STARLITE

THE NEWSLETTER FOR THE STOURBRIDGE AND DISTRICT A.R.S.

G6OI

G6SRS

G4CVK

ISSUE: DECEMBER 2019

STOURBRIDGE & DISTRICT AMATEUR RADIO SOCIETY

INCORPORATING

OLD SWINFORD HOSPITAL SCHOOL RADIO CLUB

MEETINGS HELD AT

OLDSWINFORD HOSPITAL SCHOOL
HEATH LANE
STOURBRIDGE
[8:00 TO 10:00 PM]

VISITORS ALWAYS WELCOME

THE SOCIETY HOLDS ITS MEETINGS
EVERY MONDAY (EXCLUDING BANK HOLIDAYS)

RSGB AFFILIATED SOCIETY

STARLITE

Telephone Enquiries to:-

Hon. Secretary
John Clarke M1EJG
[01562] 700513

Or by Email to:-
honsec@g6oi.org.uk

StARS Website URLs:-
www.g6oi.org.uk
http://g6oi.ross-lewis.co.uk/index.html

StARS Facebook Page:-
https://www.facebook.com/groups/stourbridge.ars/

All correspondence/enquiries should be addressed to the Hon Secretary at:-

StARS
c/o The Mill House
21 Mill Lane
Blakedown
Kidderminster
DY10 3ND

Forthcoming Meetings

December 2nd	On Air. Informal. Digi Modes Group.
December 9th	On Air. Informal. Digi Modes Group.
December 16th	**Christmas Dinner @ The Foley Arms, Pedmore**
December 23rd	On Air. Informal. Digi Modes Group.
December 30th	**Final On Air & Informal Meeting Of 2019**
January 6th 2020	**First On Air & Informal Meeting Of 2020**
January 13th 2020	On Air. Informal. Digi Modes Group.
January 20th 2020	Main Meeting – Subject t.b.a.
January 27th 2020	On Air. Informal. Digi Modes Group.
February 3rd 2020	On Air. Informal. Digi Modes Group.
February 10th 2020	On Air. Informal. Digi Modes Group.
February 17th 2020	**Constructors' Competition**
February 24th 2020	On Air. Informal. Digi Modes Group.
March 2nd 2020	On Air. Informal. Digi Modes Group.
March 16th 2020	**Annual General Meeting 2020**

Editor's Comment

Thanks to John G8UAE for sending the following:

Results are in for SSB Field Day. We claimed 10,474 points from 112 contacts. We received 12,704 Points from 108 contacts with an error rate of 4.39; the average was 5.54. This gave us 17th position of 19 entries.
The reason we received more than we claimed was that SD somehow got set up for G6OI, not G6OI/P.
This resulted in SD marking all fixed station contacts as not scoring.

The Surplus Sale was attended by about a dozen members and was a successful auction-style event. Some items were unsold, but many others (including higher value items) were sold in fairly quick succession, realising funds for the seller and StARS. Thanks to Nick G6DQN and John G8UAE for being the auction team.

Transmitter Power Measurement And Tolerance

What is the real difference between a transmitter with an output power of 25 Watt or 22 Watt or 28 Watt verses 25 Watt. This question or problem has been made as the authorities, love playing the numbers game. (The specification is 25 Watt therefore your transmitter must transmit 25 Watt and NO LESS or NO MORE).

ETSI 300-162-1: Technical characteristics and methods of measurement - that the European Community and South Africa use as a Standard for measurement. In that specification, Measurement uncertainties are stated, herewith the table:

6.7.1 Measurement uncertainty

Table 1: Absolute measurement uncertainties: maximum values

Parameter	Maximum uncertainty
RF frequency	$\pm 1 \times 10^{-7}$
RF power	±0,75 dB
Maximum frequency deviation: - within 300 Hz to 6 kHz of modulation frequency - within 6 kHz to 25 kHz of modulation frequency	 ±5 % ±3 dB
Deviation limitation	±5 %
Adjacent channel power	±5 dB
Conducted spurious emission of transmitter	±4 dB
Audio output power	±0,5 dB
Amplitude characteristics of receiver limiter	±1,5 dB
Sensitivity at 20 dB SINAD	±3 dB
Conducted emission of receiver	±3 dB
Two-signal measurement	±4 dB
Three-signal measurement	±3 dB
Radiated emission of transmitter	±6 dB
Radiated emission of receiver	±6 dB
Transmitter transient time	±20 %
Transmitter transient frequency	±250 Hz
Receiver desensitization (duplex operation)	±0,5 dB

Power measurements are for both **Power Meters** and **Signal Generators**.

