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T.D.A.R.S.

Telford & District Amateur Radio Society

News Letter

G3ZME G6ZME Issue 217 Date April.2006

Dawley Bank Community Centre, Bank Road, Dawley, Telford, Shropshire. TF4 2AZ

Forthcoming programme

April 12	**Club Contesting and Portable Activities .** Coming along ?
April 19	**Using the club's Antenna Analysers & such-like.** G0VXG & G3UKV
April 26	**All About Digital Radio Mondiale (DRM)** Talk by Richard M1RKH
May 3	**First-in-the-Month:** On Air, Committee & Open Evening.
May 10	**Social Evening** (outside, rear lawn hopefully) incl new Club Tent Erection
May 17	**Chairman's Discussion Forum** evening to share ideas
May 24	**Telford Hamfest 2006**—another Phoenix ? Discussion night
May 31	**Surplus Equipment Sale**. 10% to club funds
June 7	**First-in-the-Month**. Radios "on". Committee Meeting.
June 14	**Radio Competition. L-C-R** (make an inductor, capacitance and resistor—hey!)
June 21	**VHF NFD Preparation**

CLUB MEETINGS EVERY WEDNESDAY AT Bank Road Community Centre, Bank Road, Dawley Bank. Rooms available from 7:30 pm. ALL WELCOME. COME AND MEET EVERYONE !

For Foundation & Intermediate training, contact Mike G3JKX tel: 01952 299677, mjstreetg3jkx@aol.com.
Advanced course contact Eric M0KZB tel: 01743 240286, e.arkinstall@virgin.net, or Mike G3JKX for 'booster sessions'.

NOTE: Want to order a new TDARS jumper or other garment? Sign-up on club Noticeboard.

Editorial

The recent EGM of the Telford Rally Group was crucial to our Club. Those of you who came to the TDARS AGM at the end of March realised that our finances have suddenly become a bit shaky. Whilst a good balance sits in the Bank account, outgoings in the past year have been far higher than income, with no really exceptional circumstances, except that the 2005 Rally was unable to payout to SARS/TDARS, as it only just 'broke even' in 2005. If no action is taken this year, some unpleasant medicine will be on the horizon, now that the 2006 Telford Rally has been cancelled.

So the Group (TARRG) was formally dissolved and the new TDARS Committee went into immediate session and came up with a couple of money-raisers. The first was to run a mini lottery event for Club Members (more of that later this year), and the second was to organise a midlands amateur radio event, which will be called "Telford Hamfest 2006". Some initial groundwork has been done. It will take place at a renovated warehouse next to Enginuity in Coalbrookdale; (one of the Ironbridge Trust Museum's 10 sites) on Sunday 1st October. We envisage a scaled down event compared with the previous Telford Rally, but with various attractions including exhibitors, some traders, good local catering and pubs, specific amateur radio features and of course family attractions of Enginuity, Blists Hill Museum, Dale Park and recently constructed local country walks. The TDARS Committee en bloc will undertake the work, but welcome anyone who wishes to assist in the organisation, contact Richard 'VXG ASAP. The experience of several committee members being involved in the organisation of a radio rally for the past 28 years should stand us in good stead, but the support of the whole TDARS Membership is vital to this enterprise.

MIV

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<u>TDARS Information and pictures Web Site</u> www.tdars.org.uk

CHAIRMAN: Richard Wilkinson G0VXG (883671)

VICE-CHAIRMAN: Martyn Vincent (255416)

SECRETARY: Mike Street G3JKX (299677)

TREASURER: Jim Wakenell G8UGL (684173)

CURATOR: Derek Southey G0EYX (01785 604904)

NEWSLETTER EDITOR: Martyn Vincent G3UKV (255416)

Committee: Richard M1RKH;Mike G4NKC;Simon G0UFE;Chris M0ECM; Dylan M1IHM; Bob M0RJS

Assistant Curator: Kevin Hutchinson G8UPF (01746 764556)
QSL Manager : Malcolm 2E1DJM; Trophies/Certs: G3UKV, M1RKH

<u>CLUB NET</u>: SUNDAYS 144.600 FM AFTER 9 PM. GB3TF ALSO MONITORED FOR ANYONE NOT ABLE TO OPERATE ON 2 METRES.
ALSO FIRST WEDNESDAY IN MONTH AFTER 2000 HRS LOCAL TIME ON 3657 KHz +/- QRM.

