antennas.

I found it a bit fiddly to use, so I made my own with a couple of gash variable capacitors and an overpriced roller coaster inductor that I found at the National HamFest. The components were just attached to a piece of aluminium plate and could be configured as a Pi or T configuration, either of which could have a component added or removed to form an L match. I thought this was more efficient and it was often easier to tune than the MFJ, although the latter had the advantage of the inbuilt twin needle SWR meter, so I just bypassed the MFJ's internal bits by wiring it straight through for use as an in-line SWR meter. Eventually I stopped using it after I changed the location of the shack to an upstairs room in the house when I got my TS-570D. This had an internal SWR meter and ATU and fed coax to the antenna in the garden.

There are several things I don't really like about the ATU; one of which is common to just about every ATU on the market and that is the inductor range switch that operates by progressively shunting sections of the tuning inductance. Theoretically, shorted turns in any magnetic circuit should sap energy and lower the Q, although the coupling between turns in a large air-spaced coil is relatively loose, so it doesn't have a great effect in practice. Of course this doesn't follow for a tightly coupled coil such as a mains transformer or well designed toroid, whereby the effect of a shorted turn could be disastrous.

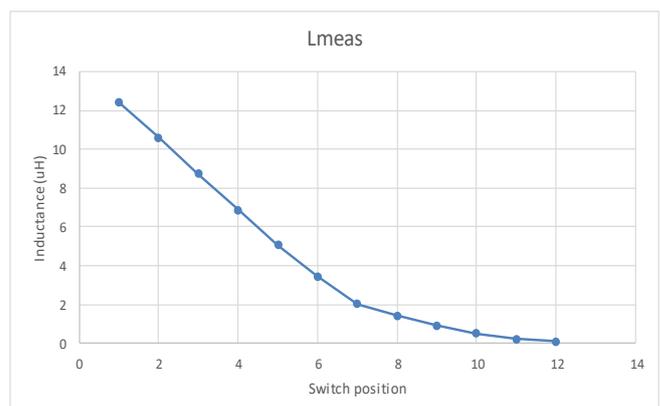
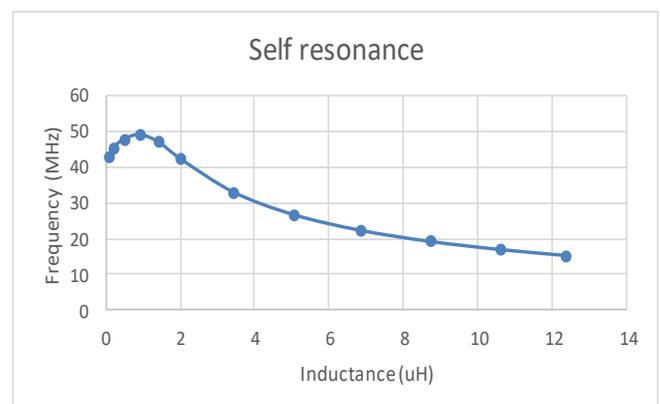
Another aspect of the design is the long leads that exist between any and all of the main components. This just adds stray inductance. Sometimes the inductance can be absorbed in the design, but it is never really desirable. Also, the SWR sense transformer has two primary turns to increase the sensitivity to validate the claim that this will work for QRP stations and a max. power range of 6W. The original circuit is shown after the layout of the ATU is explained (over the page).

I started thinking about modelling it after I read John, M0UKD's pages some while back: [mfi-971-mods](http://mfi-971-mods). He also adds a bypass switch so that he can link out the tuning gubbins, and a toroid to increase the main inductance to get the tuning range needed for 160m, which suits his purpose. I had an idle moment and started to model the ATU to see what sort of range it would cover in its original form.

Band	L (uH)
L	12.4
K	10.61
J	8.73
I	6.86
H	5.07
G	3.45
F	2.03
E	1.43
D	0.92
C	0.5
B	0.22
A	0.09

