Chelmsford Amateur Radio Society

Established 1936

Affiliated to the RSGB *Club Call Sign-G0MWT*
President-Carl Thomson, G3PEM *Chairman-John Yates, G1UZD*
Treasurer-Roland Taylor, M0BDB *Vice President-John Bowen, G8DET*

LOTTERY FUNDED

Newsletter No 586 **Web Address: www.g0mwt.org.uk** **January 2015**

Tuesday 6th January

OAKLANDS MUSEUM, MOULSHAM STREET, CHELMSFORD, CM2 9AQ

"Radio Amateur Awards" By Carl Thomson G3PEM

Our first meeting of the New Year is on Tuesday January 6th. Our president, Carl G3PEM will give a talk about radio amateur awards. The last time CARS had such a talk was about 10 years ago, so we are long overdue for a reminder and Carl has updated the material. It is also aimed at those newly licensed amateurs to inform them of another branch of this fascinating hobby of ours - so do come along! Topics will include: How to start collecting awards and where to find details of the award programmes.

Do support the raffle and make sure you also settle up with James if you have not yet renewed your subscription.

If not renewed it will be cancelled in January!

Dates for your Diary

Tues 13th, 20th, 27th	CARS - Evening Radio Nets @ 8:00 pm (Local). See Website for details.
Every Monday	Essex Ham 2m Net @ 2000h GB3DA
Thursday 15th January	CARS 31st Foundation Course starts
Monday, 19th January	Cars Skills Night 7:00 pm Danbury Village Hall
Sat-Sun 24th/25th January	RNLI SOS Week. Marconi Sailing club, Steeple on the river Blackwater, opposite Osea island Location JO01JR Organiser James, 2E1GUA

To remain a Member of CARS, send a Cheque for **£15** for Membership (FREE if in Full Time Education) to: - Mr James D Beatwell, Membership Secretary, 36 Hunts Close, Writtle, Chelmsford CM1 3HJ

To receive your membership card, please enclose a stamped addressed envelope.

Nets Tuesdays **2000h** (13th) GB3DA, (20th) GB3ER, (27th) 1.947MHz
Also there is the Essex Ham net every Monday @ 2000h on GB3DA

Net Controller for January is Colin, G0TRM Thanks to Carl, G3PEM & Colin, G0TRM for December.

Silent Key: CARS Vice President, Geoff Mills, G3EDM

It is with great sadness that we have learnt of the passing of Geoff G3EDM during the early morning of the 16th December. I first worked Geoff on the 10th May 1969 on top band AM when his QTH was Billericay. I always found Geoff a fountain of knowledge when you had a problem and his advice was freely given. He was a gentleman of the old school, very well respected both in the amateur radio field and by all those students that knew him from Mid Essex Technical College.

I will miss his advice, support and guidance that he has given to me on technical issues over the years and we will all miss the time he devoted to the Chelmsford Amateur Radio Society.

Our sincere condolences to Sylvia and family. Carl, G3PEM Chairman of CARS

Please look at our website for information about Geoff. http://www.g0mwt.org.uk/society/g3edm-sk/g3edm.htm

The CARS December Social, Tuesday December 2nd

CARS for years have had a Christmas Dinner or in more recent years, a Christmas Lunch – this year it was thought to have a change and instead of having a formal meeting we would incorporate it into a *Social Evening*, inviting partners as well as something to nibble on.

John G8DET and Dave Bolwell, G3JCM turned up with heated trays (with John Roe G4IMS providing a back-up tray) and piled it with Mince Pies. James, 2E1GUA has on previous occasions said he prefers Shortbread Biscuits so these were provided for him and others. James came from Writtle by bus and walking, even with a broken leg! David G3SVI and Myra, M0MYR provided trays of mixed biscuits to be eaten with the refreshments whilst the Chairman, John G1UZD provided Twiglets and a box of Chocolate Fingers.

Eric Lawley, G8ADX had made a DVD of Goonhilly which brought back many nice memories from a number of CARS Members watching and of Poldhu in Cornwall. The Royal Party was shown walking to the transmitting hut under the four huge wooden towers – clearly a number of stays could be seen. No-one had seen this photograph (dated 1903) before and Tony, G4YTG commented "You cannot stay a Tower" much to the amazement of those present. It is something to do with free movement at the base. History reports that these all fell down – so now we know!