REWARD…. REWARD….REWARD

A reward of 500 microfarads is offered for information leading to the arrest of hop-a-long capacity. The unrectified criminal escaped from a Duracell where he had been clamped in ions awaiting the gauss chamber.
He was charged with the induction of an 18 turn coil named Milli-Henry who was found choked and robbed of valuable joules. He is believed to be armed with a carbon rod and is a potential killer. Capacity is also charged with driving a dc motor over a wheat-stone bridge and refusing to let band pass.
If it is encountered, it may offer a series of resistance. Electromotive force spent the night searching for them in a magnetic field where they had gone to earth having no success and believe they had returned ohm via a short circuit.

GØ EYX

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Construction Competition 2006 Pics by Bob M0RJS.

Mike G3JKX wins the main Construction Trophy for his superb K2 HF Transceiver project, whilst Gary G4FJQ picks up the Novice Construction Trophy for his 2 metre PA project seen on the table with the meters. (Actually a substitute cup as the original couldn't be located on the night!) Mike also won the Jack Hassall Trophy at the AGM. Good Year, eh Mike ?

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REMINDER: Paid up Members are welcome to borrow almost any item of Club Equipment, so long as it is returned the following week and the usual "signing out" process is followed strictly. That's a privilege of TDARS Membership.

If you can't return it on time, please find someone else who can, or don't borrow it that week!

Ephemera: Club News

- Congratulations to ***Members who have upgraded*** to a higher Licence—Ron (ex 2E0BAJ) is now M0EAK, whilst Tim (ex M3***) has become 2E0BDZ and Chris (ex 2E0CMJ) is now M0ECM. Apologies if I've missed anyone else out—please let me know.

- The ***Under-a-Fiver Construction competition*** was won easily by Richard G0VXG for his QRP 70cm transmitter (featured in the last Newsletter), whilst runner-up was Mike G3JKX with a contact-less iambic keyer module and in third place was Dave G8VZT with a basic microwave frequency conversion unit.
- In the ***Main Construction Competition***, entries were down this year, but the excellent entry by Mike G3JKX was a worthy winner with his 1000 piece jigsaw—the K2 HF Transceiver (see photo elsewhere). Just behind him was Dave 'VZT's component measuring instrument that measures capacitance and inductance. In third place, there was a three-way draw, with Gary's (G4FJQ) 2 metre valve PA unit, Richard M1RKH with his DRM receiver and Martyn G3UKV with a completed 10GHz Transverter project. As a Novice constructor, Gary was awarded the Novice Construction Trophy for 2006—see photo elsewhere.

- Following a Committee decision last year, when it was decided to discontinue purchasing replica trophies for club awards such as those listed above, and to replace them with suitably ***inscribed certificates***. Thanks to Richard 'RKH for doing an excellent job with both the 2005 and 2006 trophy winner certificates, which were distributed at the recent AGM. The Club logo in particular is very attractive.

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- The ***tamper-proof security cover*** for the HF/VHF permanent G3ZME station has now been made by Gary 'FJQ, and merely needs completing below the operating table level.

- Do you realise that you can view this Newsletter in glorious technicolour (eg 10 colour photographs this month…) if you use the ***yahoo group reflector*** TDARS@yahoo.groups.co.uk ? It provides updates or changes to the Club programme, gives opportunity to raise issues or queries and often will give you the information you want. Costs zilch. Just ask a committee member if you want more information. Dave G4EIX is the group 'Moderator' - he set it all up originally.

