STARLITE

The Award Winning Newsletter for Members and Friends of

G6OI
1938

Stourbridge and District Amateur Radio Society

G6SRS
1938

incorporating

Old Swinford Hospital School Radio Club

G4CVK

1969

ISSUE 10/2015

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STARLITE

MEETINGS

Visitors always welcome
The Society holds its full meetings on the
1st and 3rd Monday of each month at

Old Swinford Hospital School
Heath Lane
Stourbridge
(8.00pm – 10.00pm)

Additionally the shack is open during the same times on the intermediate Mondays

Telephone Enquiries to :-
Hon Secretary
John Clarke M1EJG
(01562) 700513

Or by e-mail to :-

honsec@g6oi.org.uk

All correspondence/enquiries should be addressed to the Hon. Secretary :-
STARS
c/o The Mill House
21 Mill Lane
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Kidderminster
DY10 3ND

STARS Web Site URL :-

www.g6oi.org.uk

MESSAGE FROM THE PRESIDENT

Well I must start off by mentioning the recent SSB field day content that we took part in after a gap of a couple of years. It was good to see such a turnout from members beginning with the setting up, the content and finally the taking down. Keith undertook a sterling job volunteering **you** all for shifts and arranging for the use of the Nursery. A special mention needs to go to the night shift of John (Hon Tres), Tim and Marc who discovered how cold it got that Saturday night / Sunday Morning. Official results will be revealed in due course. Band conditions were not brilliant but I guess you could say progress was slow but steady. The actually taking part and getting G6OI on the air is the main achievement. For a number of members it was their first contest and the feedback was generally: when can we undertake the next one? See also Mike's article regarding the UKAC 144Mhz contest on the page five.

Congratulations to Pete on passing his Intermediate course - his new call sign is 2E0MVM

As expected the talk given by G4ROJ on Kite Aerials made for an excellent evening. Roger brought along a range of kites and the cable used to get his aerials aloft. Roger talked us through a series of slides showing various aerial configurations using single and multiple kites.

Unfortunately Phil has cancelled his talk for April next year as he feels his knowledge is limited and also out of date on digital radio repeaters. A Stars member contacted Phil regarding the talk - was that you? as Phil has mislaid the email. Please let me know if that was you?

The 2m and 70cms aerial array at Old Swinford needs the rotators connecting up. This needs some suitable multi-way connectors (plug and sockets) and also some multi-way cable to run from aerial junction box (side of red telephone box) to the shack - if anyone can assist with these materials?

James French (G7HEZ)

See next page for pictures

Jim (with mic.) and Dr. Bob taking a shift – SSB Field Day

Dusk on the first evening of the SSB Field Day

SSB Field Day - The night shift 03:24 in the morning. I wonder who got the last biscuit?

Thanks to James for the pictures at the top of the page and thanks to Tim for the picture at the bottom of the page

CQ Contest

The SSB Field Day contest on 5-6 September was enjoyed by many, and for a few of us this was our first time taking part, myself included. It left me wanting more.

There's a VHF contest that runs every month that has caught my interest – the 144MHz UKAC. This runs between 1900-2130 UTC on the first Tuesday of every month and coincides with the last two hours of a number of European activity contests. This is about the only time these days where 2m SSB comes alive! Actually, this is part of a wider picture because there is a UKAC every Tuesday; 432 MHz on the 2nd Tuesday, 1.3 GHz on the 3rd Tuesday, 50 MHz and 13cms to 3cms on the 4th Tuesday, and 70 MHz where there is a 5th Tuesday in the month. Although there is an overall UKAC award, there are also results for each category so it's perfectly feasible to just enter the 144MHz series.