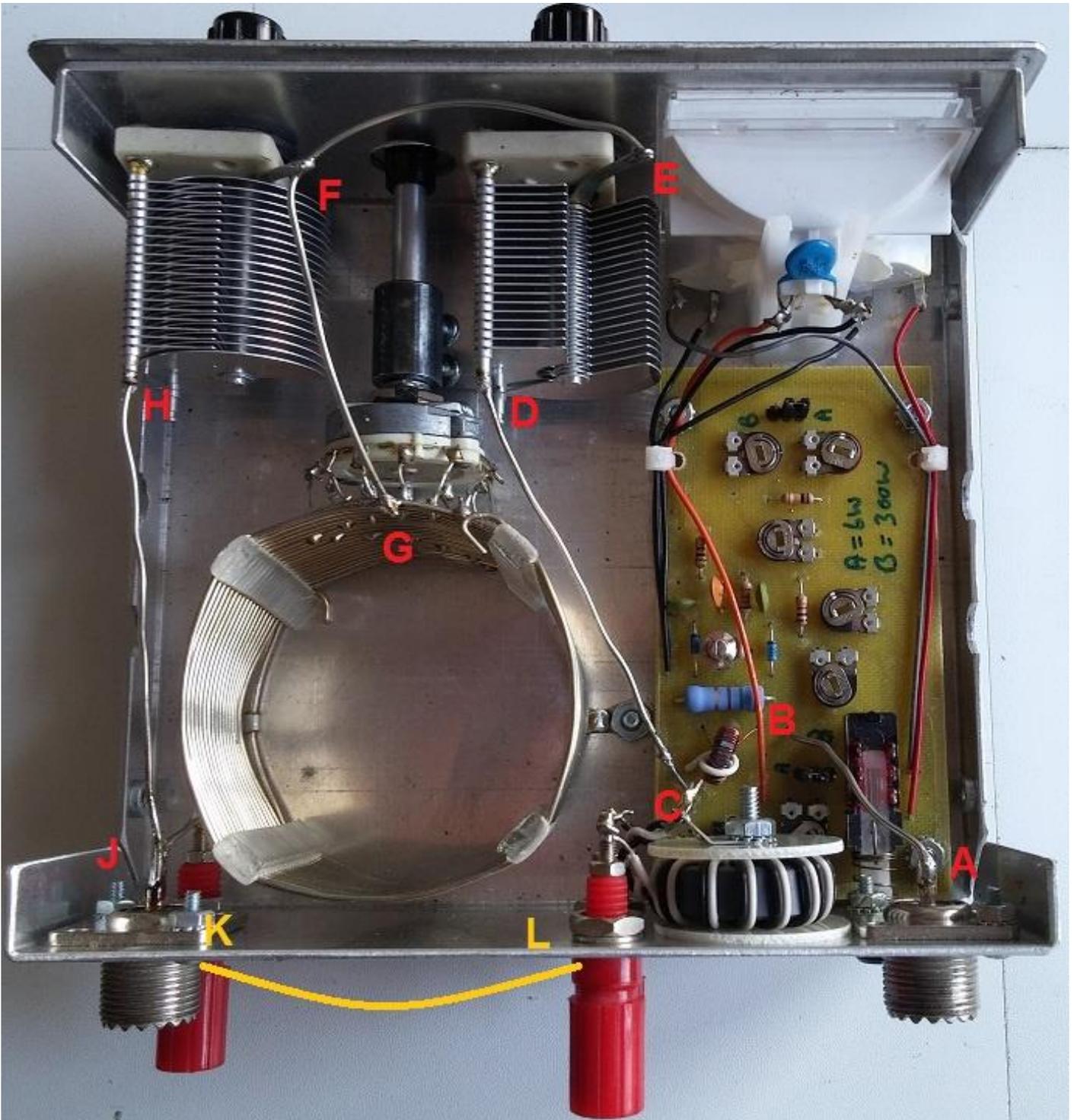
I used my analyser to perform the measurements and it was instructive to see the self resonance of the inductor. There are 12 bands, labelled A-L (in order of increasing inductance) and I was surprised to see the self resonant frequency increase (as you would expect) but then decrease again as I progressively switched out the inductance. I started to calculate the stray capacitance for each band and, whilst I came up with an answer, I was seeing a variation in stray capacitance. It seemed relatively constant at low frequencies then increased markedly. To measure this I initially

used the conventional method given further on in the article. Concerned that the direct measurement was influencing the results too much, I measured the inductances directly at the lowest sensible frequency, where L would predominate then switched to the self resonance method. I used a very small and loosely coupled loop so that the dip measurement would have minimal impact on the result. The results were more or less identical and then I realised what must be happening.



## Layout

RF input is tinned copper wire (tcw) from A-B, T1 is between B&C, then tcw to "Tx" capacitor D and then from E-F, the "Ant" capacitor. This is the junction of the T where the inductance joins at G. After the Ant capacitor, it is routed H-J tcw to the output socket. If you want to connect to a twin feeder antenna, then another link must be placed externally between K&L. All in all, quite a lot of stray inductance. The TCW lead wires were measured and the inductance estimated by equivalence of 20nH/inch.



These were then added to the circuit diagram. The stray capacitance was calculated as detailed in the text and added to the model piecemeal, as necessary. The output balun was removed and measured o/c and s/c to determine the loss resistance and stray capacitance and also simulated to verify the result.

As the switch is rotated to short out the unwanted sections, I believe that the increasing number of turns in the shorted coil section connected to the switch wiper then behaves as an increasingly parasitic capacitor to chassis. If anyone has a better explanation, I would be pleased to hear it.

**Simple method to determine self-capacitance and inductance in a coil:**

If you don't have a network or impedance analyser, just put a resistor (a few kΩ) in series, connect to a variable frequency signal source, put a scope probe across the inductor, and adjust the frequency until you reach resonance ( $f_{res}$ ), when the amplitude reaches a peak as indicated on an oscilloscope or RF probe. You can measure the frequency of the signal source with a counter, or estimate it with the oscilloscope.