- **NOTE: TDARS SUBSCRIPTIONS FOR 2006-07 NOW DUE**—Contact Jim G8UGL ASAP. This year we especially need funds to maintain a VIBRANT radio Club. £29 normal, £15 Full-time student, £23 Concessionary (usually non-earners).

Robin G1MHU has been researching possible purchases to assist at VHF NFD.

(See also http://www.zen22486.zen.co.uk/TelfordNFD.htm , or replace .htm with .ppt for flashy Powerpoint presentation)

If you really want a LandRover ...

Or something a little bigger ?

Don't forget the mast and rotator….

Following a Risk Assessment …….

Wouldn't this suit Jim more ?

A new shovel to empty the loo tent ...

… to keep the generator fuelled up.

To deal with local QRM from adjacent Hilltops.

(Wonderful what's available to purchase on the Internet …! - Editor)

Mike's Piece

Moving a wire in a magnetic field causes a current to flow in it. Keeping the wire still and moving the magnetic field has the same effect. Your receiving aerial does just this, converting moving alternating magnetic fields into alternating currents for your Rx to sort out. Giving a wire some current also causes a magnetic field to be produced. Your TX PA is an electron pump and, as your aerial is conductive, it also produces magnetic fields.

Applying a voltage to a coil of wire produces a strong magnetic field. As this field builds, it induces another voltage into the coil, called the 'back EMF', which opposes the applied voltage. This means that the current flow starts off quite small and takes some time to reach a maximum. In other words a coil has inertia, which is called Inductance, the unit of which is the Henry or H for short! (For RF frequencies, a Henry is too large a unit. e.g at VHF, coils of a fraction of a microHenry are used). If you now switch off the applied voltage, the resulting collapse of the magnetic field causes another back EMF to be induced which tries to prop up the rapidly falling applied voltage and *reinforces* the falling current! These 'back EMFs' can be very high, especially if the magnetic field is very strong and can cause quite high reverse or overswing voltages to be generated. To prevent a relay coil from doing so when it is de-energised, a diode is wired across the coil to short it out when the reverse/overswing polarity appears, safeguarding nearby circuits which may be damaged if, say, a large negative voltage appears on the collector of an NPN transistor.

A coil and capacitance in parallel presents a high impedance (Z) to a signal at the resonant frequency. If wired in series, the Z is low, accepting or passing the wanted frequency) Remember, Z is a mixture of R and reactance. The efficiency or 'Q' must be kept high by having a very low RF resistance. This means using wire of sufficient diameter or otherwise the RF currents will be lower than they could be, so the signal passed on to the next stage will be low too. As we go higher in frequency another problems appear. There, the RF tends to travel on the outside of the wire. We get around this by silver plating the wire and/or increasing the wire diameter even more, increasing the surface area and thus improving performance. Some VHF/UHF coils use silver plated *tubing*. Yes, the plating oxidises in air, but fortunately the oxide conducts almost as well as solid silver! The silver plating liquid you can buy is quite effective, even at HF. Try it on your tin-plated ATU coils. Big RF currents flow in here so keeping the resistances down is important. So, while you have the lid off, check all the soldered joints and the mechanical chassis connections for tightness and corrosion too. A good idea ? You bet your sweet life it is !

VLF coils, some needing thousands of turns, have to use Litz wire to keep the R low. What is Litz wire? Imagine a bunch of very thin varnished copper wires, all twisted together and soldered together at each end. All the wires in parallel will result in a very low overall resistance but have a large overall surface area, keeping the Q up.

Finally there's the subject of L to C ratio. Oscillators tend to use a low LC ratio , i.e a small L and a big C, so that circuit capacitances, including strays and those of the active device, (transistor) are swamped out. i.e any changes in C have less effect, so the oscillator frequency doesn't drift so much. Most RF circuits in your Tx & Rx have high LC ratio to keep the losses low and the signal up! That's it. Vy 73 Mike G3JKX

TELFORD & DISTRICT AMATEUR RADIO SOCIETY

Abridged Minutes of the 37th. Annual General Meeting at HQ on 29th March 2006

Present: M1IHM (Chairman) and 25 other Members.
The Chairman opened the meeting at 2003hrs.