A BBC West Country News "Spotlight" item about Marconi at the outbreak of WWI at Poldhu with David Barlow, G3PLE commentating was shown. This was also provided by Eric who now lives in Newton Ferrers, Devon.

Chairman John Yates addressing the meeting

John Yates provided a thought provoking Quiz along the lines of similar Skills Evening ones with questions by Clive, G1EUC and Peter Sipple, M0PSX. Murray G6JYB had to explain some of the finer points of the answers to the questions.

John G8DET provided 41 linen bags with hidden items in – you had to feel the hidden items and write the answers on a piece of paper – Andy Kersey, G0IBN got 23 which clearly showed that if you were in a building at night and the power went off – follow Andy to safety! Many were obscure including a Shark's Tooth which was 35 Million years old. The only radio item was a 180pF Capacitor.

David and Myra provided a running supply of hot drinks and chocolate biscuits which were much appreciated.

Tony, G4YTG provided his Electronic Keyboard and tinkled the ivories – Ann Salmon thought it was John's CD Player until she saw Tony at the keyboard – thanks Tony.

Unfortunately a number of CARS Members reported in ill – we wish them all a speedy recovery – our thanks to them for not spreading their chest infection, etc.

A good evening was had by those who attended.

David who looks after us on behalf of Oakland Management was supplied with mince pies and nibbles and presented with a tray of Shortbread Biscuits organised by David and Myra in recognition for looking after us so well each Tuesday Evening throughout the year. CARS Members signed the Christmas/Thanks Card to him.

Article and photographs courtesy of John, G8DET.

25 Years 1989-2014

Brian G3CVI retired after 25 years as CARS Treasurer at the October 2014 AGM. Brian was also Membership Secretary and played a leading role for Sandford Mill events. Below are pictures from a presentation made to him by myself and Chairman John G1UZD.

Colin G0TRM produced a lovely certificate and a crystal vase was purchased all ready for the presentation. The snag was Brian could not turn up to our meetings, therefore, on the Thursday following our Christmas meeting Chairman John and I went around to Brian's QTH and made the presentation on your behalf, and the above photographs record that event.
The certificate, shown below, marks Brian being made an honorary member in recognition of his long service to CARS.

CHELMSFORD AMATEUR RADIO SOCIETY

HONORARY MEMBERSHIP CERTIFICATE 2014

THE SOCIETY HAS GREAT PLEASURE IN AWARDING HONORARY MEMBERSHIP TO

BRIAN THWAITES G3CVI

FOR 25 YEARS SERVICE AS THE SOCIETY TREASURER, THE MEMBERSHIP SECRETARY AND SANDFORD MILL COORDINATOR

John Yates (Chairman) · John Bowen (Vice President) · Geoff Mills (Vice President) · Carl Thomson (President)

Background:
Brian had an 'apprenticeship' as Treasurer's assistant under previous Treasurer Bill Cole G4JUW. Following Bill stepping down, Brian G3CVI became CARS Treasurer at the 1989 AGM (See CARS Newsletter-286, Nov-1989)

Carl, G3PEM

The G4TPH Mk II Remote Tune Portable Loop

I got interested in loops after reading the "Truth About Loops" article in the RSGB publication 'The International Antenna Collection' wherein Mike Underhill, G3LHZ, put forward a good argument for experimenting. I told myself that the G4TPH loop shouldn't work as there were too many physical joints in the antenna loop to give the really low impedance that loops normally demand and it also seemed expensive but, wanting to find an aesthetic antenna solution in the garden, I warmed to the idea. Reports by PW and RadCom were not entirely negative and Tom, G4TPH, was selling off his stock owing to a house move so, with a 45% discount on his normal retail I decided to buy an example to try.

What does it do? Well, not a lot, judging by first impressions. It seemed (just about) to cover the advertised tuning range of 40-15m. The SWR was quite reasonable, but suspiciously broadband. Loops are known for being sharp to tune and difficult to hit the sweet spot, so the ease of tuning started to ring alarm bells. To be fair, the supplied antenna's tuning is easy to use as you can alter the motor speed by varying the applied voltage, and a gearbox ratio of 3,000:1 makes for relatively slow tuning if you wish. The instructions suggest you tune for maximum noise then tweak for best SWR. In an ideal world, these should be one and the same position.