Then,  $C = 1/(L * (2 * \pi * f_r)^2)$ . Subtract the capacitance of your scope probe, and the rest is self-capacitance of the inductor. Now, remove the capacitor and replace it with another value,  $C_2$ . Find  $f_2$  the same way you found  $f_1$ .

We know that for a resonant circuit,  $L * C = 1/(2 * \pi * f)^2$ ; so let  $C_s$  = stray capacitance of coil

$$(1) L * (C_1 + C_s) = 1 / (2 * \pi * f_1)^2$$

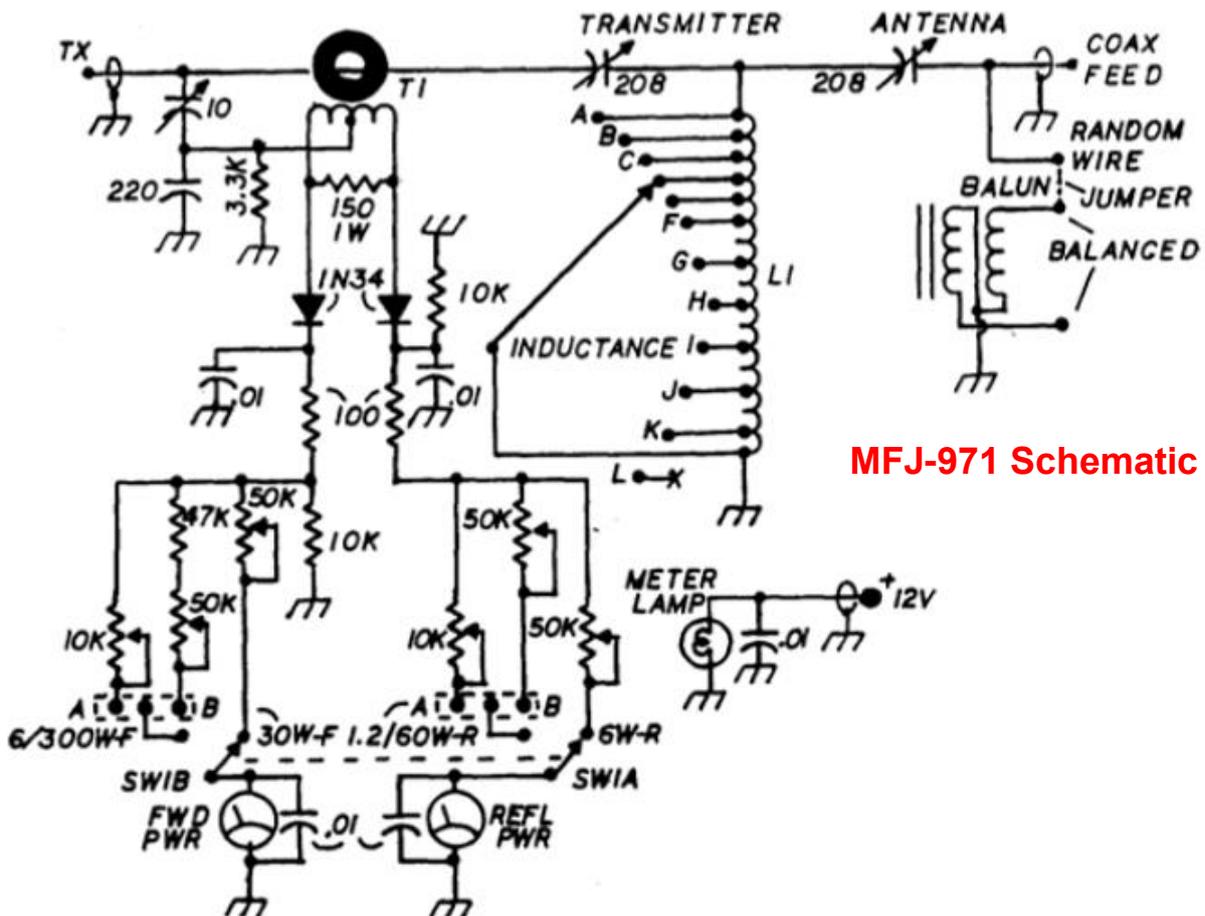
$$(2) L * (C_2 + C_s) = 1 / (2 * \pi * f_2)^2$$

$$(L * (C_1 + C_s)) / (L * (C_2 + C_s)) = (1 / (2 * \pi * f_2)^2) / (1 / (2 * \pi * f_1)^2)$$

The L's cancel and the  $2 * \pi$ 's cancel:  $(C_1 + C_s) / (C_2 + C_s) = f_2^2 / f_1^2$

Solve this for  $C_s$ :  $C_s = (C_1 - C_2 * f_2^2 / f_1^2) / (f_2^2 / f_1^2 - 1)$