1) Apologies: Mike G3JKX, Mike G4NKC

2) Retiring Chairman's Statement.
Dylan M1IHM thanked the retiring Committee for their help and support over the past year – help with events, talks, guest speakers, such as G0VXG, G3UKV, G4LU. Congratulations are due to Mike G3JKX for his work with licence training courses and to Eric M0KZB. More newcomers have been attracted to the club, and the more we encourage them, the more they will become involved. There have been some big changes during the year, such as the Rally's change of location to Shrewsbury, new microwave beacons coming on-line and a new GB3TF repeater now working. Dylan said he had enjoyed the year, and he was just getting to feel his feet.

3) The Minutes of the 2005 AGM were read and approved unanimously.

4) Matters Arising: None

5) Treasurer's Report.
G8UGL distributed the audited accounts to all those present and invited questions from the floor.
The main purchases were two Heil headset packs, transceiver foot-switch controls, a library cupboard, 2 tents, quality coax (for members to purchase), and a new 'TF logic board and components (currently under construction by G8UGL). Several members expressed concern that expenditure exceeded income by nearly £2K. Jim said that there are 38 current TDARS members, but this included several honorary and lifetime members. M0KZB thought it was time for a 3 year financial forecast, given the current trend, but the Treasurer felt that the balance sheet was sufficient as it was clear that in about 2 years time, funds would run out if nothing was done. There was a general consensus by the floor that membership numbers needed boosting, and expenditure should be minimal until the future of such fund-raisers as the Telford Rally became clearer.
G8UGL then reminded members that annual subscriptions were now due for 2006-07.
M0RJS proposed acceptance of the Treasurer's Report. Unanimously accepted.
Discussion followed regarding the Committee's recommendation to increase TDARS annual subscriptions by £2 for all members, except full-time students, who would pay £1 more.
Dave G8VZT questioned whether this recommendation had been put in writing to the Club Secretary, as required for inclusion in the AGM, and some debate followed. However, a member reminded the meeting that the Constitution (item 4d) requires the AGM to set the annual subscription rates each year. The above increases were subsequently approved. (Ordinary rate £29, Full-time Student £15 and Concessionary rate £23.)

6) Election of TDARS Committee for 2006-07
Results as follows:-

Chairman:	G0VXG	**Non-committee posts:**	
Vice-Chairman	G3UKV	**QSL Manager:**	2E1DJM
Secretary	G3JKX	**Assist. Curator:**	G8UPF
T**reasurer**	G8UGL	**Trophies/Certs:**	G3UKV/M1RKH
Newsletter-Ed	G3UKV		
Curator	G0EYX		

Ordinary Committee: M1RKH, M1IHM, M0ECM (ex 2E0CMJ), G0UFE, M0RJS, G4NKC.

6) Presentation of Trophies.
The new-style Certificates were presented to 2005 recipients, and the 2006 Trophies + certificates were also presented by the newly elected Chairman, G0VXG

Main Construction: M. Street G3JKX
Novice Construction G. Bolas G4FJQ (ex M3SXE)
Under-a-Fiver Construction R Wilkinson G0VXG
G3IMP – Operating in the Spirit of Amateur Radio – M0RJS
Jack Hassall – Services to TDARS over previous 12 months – Mike Street G3JKX

The Meeting was closed by the Chairman Richard, G0VXG, stating that the Club would focus its attention on funding in the coming year.