Now down to basics. If we convert Power from Watts to dBm we see that 25 Watt = +43,979 dBm, rounded up to +44 dBm for simplicity. Next, we convert 22 Watt to dBm and end up with +43,424 dBm or a difference **0,57 dB**, hardly significant. dBm = Log (Power in mW) * 10, 1 Watt = (1000 Log)*10 = 3*10 = +30 dBm. 5 Watt = (5000 Log)*10 = (3,6989) * 10 = +36,989 dBm.

The power tolerance of a 25 Watt transmitter to meet specification is therefore between **21,134 Watt > 29,85 Watt**, worst case. Receiver measurement will have the same result, 0,25 uV = -119 dBm, so the limits will be **0,23 uV > 0,27 uV**. All things being equal there will always be some uncertainties in any measurement.

Test Cables are a strong point in question, especially if inter series adapters are used to connect the DUT to the measuring instrument. Test Equipment should normally be calibrated regularly to a traceable standard (CSIR/SANAS). Test Equipment suppliers (Rhode & Schwarz, Inala Technology & Protea Electronics) have their in-house calibration standards that are traceable. With that the calibration is also done in a controlled temperature environment.

Our Watt boxes and Test Instruments are not in a controlled environment, which leads to further discrepancies to accuracy. Who actually checks the state of the connectors on their instruments and cables? That only happens when measurements do not tally up. Using a Watt/SWR meter, what termination is used? 50 Ω Termination or an Antenna, the later can cause errors as the VSWR will affect the overall forward power measurements.

At the end of the day what have we really achieved? In the perfect world our **25 Watt** radio with all the path loss, cable loss, connector loss and a received signal of **0,25 uV**, or a **22 Watt** transmitter with all the stated losses a received signal of **0,23 uV** and finally a **29 Watt** transmitter with all the same losses a received signal of **0,27 uV**, is that really worth blaming the Transceiver that does not transmit 25 Watt?

To make any real difference on improving the received signal strength you will have to boost your transmitter power by 6 dB, so a 25 Watt transmitter will have to be replaced with a 100 Watt unit. At the extreme, the original 0,25 uV signal will now be 0,5 uV which is a 6 dB increase, a 4 fold increase in TX power to receive twice the signal strength, not even an “S” Point, **S9 = -73 dBm or 50 uV**, the typical sensitivity of the receivers are 0,25 uV -119 dBm for 12 dB SINAD, so from “S0” to “S9” receive level you would need a power increase of 46 dB. Some examples **1 watt** +46 dB = **40 Kilowatt**, **400 Watt** +46 dB = **16 Megawatt**. That is a substantial power increase, so the deviation of **< ± 0,75 dB** in transmitter power is not worth condemning the equipment. (*SINAD = Signal-to-noise and distortion ratio which is a measure of the quality of a signal from a communications device. Ed.)*

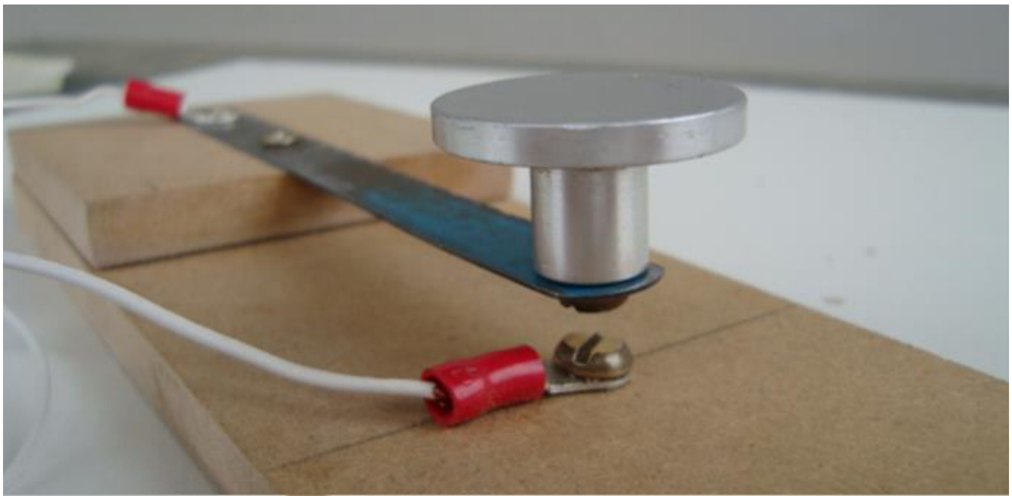
To minimize potential errors, I have made a set of Test cables with various terminations using RG-400 Teflon cable approximately 600 mm in length, with crimp connectors, that are used for controlled measurements. To remove uncertainties in measurements, one way would be to eliminate all cables and connectors and connect the DUT directly to the instrument, impractical as damaging the Test Instrument connector will set you back a good amount of money, so out with the test cables, use good quality cable and connectors for repeatable and reasonably accurate measurements. Also try to use one Test Instrument as a reference if measurement issues do arise, impractical if you are in the field.