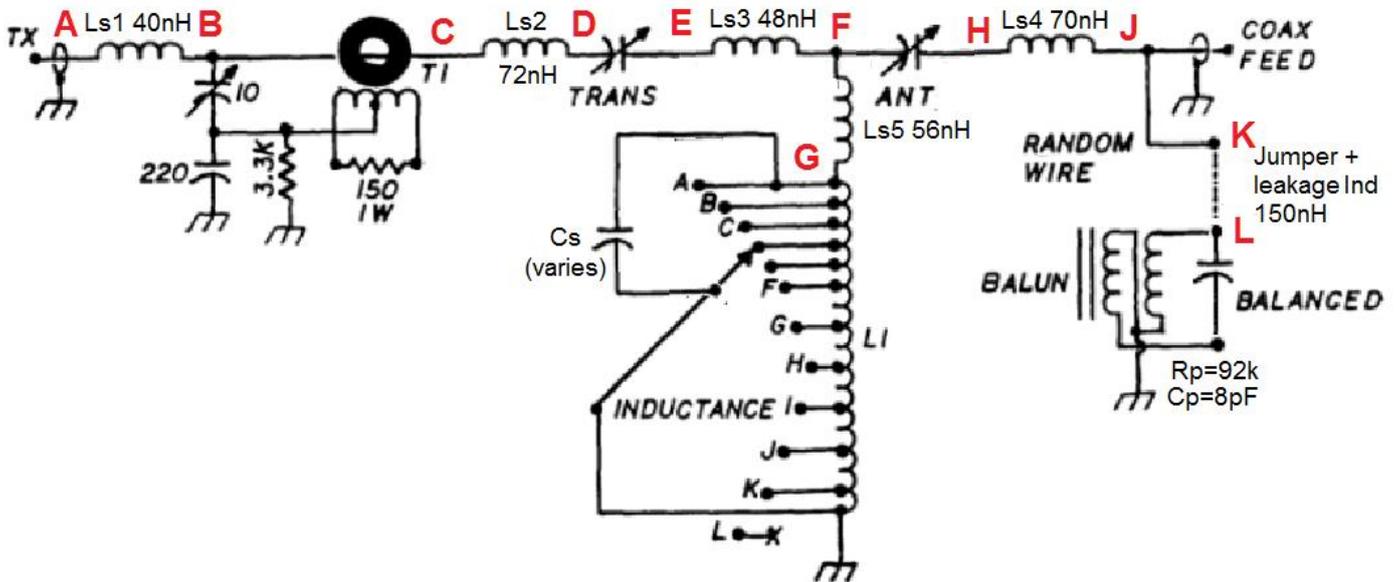
Now that you have  $C_s$ , you subtract the probe and test fixture capacitance from  $C_s$  to find the true value. Plug this back into (1) and (2) to solve for L. You will almost certainly get two values for L, due to measurement uncertainties, apparent changes in L with frequency, series resistance etc. Take the average of the two, or do several more tests with different cap values, and then average all of the values of L.



**MFJ-971 Schematic**

The equivalent circuit is given below, with the relevant points added and irrelevant stuff omitted. There is also a small mutual coupling that exists between the main tuning inductor and Ls2 & Ls4. This is not shown here and slightly complicates the model but, in the grand scheme of things, is not a worry.