Meeting closed at 2100 hrs

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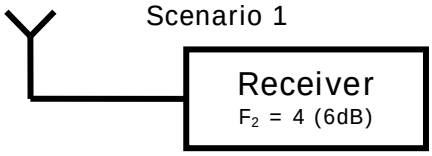
Why Stick The Pre-amp at the Top of the Mast? by Richard M1RKH

The 23cm station I put together is now working, and I've had some contacts, mostly local (yes, there have been more people on a 23cm sked than we have on a Sunday night). Now work goes on to optimize the system. I've been talking to Bob again and we've been discussing improvements we could make. So what can be optimized? Obviously producing more power wouldn't be a bad thing. To this end I have got a PA producing around 60W at 23cm. The other thing that can be done is to give it bigger ears. Space is limited so no more elements on the yagi, but a pre-amplifier would be in order.

What is a pre-amp? The job of a pre-amp is to amplify a signal in preparation for being amplified somewhere else, in our case it would be further amplified in our rigs. There are a couple of criteria that are most important in a pre-amp, Gain and Noise Figure.

Gain: Its got to amplify a very weak signal, ready for sending down the coax line.
Noise Figure: A low noise figure means that it puts as little extra noise onto the signal as possible line. Amplifiers have an inherent problem – they generate noise all the time, one component is thermal noise, controlled by reducing the temperature, this is something difficult to control without complex cooling arrangements (something that is done in radio telesecopes using liquid gases). There are other forms of noise that are generated by semiconductor devices called shot noise.

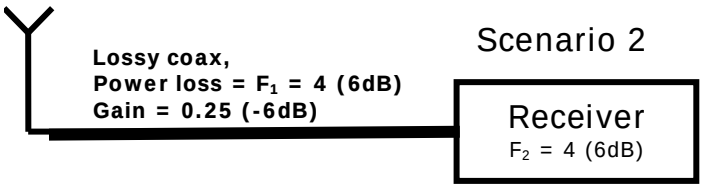
Why not have a low noise amplifier near the back of the rig. This may not be the best place for it. Of importance in any system where signals and noise exist is the ratio of signal to noise or SNR. The more signal the better. What is certain is that at the input of an amplifier, there is signal and noise, both of these are amplified. However there will also be noise added by the amplifier itself. So the signal to noise ratio further down the system will always get worse. The noise factor tells us how much noise is generated by the amplifier itself compared to the amplifier if it had no noise generated at its inputs. A lower noise figure is better than a higher one, it is always greater than one. In a 23cm Pre-amp of Bob's the noise figure, F = 0.8dB = 1.2. Pretty good!



Lets start off with a system of antenna, coax and rig, NO pre-amp at the moment, look at **Scenario 1**. The rig connected directly to the antenna, I didn't choose the noise figure of 4 for any reason, just as an example. Clearly the noise figure of this system is F = 4 = 6dB

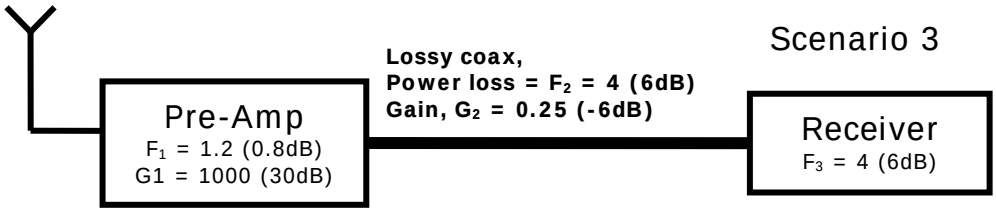
Scenario 2, the noise figure when the receiver is connected at the end of some coax, with all its losses. The overall noise figure will be given by the equation below. It's in the ARRL and RSGB handbooks. Remember a lower figure is better:

$$F \equiv F1 + \frac{F2-1}{G1} = 4 + \frac{4-1}{0.25} = 16 = 12\text{dB}$$



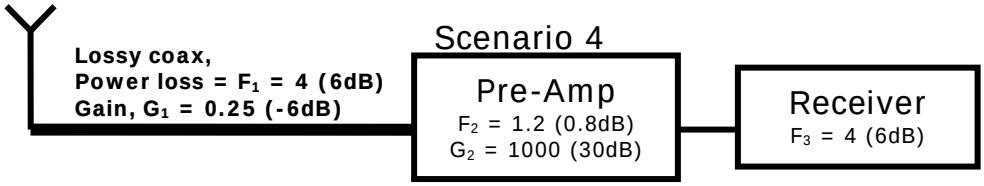
Scenario 3, with the pre-amp included.