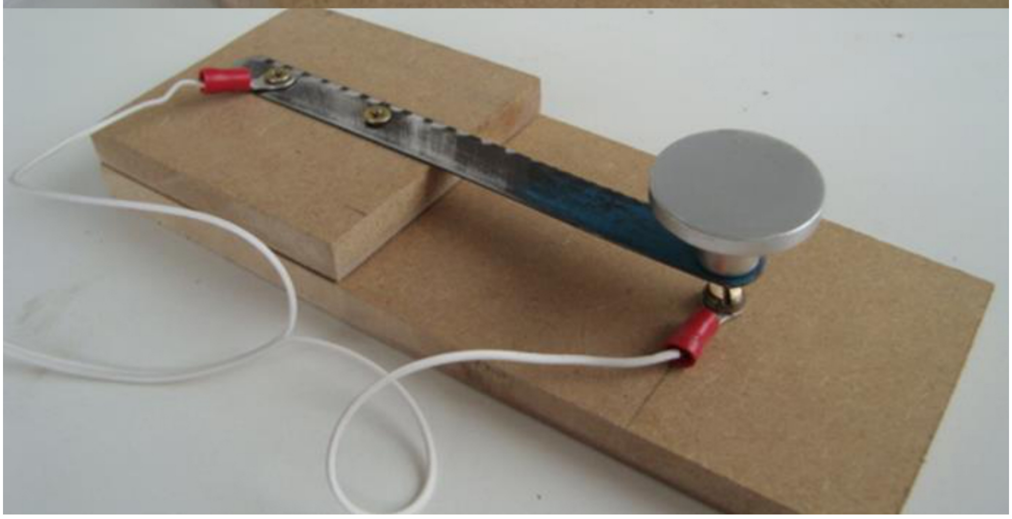
Make you own Morse Key

Here are a couple of photographs of a Morse code key that anyone should be able to knock up in a couple of hours.

It consists of a piece of hack saw blade, two pieces of wood, four screws and a knob from a drawer *(I think your wife will notice if you take one from the kitchen! Ed.)*

The hacksaw blade supplies the 'spring' so no other springs are needed. The gap between the contacts is huge in the photograph (to illustrate) but it can be adjusted by turning the screws in and out.





An End Fed Half Wave Antenna

The HF antenna I'm using is described here:
<https://www.facebook.com/groups/EndFedHalfWaveAntennas/>