**Equivalent simulator model circuit**

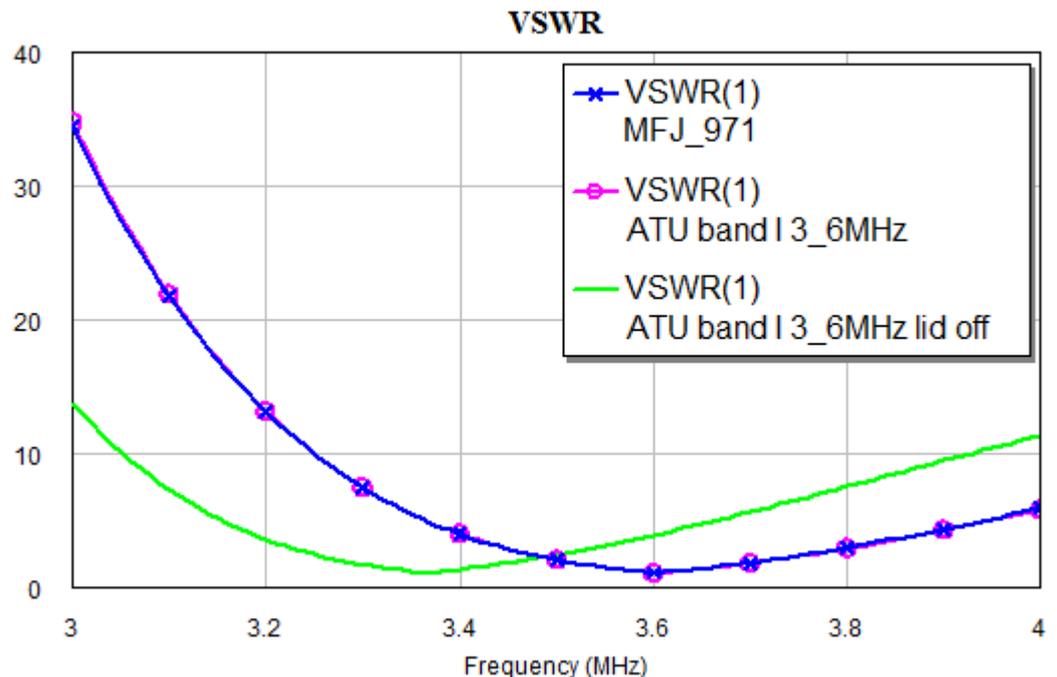


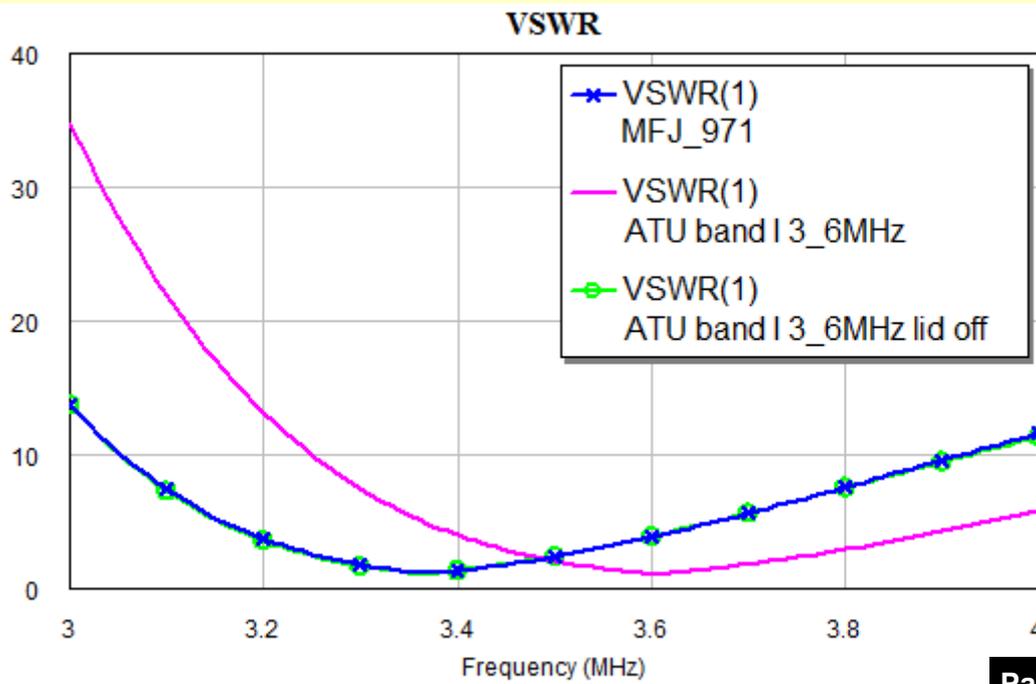
When I compared the measured and modelled data for any given load, I was not surprised to see a difference between the modelled and measured parameters, but there was more to learn. I could produce graphs for this and fill a book, never mind this Newsletter, but space is limited so I will choose a single example. The graph shown here gives three curves:

Blue shows the ATU model, which is fitted to the cyan curve which, in turn, represents the measured bandwidth of the ATU for a 50Ω match at 3.6MHz without the balun in circuit. The green curve shows measured data for the ATU with the lid off (which is, of course, how I measured the constants in the first place). The green curve shows a steeper curve and this is normally associated with a higher Q circuit. This lower Q for the data with the ATU lid on is due to the coil being loaded by the proximity of the box lid.

One end of the coil is grounded flat to the floor of the box and the other (hot) end is barely 4mm from the lid. This very effectively reduces the inductance, but doesn't have a noticeable effect on coil capacitance, suggesting it is essentially within the coil itself.

Note: I have not accounted for capacitance to the enclosure in any of the other components (as the model was created with the lid off) so there will be other slight discrepancies, but they will be of a lower order.





By removing the lid after measurement, the resonant frequency was lowered to 3.376MHz as the inductance value was effectively increased. By adjusting the value of inductance and Q alone in the model (see left) I was able to arrive at the model-data equivalence in the table below.

The constants were obtained for both sets of conditions and the results reflect both theory and practice.

The measured coil inductance for band I is about right, whereas the stray capacitance I measured for the coil alone is modified in the model by a small amount. That could be accounted for by the fact that I measured the coil in isolation and when it was connected back into circuit, it would have other parasitic strays added from the other connected components. I did not measure this at the time but the model suggests the optimised figure is reasonable.

Parameter	Lid off	Lid on
Q (L1)	285	216
L1	6.86u	5.96u
Cs	31.2p	31.2p
C Ant	148p	148p
C Tx	148p	148p

To sum up: the model follows the hardware quite well, although it is not perfect, of course. What it does do though, is allow me to model an antenna match with reasonable confidence. I can make antenna measurements outside with one of my analysers and then save the data as S-parameter files. These can then be imported into the simulator, which allows me to adjust the ATU's controls via a set of software sliders (like a sort of software tuning control) that represent the tuning capacitors. The inductor can also be set using one of the sliders, or by step changing the values appropriately. I can simulate the effect of an external, or remote ATU without the intervening coax, or I can model an antenna design then see how it might match up in the real world.