$$F \equiv F1 + \frac{F2-1}{G1} + \frac{F3-1}{G1G2} = 1.2 + \frac{4-1}{1000} + \frac{4-1}{1000 \times 0.25} = 1.2 + 0.003 + 0.012 = 1.215 = 0.84\text{dB}$$



This is clearly a huge improvement, even better than having the aerial directly connected to the receiver, all on account of having low noise and high gain to counteract degradation later in the system. Now the ultimate test, what if you put the Pre-Amp directly into the receiver as in Scenario 4:

$$F \equiv F1 + \frac{F2-1}{G1} + \frac{F3-1}{G1G2} = 4 + \frac{1.2-1}{0.25} + \frac{4-1}{1000 \times 0.25} = 4 + 0.8 + 0.012 = 4.812 = 6.8\text{dB}$$



This is 6dB down on having the pre-amp at the antenna. So the case still stands, and that's why you always should have low noise pre amplifiers as close to the antenna as possible to improve the systems performance in response to noise.

Mike's Piece No. 2

As many of you know, I have recently built an Elecraft K2 transceiver kit. During this time, Martyn G3UKV and I were running an Intermediate Licence course up at the club. One of our students had a problem in that he had a duff hand. As you will quickly realise, this makes soldering almost impossible. Making something electronic, which works, is a necessary requirement to pass the course.

During the build of my kit, it was necessary to pass the leads of quite small components through holes in the PCB, turn this over and solder the wires to the pads on the reverse side. Sometimes these components had to go into a very small space between other parts. Also, you usually bend the component leads a little on the reverse side to hold the part in position whist you turn the board over. This is great IF you can bend the wires. Some leads, e.g. on relays, MUST NOT be bent.
Another problem was holding small printed circuits still, whilst soldering. The usual 'third hand' which you can buy, is clumsy and quite difficult to use, even for an able-bodied person.

Both of these problems were easily resolved by using a lump of Blue-Tack !

Firstly, stick an acorn sized piece onto the top of a part, making it much easier to hold. After placing the wires through the holes, ***push the Blue-Tack down onto the board, which holds the part firmly in position*** for soldering. This works like a charm and I realised this technique was ideally suited to our manually disabled student.

During the build of his course work radio we also used a big lump of Blue-Tack to stick the Printed Circuit to the bench. This held it quite still whilst soldering. Just soldering two components together is also so much easier if they are both stuck down and kept still for soldering the leads together. Making up connections to leads is made so easy, using Blue-Tack to hold the cable end in exactly the position you need. Pins can be stuck into a lump for soldering wires to. Easier than using a vice!

Assembling my kit naturally involved getting small screws, washers and nuts into position to fix bits together. Once again the Blue-Tack came into its own. A tiny piece on the point of a screwdriver, holds a bolt head perfectly, whilst you get the threaded part into its hole. The washer can be pre-positioned on the screw using another tiny piece, which stops it falling off into the works ! Nuts can be stuck in position whilst the screw is started into it. Naturally you must ensure that these bits of Blue-Tack are retrieved for re-use and not left around inside your bit of kit.

I hope that those of you who have never built anything and/or have unsteady hands will try these methods, which makes assembling electronic bits that much easier. There is nothing like making something yourself that works. Maplins have got some nice (cheap) 'starter' kits to break you in. There's also lots of kits advertised in the various radio magazines. Go on, have a go. You never know, you might like it!

That's it for this time. Vy 73 Mike, G3JKX. 01952 299677 mjstreetg3jkx@aol.com

(Has Mike got shares in Blue-Tack ? – Ed)

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Thanks to M0RJS, G1MHU, G0EYX, M1IHM and G3JKX for Newsletter input.