The first tries on air resulted in signals that were about 4-5 S points down on a random length of wire which was untuned and just connected into the back of the rig. In fact, I noticed that when introducing the loop's PL259 connector to the rig, the centre conductor contacted first and the noise came up nicely, but when the outer made contact, it muted considerably. This wasn't just the ambient or band noise, it was the signals as well. This was either due to a balanced system (as this coupling is) or it was just insensitive; a couple of calls resulted in either no contacts or very weak reports where I would have expected to get S5-S9 contacts and this didn't bode well, so it was time to study the components.

What do you get for the money? A quantity of 10 off, 16mm x 3mm x 390mm drilled aluminium bars and a bag of wingnuts, washers and bolts to make a 1.25m dia. polygon antenna that can be dismantled for easy transportation. Also, the motor and gearbox with 110pF variable capacitor, sensor and tuning voltage switch are enclosed within plastic cases with relevant BNC or power connectors. You have to bolt it up tight, or else

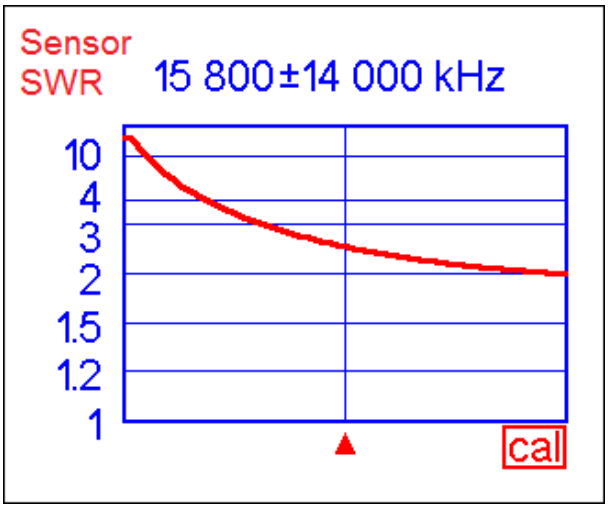
the loop will not hold its shape. I replaced the supplied crosshead bolt and wingnut fixings with conventional hex bolts and nuts. After this, the loop itself seemed to have reasonably low resistance despite the numerous joints, but measured Q values suggested greater RF losses.

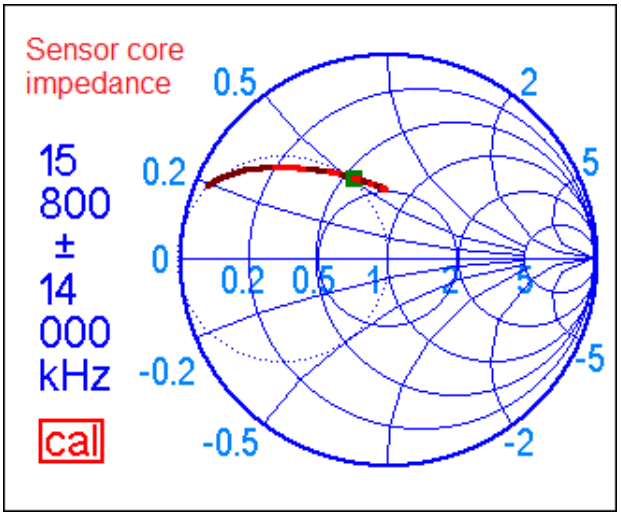
There is a sensor (Tom calls it a load unit) that picks up the signals from the loop. It is essentially a current transformer with a single turn around a stacked pair of ferrite toroids which are incredibly lossy, according to my analyser. I believe they are Ferroxcube EMI suppression parts CST29/19/7.5-4S2. There is precedence for using EMI suppression components in AR projects (e.g. the G4HUP power meter) but why willingly introduce loss into an antenna circuit? As previously stated, the answer probably lies in the fact that loops can (and should) be sharp to tune with any normal coupling circuit and it is an attempt to damp this out; the losses almost certainly account for the fact that a low SWR can easily be maintained across the band.