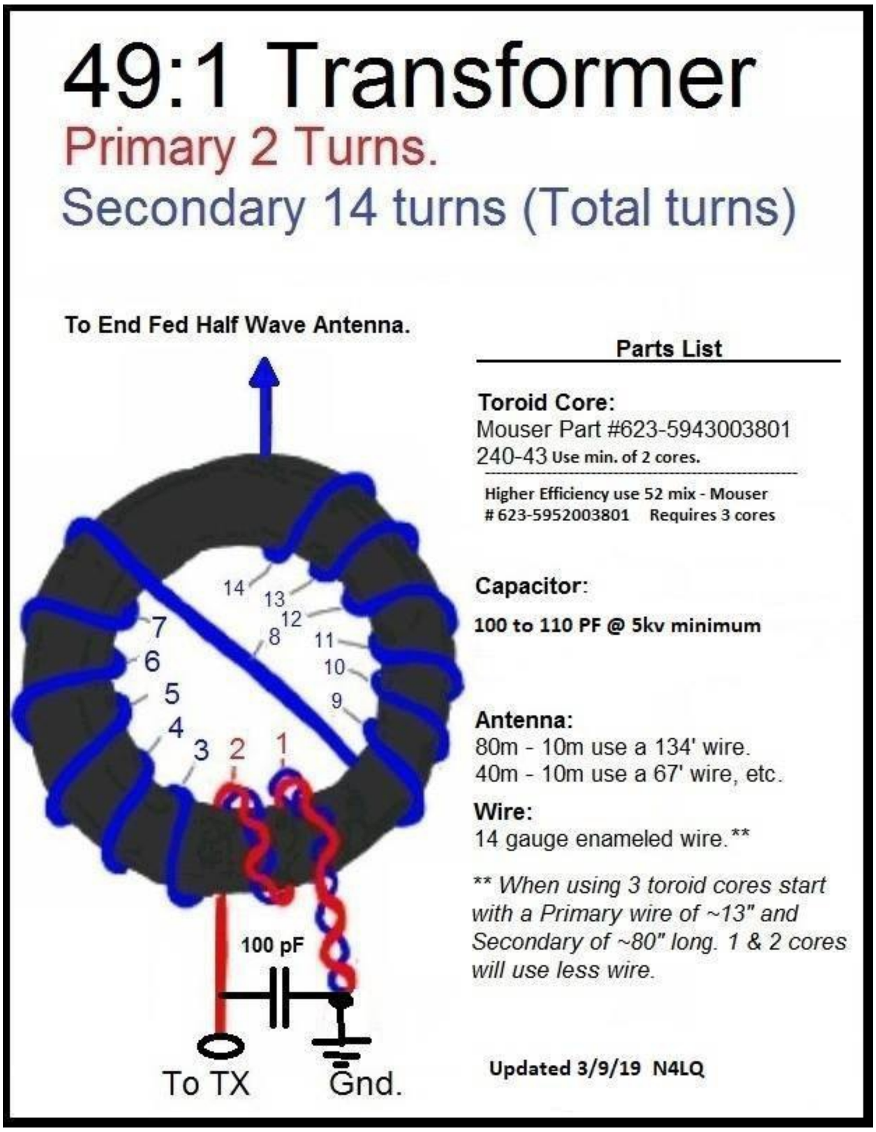
The group is more experimental than analytic, but the antenna works brilliantly. Just don't try to argue about it with them :)

Unlike other "end fed" antennas, this is resonant as a half-wave, which means that the harmonics fall into higher ham bands and it's resonant on those too.

To achieve that, you need an un-un with a turns ratio above 7:1, which is 49:1 impedance ratio, feeding the wire very near the end at a 2.5kohm point.

It simply doesn't work to use 3:1 turns ration (9:1 impedance) because the feed point at 450 ohms requires a wire that's shorter than half wave - and then the harmonics don't fall into the higher bands.

Bottom line is you can operate 80/40/20, or 40/20/10 without using a tuner, which is especially good for mobile QRP operations. Also some in-between bands like 15m, I've heard.



They recommend one, two or three 240-43 toroids (depending on Tx power level 30W/120W/1kW), or spend a little more on type 52 for better efficiency.

My comments: You might get slightly better results using 2:15 turns. For 160m use 3:21 turns. You could also use more turns on a smaller core for QRP use. I don't believe that the capacitor needs to be rated 5kV.

Remote Antenna Switching

From EI7BA's Amateur Radio Pages

Why Remote Switching??