Some more details about the contest:

- The exchange is RS signal report, Serial Number, and a 6 character locator.
- Scoring is one point per km multiplied by the sum of non UK Locator Squares worked plus 2 times G, GW, GM, GI, GD, GU and GJ Locator Squares worked.
- Sections – there are 4 sections but the ones we could consider are:
  - Restricted (AR) : Power 10-100W, one antenna at a time, or just one beam only.
  - Low Power (AL) : Power 10W max, one antenna at a time, or just one beam only.
- The individual entries by a club's members to the UK activity contests which take place on each Tuesday in every month all count towards a society's overall score for the year for each UKAC. To maximise the club score, it's important for the club contest organiser to get as many members to come on for as many sessions as possible.
- Stations enter the UKAC contests in the normal way, but need to choose an AFS (affiliated society) name when uploading their log. Entries to all sections of the UKAC count towards the overall club score.
- Stations who enter on behalf of an affiliated society must be members of the affiliated society, but not necessarily RSGB members themselves.
- All sessions will count towards the total club score.
- G6NB Trophy will be awarded to the winner of the Club Championship.
- The Foundation Shield will be awarded to the leading Foundation Licensee.
- The Intermediate Shield will be awarded to the leading Intermediate Licensee.

More information on the RSGB website: http://www.rsgbcc.org/cgi-bin/readcal.pl

The low power section may be of particular appeal to foundation level licence holders due to the 10W maximum power rule. This would allow for maximum club member participation.

To get the most points, we need lots of people taking part at the same time using their own equipment. But what do we need to make this happen using club equipment? Well, the good news is that we have all the kit we need (2m/70cm all mode transceiver, 2m + 70cm crossed element beams)… and the slightly bad news is not all of it works, specifically the rotator which needs some attention and the fact that some things still need wiring up. However, all of this can be overcome of course. Volunteers?

I know a few of us are keen to enter more contests and this seems like a good way of getting more people involved. If we get this up and running, there will be a regular 'sporting' aspect to our activities which might even be a way of recruiting more people into the society, particularly from the school. Who knows, if it really takes off maybe they'll find us a permanent home again!

Meanwhile back in the real world… if any of this sounds interesting to you, please make yourself known and let's get those beams back in working order.

Mike G7HEM

ADVERTISMENT - ITEMS FOR SALE

Drake TR7A Transceiver with matching P.S.U. And speaker - £350 o.n.o

AL-811 Amplifier £500 o.n.o. (Ameritron 600 Watt Linear Amplifier)

Both in perfect working order

Please Contact – John Raybould (G4PQI) on 01384 566341

SWR AND ANTENNA TUNERS

Foreword

John Haddleton has kindly donated this article for inclusion in Starlite. The article below and follow-on articles should be instructive and entertaining to newcomer and experienced ham alike.

Introduction

The information in this document is not of my development, but from years of listening to others who are much more versed in antennas, RF circuits, transmission lines, etc. I have also Pillaged, Robbed, Copy and Pasted many useful bits of information off the Interweb, by Copy and Paste, and then editing the lot to hopefully make a coherent document.

Semantics

In this Thesis I will refer to SWR as a simple means of stating a mismatch between two components operating at RF.

I will also refer to load and antenna meaning the same, as the antenna is the load we work with. I will also refer to feed lines and transmission lines which are the same. The load could be something different, but we are interested in working with transmission lines and antennas and how they interact and work together. The article is in several parts which will be continued in future editions of Starlite. To make a start on the linked subjects of SWR and Antennas we will first look at the subject of SWR (Standing Wave Ratios).

SWR, What is it ?

When power is transmitted up a feed line and it gets to the antenna and the load impedance is the same as the impedance of the feed line all the power goes into the antenna. Thus there is no reflected power, voltage and current coming down the feed line...all the power goes into the antenna.

If, however, the load impedance is different from the feed line then some of the forward power is reflected. Either the voltage or current will be 180 deg out of phase with the forward voltage or current.