Worryingly, there is a note in the instructions that if the sensor gets hot(!) reduce the power, let it cool and check the SWR. That suggested that there must, indeed, be excessive core losses and possibly that the core could be prone to saturation. I set about trying to see how I could model both the sensor and loop in a simulator to replicate the performance and measurements.

I decided to make measurements from 1.8-29.8MHz as this loop could be reduced in size merely by subtracting elements and, according to Tom, it will cover 10m with 7 segments. Similarly, G3LHZ has used loops of <1m diameter on top band, so I thought it would be interesting to experiment lower down than the advertised frequency range with extra capacitance being added. Only the measurements I made on 40m are given here.

The sensor

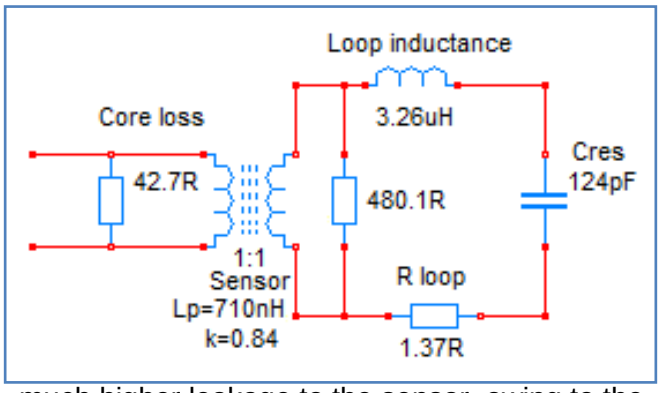




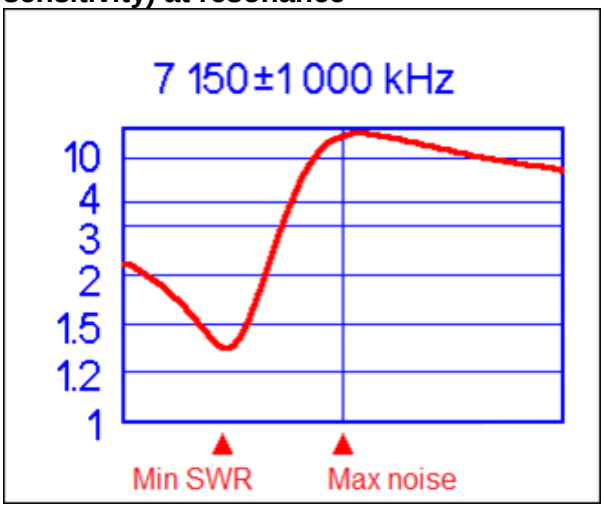
The Smith chart display shows the measured complex impedance of the sensor winding and core, and the SWR diagram shows that if you didn't connect anything else to it, the SWR of the sensor alone could be tolerated by a transmitter at the top end of the HF band from 30m to 10m. If I put a single turn around a ferrite core that is usable at RF, I would expect it to produce a very high SWR and look mostly inductive, but this did not seem at all right.