I trust this article is of interest. If I can do it, then anyone can. Actually, I found this lovely piece of tongue-in-cheek arrogance on the 'net somewhere: *I will not explain electronic theory. For those who know, no explanation is necessary. For those who do not, no explanation is possible!*

Is there anyone out there who performs similar tricks with their home equipment? I know that some of you are keen to home-build and, even if not, there must be so many people who are rightly proud of their rigs and are willing to hold forth in conversation at the likes of Skills and Club nights.

Why not write something up and tell us about it? It's not only the RSGB and Practical Wireless contributors who have valid (or, necessarily, valued) opinions on the kit they own and/or review so go to where the policemen live and Letsby Avenue! - **Ed**.

### Help wanted - a response

I was pleased to hear that John, G4IMS had gone along to help Vic, G4RAP with his equipment setup. John reports that he was able to provide some assistance, but that further help is needed to identify some possible problems with Vic's station configuration. Hopefully, we'll be able to keep you posted with a success story. - **Ed**.

## RAYNET at Jaywick

Pete, M0PSX was deployed by Essex RAYNET as part of a team of 16 supporting the evacuation of Jaywick residents in in mid-January. Here's his summary of the incident:

RAYNET was deployed to support Tendring District Council following severe flood warnings for the Essex coast in January. The Environment Agency warned of a "risk to life" in parts of the county, resulting in a sizable deployment from the emergency services, council departments and numerous volunteer organisations.

Members had been kept apprised of likely poor weather, as warnings from the Met Office had been circulated earlier in the week. In the early hours of Thursday morning on the 12<sup>th</sup> of January, they were given notice that assistance may be required. All members were alerted to be on possible standby, and to charge batteries and ready their equipment. Later on Thursday morning, they were officially notified by Tendring District Council, via the Essex Civil Protection and Emergency Management Team that RAYNET's support was required, and Essex RAYNET members started to deploy to the council's offices in Weeley. Within a few hours, a Control station was operational at Tendring District Council's DERC (District Emergency Response Centre), with cross-band repeaters active for local coverage, and county-wide for members en-route to the incident.

RAYNET's primary involvement was to support Tendring District Council who were coordinating the evacuation of a potential 2,500 residents from Jaywick. An emergency rest centre was opened at the nearby Tendring Education Centre, with a team also at Frobisher School to support evacuation. They quickly deployed a team to each location making use of a cross-band repeater for robust communication back to Control at the council offices in Weeley.



Essex RAYNET at Control, Tendring District Council, Weeley



Primary Rest Centre at Tendring Education Centre, Jaywick

RAYNET was also deployed to the Forward Command Point, which was the central command for the police and fire and rescue teams. A large number of emergency vehicles were gathering at this point for operational briefings, before deployment to Jaywick. In the run-up to the expected tidal surge, most of the effort was contacting the residents (with police knocking on over 2,000 doors, leafleting and media), and preparing to evacuate the most vulnerable to a rest centre.

We were active through the night, and a small number of residents had already settled in for the night at the primary rest centre. Some of the RAYNET team were able to take shifts in getting a few hours shut-eye on inflatable mattresses ahead of a busy morning.

Media interest in the event was very high, with satellite trucks and radio cars from BBC and Sky in attendance, as well as local and national print media arriving from Thursday into Friday. The evacuation was in full flow from 7am on Friday, but after a few hours, it became clear that the tides and high wind predicted for midday were likely to be less severe.



Primary Rest Centre, Tending Education Centre, Jaywick

As teams were preparing to scale back the operation, the Environment Agency reported that the latest information was that midnight high tide was of greater concern than middays. With the prospect of overnight floods and rescue operations, the operation ramped up again.

By this point, most of the emergency services, council officials, volunteers and RAYNET members had been active for 24 hours, and a call was put out for additional RAYNET members to assist. As it was a working day, many members were unable to attend immediately, and a call for assistance from nearby RAYNET organisations

was made, with Mid Herts RAYNET on standby for deployment on Saturday. In the end, enough Essex RAYNET volunteers were able to support the event, with nearby groups on standby if the incident either escalates or became protracted. RAYNET's national emergency planning team were also kept informed and monitored the situation throughout.

Evacuation activities continued through Friday evening. At the peak, 230 residents from Jaywick heeded the advice to gather at the rest centre, some bringing their pets. Fortunately for all concerned, the predicted midnight tidal surge didn't happen, and residents returned home on Saturday morning. Essex RAYNET were stood down a few hours later, with some members having been active for over 40 hours, and looking forward to a decent sleep on Saturday.