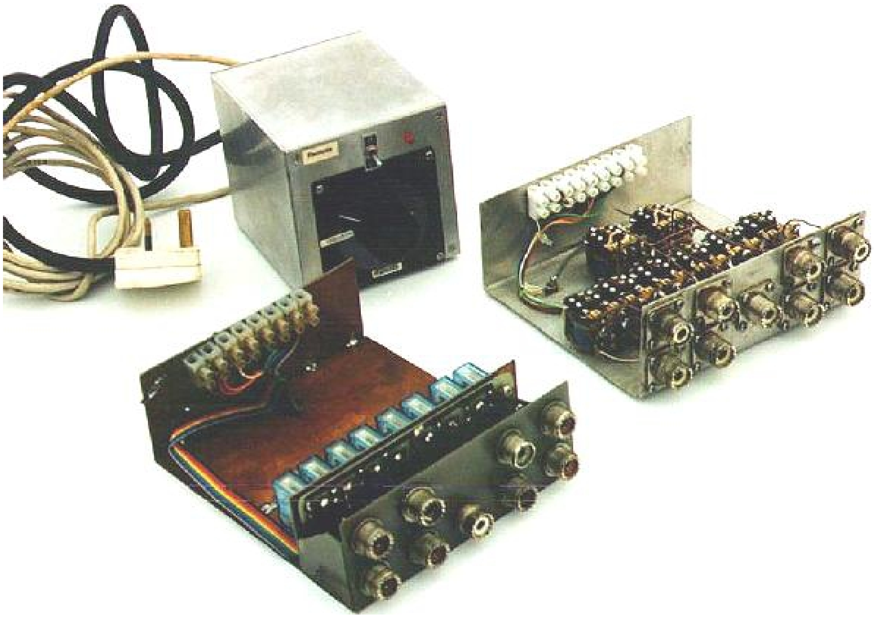
My original Remote Antenna switch was made specifically to select the various driven elements on my Quad. This works extremely well, and was simple to build. I then realised that remote switching for all of my antennae would have a number of advantages.

1. A large reduction in the number coax "runs" from the shack to the various antenna locations, thereby making a considerable saving in cost, and complexity, of switching antennae from the shack.
2. A few runs of expensive, high quality "hard line" coax to the main antenna switching points outside the shack, is CHEAPER than running seperate runs of RG213 or similar, to each individual antenna all the way from the shack.
3. If an electrical storm heads in your direction, it is comparatively easy to unplug two or three coax lines and control cables and throw them on the lawn before you hide under your bed..!!! Also, all unused antennae have their coax feeds shorted to ground at the remote switch boxes.
4. It is easier to experiment with new, or temporary antennae, as you can hook into a spare point at a remote switch, rather than run a temporary coax all the way back to the shack...And of course, "temporary" set-ups have a nasty habit of becoming permanent "eyesores"...
5. There is an overall reduction in general"clutter" in the shack, making operating easier, and perhaps even earning the coveted "XYL seal of approval"...

There are two disadvantages to "Remote Switching"

1. The cost of the switches....Negligible, if you build them yourself.... We're Experimenters....Right???
2. If you lose your electrical supply to your home, in a storm, or for other reasons, you have no control of your antenna selection.

As regards the second scenario, I have always made a point of having an emergency supply available. I have a standby 3KVA generator, and also a bank of four large 12V automobile batteries wired in parallel. All my remote switches use 24V DC relays, so I series a small 12V battery with the other four to give me my emergency 24v supply. I have no preference for 24V relays over 12V relays... I use 24V relays, purely because I have a good supply of high quality relays which just happen to be 24V...



If you have a small antenna setup, with perhaps a tribander, and a Zepp, or trapped vertical for the lower bands, then remote switching is not really any advantage. If on the other hand, you're one of the lucky ones, and have lots of space for lots of antennae, then you should probably take a look to see if it can be of advantage in your situation.

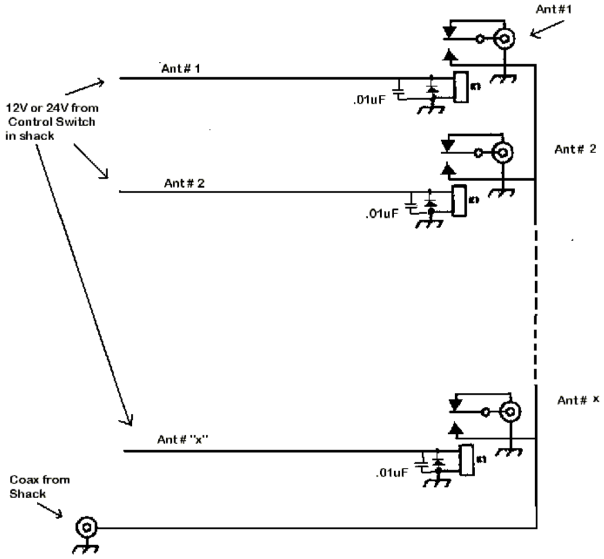
In my own case, (I'm one of the lucky ones) I live in the country, on the coast, and my site is approximately 1/2 an acre. I have permission from my farmer neighbours to erect whatever antennae I like, in the surrounding fields, so long as I do NOT interfere with the agricultural activities in any way whatsoever. I have erected four large (45-60ft) timber poles at various locations on the boundaries of surrounding fields. I have a 55ft tower at the back of the house, and a couple of verticals in another corner of the garden. I have a 4insOD plastic conduit running underground from the shack to the tower...120ft. Another conduit to the Verticals about 80ft. But the run to the 60ft pole in the field is 900ft...Yes ...nine hundred feet..