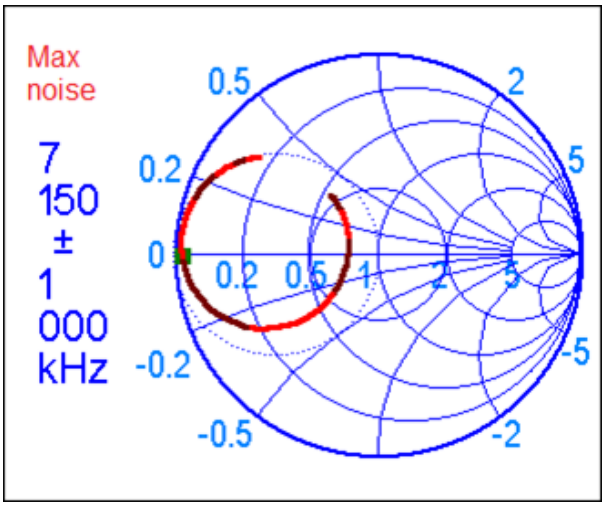
The stand-alone loop inductance measured about 3.6uH at LF so the supplied capacitor should allow it to tune from about 8MHz upward. Er-hang on a minute. 8MHz? Isn't this loop supposed to cover the 40m band? If we assume that the minimum capacitance of the variable is (say) 10pF, the upper frequency limit should be about 26.5MHz. A 11:1 capacitance range would give about 3.3:1 tuning range so with the right value of inductance, it should cover 7-23MHz. Obviously, this doesn't include any stray capacitance and takes no account of self-resonance of the loop. Sweeping the loop inductance over the 1-8-29.8 MHz range, it resonated at about 25.95MHz. This suggested a loop self-capacitance of about 10pF and therefore the loop should tune down to about 7.65MHz at resonance (and, indeed, it did). This is still not covering the 40m band. To cut a long story short, the antenna does not come to resonance at 40m with the supplied capacitor, but it did become resonant when I replaced it with another from the junk box. Furthermore, it is not resonant at the point of min SWR on any of the bands it will cover and, when it *is* resonant, the coupled impedance is a minimum and the SWR is therefore very high. This is not how a normal loop coupling responds. The loop only provides low SWR on 40m by virtue of the fact that the sensor core inductance adds to the loop inductance.
I modelled the antenna and sensor at 40m and, by comparing measurements with a simulated circuit I came up with the equivalent shown.

A parallel loss was introduced to either side of a 1:1 transformer with 710nH primary windings and a coupling factor of 0.845. The asymmetric losses account for the fact that the main loop will have a much higher leakage to the sensor, owing to the looser coupling. With those losses and a coupling factor as loose as that, surely it couldn't be expected to transfer much power to, or from, the antenna unless a very special set of circumstances exists.



40m: Note the frequency difference between minimum SWR and maximum noise (and sensitivity) at resonance





After becoming disenchanted with using the sensor to couple signals to the loop, various conventional coupling loops were made up from available components, both single ended (unbalanced) and balanced. These gave very much better performance as the point of min SWR and max sensitivity were coincident (as they should be) but it became very difficult to tune and rendered the remote tune facility completely impractical. Further practical issues were noted with variability of tuning point due to the motor power feed coaxial cable swaying about and other unwanted coupling components. There is very much more that was revealed during my measurements, but too much to include in this article, although I am happy to provide full information to anyone who is interested.

Conclusion

In use, the G4TPH antenna as supplied can easily be tuned for a comfortable SWR and it can be rotated to steer nulls as appropriate, but signals fed to the Rx are very low in amplitude and it is hard to "get out" with. Performance on receive is a good 4-5 S points down on local noise compared with a conventional antenna, but as the local noise coupling is significantly lower, signals seem to stand out, resulting in an apparent increase in wanted signal: noise ratio. Strong signals will come up to about S9 or so, but it is still hard to make myself heard at all.

The sensor core losses absorb much of the energy in either direction and confirm that Tx power is being unnecessarily wasted in the sensor component. With only a few tens of seconds of carrier at about 30-50W, the sensor gets hot far too easily, thus confirming it is also acting as a (dummy) load unit.

Note: I did send Tom a much longer version of this document (more complete) and he was happy for me to publish these findings, but we have to agree to differ on our findings with respect to its on-air performance.

Steve G4GHO

Response from G4TPH

Now to your very well structured document.

I don't have the knowledge or equipment to carry out the various tests you completed. I thus am unable to debate your findings. My first concern is wondering if all tests were carried out in the house as per the first picture.

Using my minivna analyser I get poor reception and the SWR is usually not as good as when testing the loop outside.

My other concern has to do with you mentioning the load unit getting hot. This will only happen when the antenna is not tuned the best SWR for the frequency of receive or transmit. Although the loop is more broadband than traditionally built magnet loop antennas you still need to tune for that critical low SWR point or the load unit will get hot and the SWR will soar. (I quote lower figures of power for CW and Data modes as a precaution. and have never had a problem running 100 watts SSB at most outdoor rallies.)

As you are aware a magnetic loop antenna is a resonate circuit in its own right so measuring individual parts may not be providing the best analysis since once the component parts are assembled and since all are dependent on each other the individual analysis may not really provide the correct technical analysis.