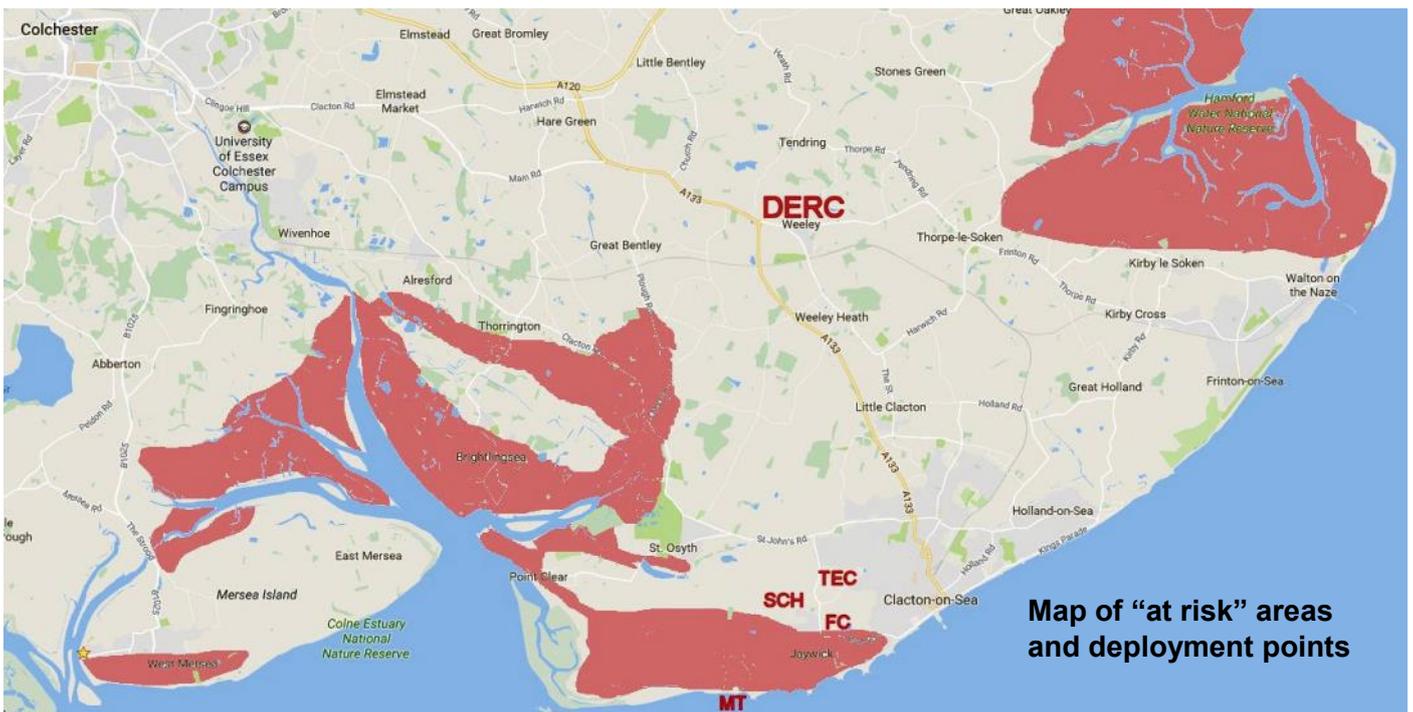
Tending District Council Rest Centre team at 2am on Friday



Inflatable mattresses for use by the volunteers and Staff during the operation. It's too tempting to make a joke about life rafts...

16 members of Essex RAYNET were in attendance in a support role, and were deployed as part of Tendring District Council's contingency plans. The team expended a total of 332 man hours over the two days. Mobile phone coverage in parts of the affected area was not great, and had the worst happened, it would likely have been necessary for a significant amount of message handling to be done by the RAYNET team. Numerous important messages were passed by RAYNET during the operation, and operators were able to keep council officials and volunteers aware of events taking place at other key locations without tying up landline and mobiles.

Incidents like this serve to highlight the need for volunteers to be available to assist communities in times of need. If you have an amateur radio licence, volunteering for RAYNET is a great way to put your skills to good use. Although emergencies requiring RAYNET are fortunately few in the county, RAYNET supports many community events and charity fundraisers throughout the year, which not only provide a valuable service to the community, but help RAYNET members hone their message handling skills and test the network's infrastructure.



Map of "at risk" areas and deployment points

- DERC – Control at the Tendring District Council offices in Weeley, mostly manned by Dave, G0DEC, Mark, 2E0RMT and Roland, M0BDB
- TEC – An emergency rest centre was opened at the nearby Tendring Education Centre
- Forward Control – The central command for the police and fire and rescue teams. A large number of emergency vehicles were gathering at this point for operational briefings, before deployment to the at-risk areas in Jaywick
- A point was active at Frobisher School to support evacuation.

For more about Essex RAYNET, go to [www.essexraynet.org.uk](http://www.essexraynet.org.uk)

Pete Sipple, M0PSX

## January Skills Night

Once again we saw a good crowd of people attend this event. It's a credit to the organisers who do their best to make sure that everyone has their interests catered for. In the case of Pete, M0PSX who does more than his fair share for the Amateur Radio community, it must come as a great relief to see the crowds mustering every week, although it's no great surprise that they do...

First up, my thanks should go to Terry, G4POP who was showing his LOG4OM logging program that he has been instrumental in developing.