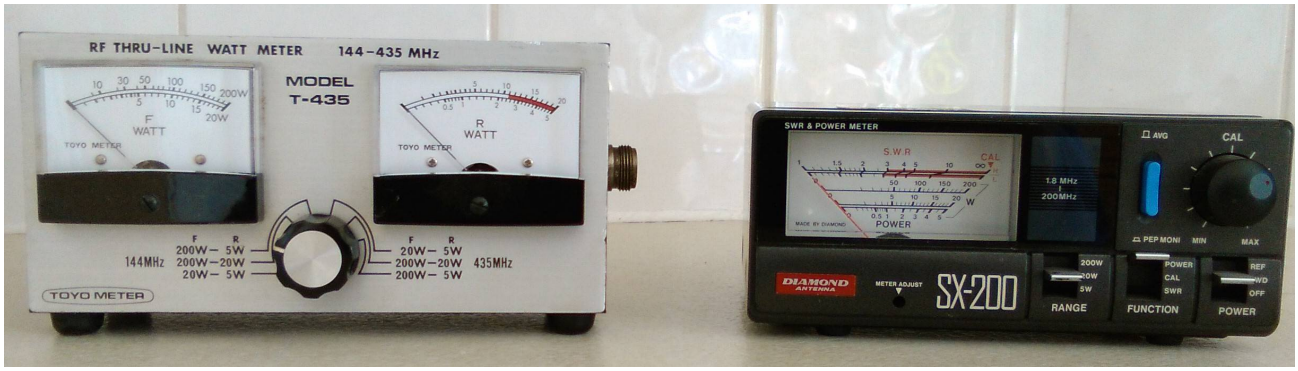

Illustration 1: Pictured Left a Thru-Line Watt Meter and Right an SWR Meter

As this reflected out of phase voltage or current travels back down the feed line it adds or subtracts with the forward voltage or current. This causes the value of the voltage or current to be different at different points along the line. The SWR is the ratio of the differences in this max and min voltage or current along the line.

VSWR (voltage SWR) is the ratio of the max voltage between different points on the line.

Also, SWR = (load impedance) divided by (feed line impedance)

or

SWR = (feed line impedance) divided by (load impedance)

SWR is always given as 1 or greater and a ratio of 1 or higher to 1 (ex. 2:1).

As a measure of forward power to reflected power ratio the following SWR for forward to reflected power:

SWR = 1.5:1 forward power of 100W reflected power of 4W (4%)
SWR = 2:1 forward power of 100W reflected power of 14W (14%)
SWR = 3:1 forward power of 100W reflected power of 26W (26%)
SWR = 4:1 forward power of 100W reflected power of 36W (36%)
SWR = 10:1 forward power of 100W reflected power of 70W (70%)

One can see an SWR of 3:1 or more becomes significant and to be concerned about.

So by knowing the SWR one can determine how good or bad the match is between the feed line and the antenna.

SWR is usually measured with a SWR meter or bridge. The meter works by having a short piece of feed line inside and sampling at 2 different points along this line. For the forward power the sample is taken closest to the transmitter. For the reflected the sample is taken closer to the antenna. These samples are most often only a few inches apart.

The RF voltage is sampled, rectified to DC and fed to 2 meters which will allow one to read the ratio. Some meters have one meter with a switch to connect to the 2 samples. Also often the forward sample has a variable resistor to adjust the meter for the max reading and then the reflected sample is measured with a calibrated scale to indicate the SWR reading. Other methods are used with some just giving forward and reflected power or voltage, some have 2 meters in one housing with scales for where the 2 meter movements meet to indicate VSWR. These are called cross needle SWR meters. In all cases 2 voltage samples are taken and compared.

Nearly all SWR meters are really VSWR meters in that they measure the max to min voltages on the feed line. Also most power meters are really volt meters measuring the voltage on the feed line with a meter scale calibrated in power assuming a fixed impedance such as 50 Ohms. It is really difficult to measure real power for there are many variables in this measurement.

Since power = V^2 / R (voltage squared divided by R) by measuring voltage and knowing R we can determine the power. Again most RF power meters do this using a calibrated meter scale and assuming an R of 50 Ohms. If another impedance such as 300 Ohms is used then a different scale

and calculation is required. Also the sampling device is through capacitive coupling to the coax feeding the antenna. The distance between the pick up point on the coax and the sampling pick up determines the amount of voltage that will be sampled. As the frequency of the RF increases or decreases this sampling value will change affecting the power reading. Usually power meters have a frequency range for the power scale they are used for. Some meters have different sampling elements to adapt the meter for different frequencies. The point is one must make sure the meter used for measuring power be made for the frequency in use.