I run three coax lines to these locations, and have one or more remote switches at these three antenna sites. For instance, at the tower, one coax line feeds the eight bands on the Quad (40M thru' 6M) and a sloper..Nine antennae...One coax...one control line.

Simple Remote Switch..

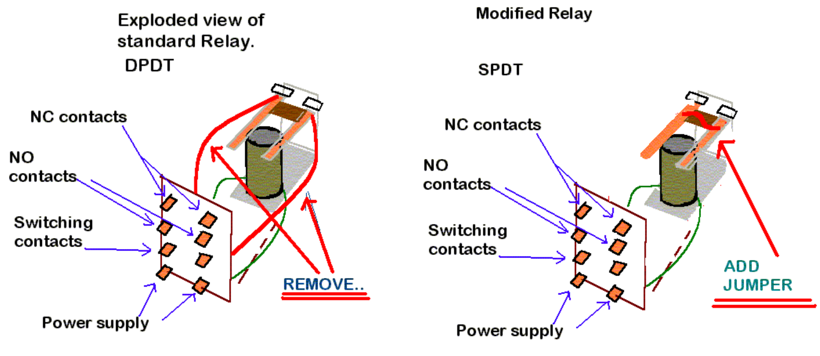
The switch consists of two units, the control switch in the shack, and the relay box at the remote end. The Control Box consists of a small Power Supply providing 12V or 24V DC to suit whatever relays you are using. The " + " of the DC supply is connected to the input of a rotary switch, and the output tags of your switch are wired to a terminal strip mounted on the back of the box. A multi-core cable is then run from the terminal strip to the Remote Relay Box at the antenna site.

(Diagram of Remote Relay Box.. All unused antenna outputs are grounded)



Most of the surplus relays that I come across are encased in a clear plastic cover, and have " OCTAL" bases. Others have flat metal "pins".Anything that can handle about 240V AC, at about 10Amps, should be adequate for powers of up to 1.5kW of RF. (switching 50 Ohm coax).

You can use these "as is", soldering the wiring direct to the pins on the bases of the relays. I prefer to modify my relays, because the long connecting wires from the base to the switching contacts, are usually pressing against the relay bobbins. This must induce RF into the bobbins, and probably introduce a bit of distruption to our 50 Ohm line. I remove the bases and plastic covers. I also remove the "flying leads", and solder a jumper between the two relay switching "leafs". This shortens the RF path through the relay,and reduces any extraneous coupling. Hopefully the drawing below will be adequate explanation of the modification...