He was able to give me some advice as to how to go about sorting the problems with my TS-570D and my complete inability to get working on digital modes



John, G4IMS was glad to be able to get assistance from Charlie, M0PZT who was on hand with his Ham Goodies rig programming facility. Charlie sold out of 40m Pixie CW kits and was showing his new range of QRP  $\mu$ baluns and  $\mu$ couplers. They look quite good.

I had brought along a laptop with a range of simulators and was able to show a few people what they could do with freely available software for both problem solving and self-education. It sometimes saddens me that there doesn't seem to be any real mechanism to spread the word where this sort of thing is concerned. You can tell when someone is baffled by a subject and may be thinking "that's not for me". Perhaps, but maybe not. Let me propose a scenario:



A demonstration is taking place. The area is crowded and very noisy and the siting is not ideal. It's only really possible to have a one-one chat with interested parties. Some people will come along and peer over a shoulder and may linger in the hope of gaining some information, or they may just think about coming back later. Maybe they just shrug and move on. I know, I've done both and then missed out with bad timing or other distractions. Would it be better to have a situation more akin to a classroom environment - with, possibly) a large screen or a projector and some seating and a (very) informal and interactive "lecture" taking place that could be recycled on (say) a 20 minute basis?



Pete, M0PSX gave us a very entertaining precis of the events of 12th/13th January during the Jaywick flood mitigation incident, which talk was very well received. As ever, the quiz brought about a series of comments and discussions and Pete was able to offer an observation on a dubious multiple choice question regarding broadcasting that had been posed for a Foundation exam and which had caused two candidates to fail by selecting the inappropriate answer. The validity of the question was queried with the RSGB who maintained their position, quoting a section of the Wireless Telegraphy Act and stating that the question should remain. Pete, however, stuck to his guns, appealed and won. The question will be removed from the database - hopefully never to appear again. Well done, Pete.

Essex CW Club were again on hand with a live station and appealing for new members; something that seems may be on the cards, seeing as Charlie sold out of his Pixie kits. Thanks for that chat, Dean!

In the Hawkins room, Ray, 2E0GVE was taking subs for CARS and handing out membership cards whilst Alan, M0IWZ was showing an Arduino that was decoding Morse code. Chris, G0IPU and Andy, G7TKK were (in Chris's words) "melting things". There was that really lovely Nixie tube clock and Melvin, 2E0DNS was asking around for help in sorting a drill motor speed controller that kept blowing IG-Bipolar output devices. Of course, Myra, M0MYR and David, G3SVI along with Ann Salmon were serving tea and cakes with Jim, 2E0JTW and Glynis, 2E0CUQ close by in their usual place making callsign badges.

All in all, a fine start to the fourth year of this rightly popular "Essex Skills Night" event - **Ed**.

## More help wanted

Over the Christmas break Chelmsford Museum Services was pleased to acquire a British Empire Medal (civil division). The medal was awarded in 1946 to Miss Florence Attridge of Chelmsford for services as head of the winding shop at New Street during WW2.

With the medal came eight documents including a signed letter from Buckingham Palace (George R.I.), a signed letter/telegram from the Admiralty, a signed telegram from the Admiralty signal establishment and a signed letter/telegram from Admiral H.W. Grant, then MD of the Marconi Company.

Other documents included congratulatory signed letters from the Admiralty and from the Marconi Wireless Telegraph Company. Another letter being researched came from "K3 section", which appears to be part of the Naval Intelligence code breaking section.

After further research the Museum will be putting the items on display at Oaklands in the near future and is keen to hear from anyone who knew or remembers Miss Florence Attridge.

Do you know anything about Miss Attridge and can you locate a picture of the lady? Do you have any information pertaining to her wartime work and her secret connections with the Admiralty and code breaking - what was K3 section?

Note - Marconi veterans report that the only Attridge on their register is a Mr. RH Attridge who joined in 1936. They were notified of his death in 2003. Maybe a brother?

Please contact **Tim Wander** at [timwander\(at\)compuserve.com](mailto:timwander(at)compuserve.com)

*Another intriguing contribution from Tim. Thanks - keep it up! - Ed.*

# Harwell Radio & Electronics Rally

**Sunday 12<sup>th</sup> February 2017**

**HARWELL AMATEUR RADIO SOCIETY**

are holding a **Radio and Electronics Rally** at Didcot Leisure Centre, Mereland Road, Didcot, OX11 8AY from **10.00am-3.00pm**.

There will be radio and electronics trade stalls, a RSGB bookstall, information on local courses for those who would like to become a Radio Amateur and an Amateur Radio Demonstration Station. Refreshments will be available all day. Entry £3.00 (children under 12 free). Details from Ann on 01235 816379 or [ann.stevens@btinternet.com](mailto:ann.stevens@btinternet.com) and if you want a table, please contact well in advance so that the necessary trader information and booking forms can be sent out and returned in good time.

**Happy New Year and 73; Ann, G8NVI**

**Organiser, Harwell Radio and Electronics Rally**