Power can also be measured by measuring current. Power = I^2 x R (current squared times R)

How Does an Antenna Tuner Help ?

Illustration 2: Above - The authour's Antenna Tuning Unit

The Antenna Tuner

An antenna tuner is a device that transforms one impedance into another. Impedance is the resistive and inductive or capacitive value in Ohms of a load such as an antenna. When using coax or feed line to feed power from a transmitter to an antenna this impedance is typically desirable to be 50 Ohms. Many coax cables used today are 50 Ohms, which means if the load (antenna) impedance at the end of the feed line is 50 Ohms then one will get a good match and all the power fed into the feed line will travel up the feed line and into the load.

However, we seldom find this perfect match in the real world. More often, especially when an antenna is being used on multiple bands, the antenna will have a different impedance than the feed line. Meaning that of the power fed into the feed line some of it will not go into the load or antenna and is reflected back to the transmitter. This is where an antenna tuner can help.

Some misconception about antenna tuners:
1. They tune the antenna (false).
2. They do nothing more than make the radio happy and do little to help the antenna system perform better (false and false again).

When using an antenna tuner, the antenna itself is more important than antenna system (radiator and feed-line and the surroundings), and it can be adjusted so as to get more power into the radiator or antenna element.

As an example.... If one has an antenna with say 4:1 SWR, this means 36% of the power going to the antenna is reflected back down the coax toward the source or transmitter. So, if one puts 100 watts into the coax/feed line this 100 watts when it arrives at the antenna, only 64 watts goes into the antenna to be radiated/transmitted and 36 watts is reflected back to the transmitter.

This is not good, for one has lost power not being radiated/transmitted and also it can go back into the transmitter possibly causing damage to the final power amplifier.

This is where the tuner comes in.

The antenna tuner is placed in the feed line between the transmitter and antenna. It can be placed at the transmitter end, the antenna end or anywhere in between. Where it is placed has to do with what type antenna one might have or for convenience might be at the transmitter end of the feeder where the tuner can be adjusted.
Some tuners are "automatic" type meaning they automatically adjust themselves when power is applied and often these tuners are placed at the antenna. In a mobile this might be a better performing system.

A tuner has coils and capacitors inside to make its adjustments. The amount of inductance from the coils or capacitance from the capacitors depends on the load to be "compensated" for, and adjusted for. That is as we have an antenna with a high SWR or load much different from our coax impedance the more or less capacitance or inductance is needed.

The tuner is a circuit that transforms our load into the desired impedance of the transmitter. This is usually the 50 Ohms required by modern transmitters.

To adjust the tuner, one applies or transmits power from the transmitter and using a SWR meter between the transmitter and to adjust the tuner settings for lowest SWR. Once this is done then the transmitter will be happy seeing a good load (50 Ohms) and the SWR working into a good load.

However, the antenna has not changed. It still has a 4:1 SWR and for every 100W going up to it the antenna reflects 36W back toward the transmitter. So how does a tuner help ?

More next month

John Haddleton (M0OBU)

STARLITE

YOUR COMMITTEE

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	TIM	G7TAC	
	MALCOLM	G8BOP	
	WAYNE	M5LLT	
Starlite Editor	ADRIAN	G0NLA	

CALENDAR OF EVENTS

It should be noted that the Shack will be open every Monday evening unless shown otherwise in the Calendar

October	Mon 19th	Dave G4DPZ Amateur Satellites
November	Mon 9th	Foundation Course - Exam
	Mon 16th	Annual Surplus Sale
	Mon 23rd	Committee Meeting
December	Mon 7th	December Christmas Gathering
2016		
January	Mon 18th	Tim 4x4 Response
February	Mon 15th	Constructors Competition and Quiz by Peter
March	Mon 21st	AGM
April	Mon 18th	To be arranged

Please note in future :-

There will be £2 admission charge to non-members for attending main meeting talks / events. This is refundable against joining the society.