These comments are not meant to discredit your findings but merely point out that traditional Magloop construction does not necessary apply to the type of inductive loading I have developed and spent numerous hours and various ferrite ring values to arrive at an antenna that is broadband and will handle 100 watts with a small air spaced capacitor.

A major concern is you finding a cold solder joint on the capacitor. This is a concern and something I have never thought was possible since the Oren-Elliot capacitors have always seemed very well made. This is something I will be checking on all capacitors.

Last but not least I have emails from hams all over the world saying how well my antennas work and how surprised they are with the reception and the contacts they have been able to make.

By all means publish your article as written. However if you have carried out all tests with the loop indoors you may wish to try it outside. You might just see how, forgetting all of the technical details, it actually does perform well for such a small portable antenna as it was intended".

Presidential Jottings

As the year ends the solar flux is beginning to decline but what an autumn it has been for working DX stations, great stuff with 10 metres open and dx stations coming in to my shack with good signal strengths. Our Christmas meeting was well attended and everyone enjoyed the mince pies and Christmas fare supplied by various members, many thanks to all that contributed to the evening.

I am on stage at our January meeting with a talk about radio amateur awards, I gave this talk about 10 years ago and so I have added to the original script with updated material. It is aimed at those newly licenced amateurs to inform them of another branch of this fascinated hobby of ours.

A Happy New Year to you all and may the flux be with you in 2015

Carl, G3PEM

Moonraker DL15 Dummy load

When I got back into radio I needed a dummy load to make some measurements and the nearest place was to get one was the local Maplin store. At £15.99, it didn't seem too much to pay – especially as the petrol or postage would probably cost half as much to go elsewhere, and the same item was sold by Moonraker for £19.96 + p&p. Briefly, the spec. is as follows:

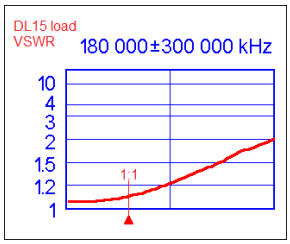
- Air cooled dummy load for DC to 800MHz
- VSWR of 1.1:1
- 50 ohm impedance terminated with a PL259 plug
- RF power is 15W continuous and 100W for 2 seconds

I just needed to check the performance of an ATU that I had obtained and some antenna configurations I was trying.

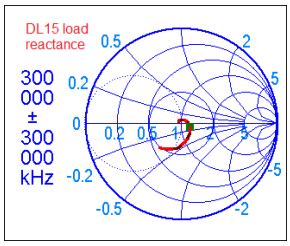
My MFJ-971 ATU had a QRP setting and I could turn down the CW power on the TS-430s, so I thought it would do for what I wanted.

When I opened the bubble pack, I almost took it straight back, as the PL259 connector screw ring is rigidly fixed to the body and centre pin of the load. This means that the only way to connect it is to rotate the whole load body; the centre pin will therefore also rotate and lead to connector wear with any kind of regular use. That is bad homebrew practise at the best of times and should certainly not be seen on commercial items. My immediate needs overrode this, however, so I let it pass and it served its purpose.

After I got my AA-600 antenna analyser, I did some proper checks on the load. I could only test it up to 600MHz, but the results even then were pessimistic:



For what I needed, it was adequate, but I fail to see how the manufacturers can justify a claim for a VSWR of 1.1:1 across the advertised operating frequency.



Basically, it appears to be a 47 ohm resistive element, but the reactive elements (lead wire and parasitic capacitance, I guess) take it out of spec. above about 180 MHz. It's OK for HF & CB, though it's a good job that no-one would want to use it for any serious work and, in any case, for those frequencies, the PL259 connector is probably inappropriate.

Steve G4GHO

And Finally:-

Remember, any articles you feel may be of interest to members are welcome as are details of items for sale or wanted. Send to cars.editor1@gmail.com.

Closing date for items in the next Newsletter

Friday 23rd January.

A very Merry Christmas and a Happy New Year to all our readers.

Advance Notice

Sunday 1st Feb - 30th Canvey Rally - Items & Helpers needed for the CARS Table