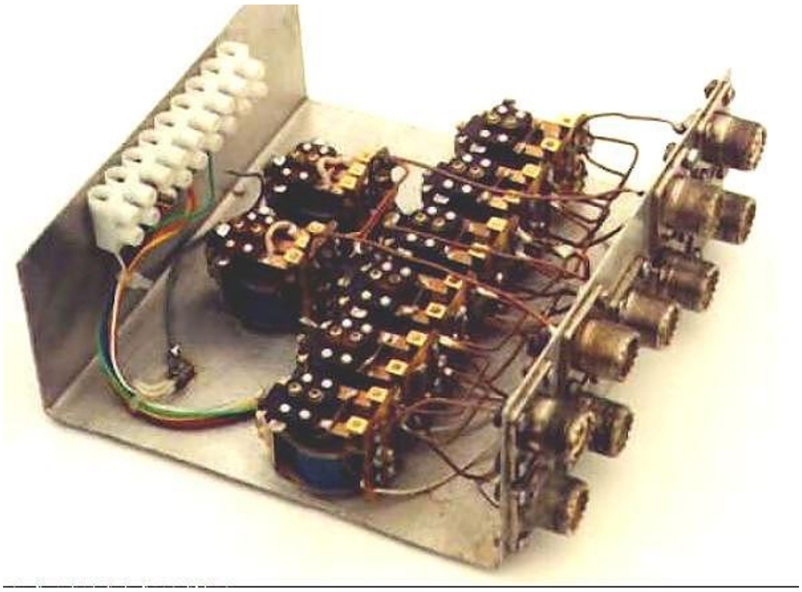
NC = Normally closed

NO = Normally open

DPDT = Double pole double throw

SPDT = Single pole double throw

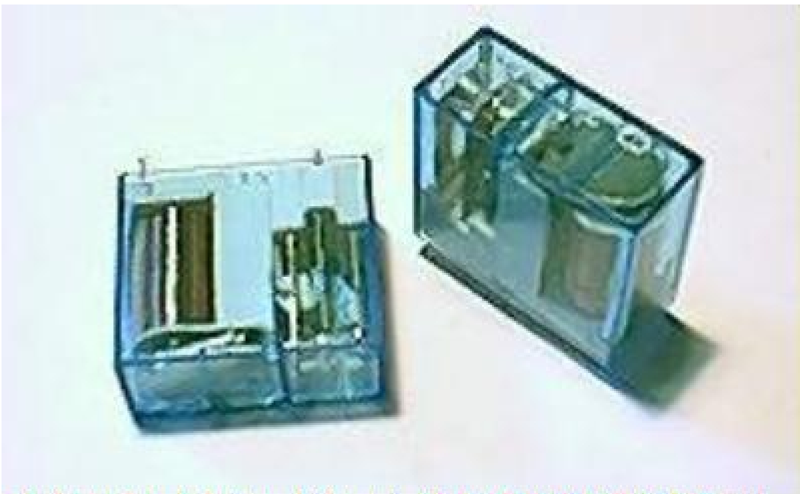
(Pic of remote relay switch box, with modified relays)



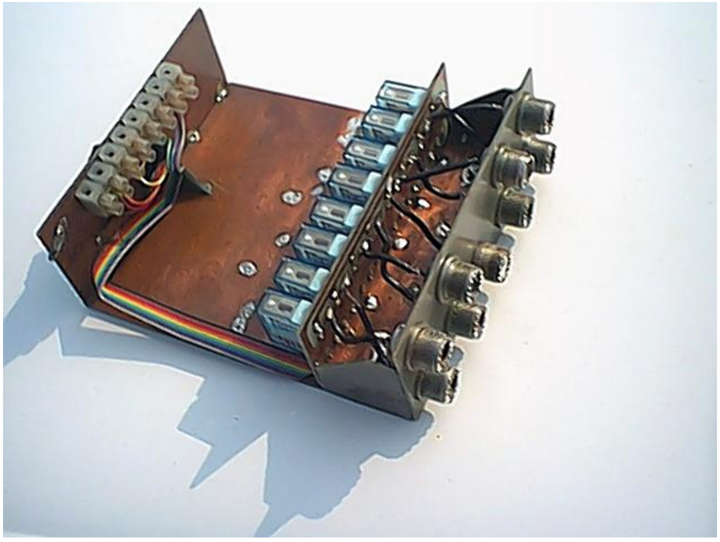
The MK2 Switch Box

Recently, I got some really nice new modern PCB mounting relays. They are quite small and tidy, but the bobbins are well away from the contacts. The Contacts are silverplated, and are rated to handle about 2kW at 240v AC. The use of a PCB, really tidies up the wiring., and minimises anomolies in the RF path... See pics below... The local contest station EI7M, recently used this switch in "battle conditions", and hopelessly failed to do any damage to it....C'mon guys... You're not TRYING!!!!

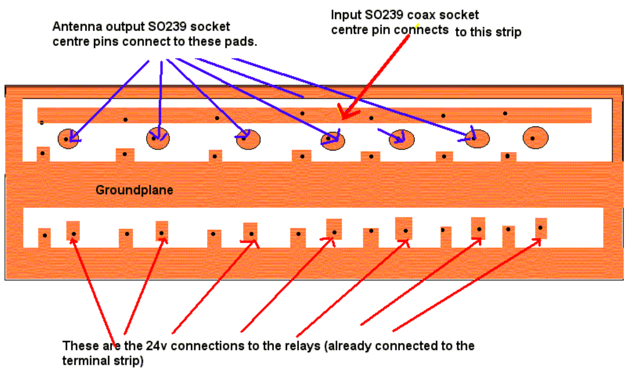
(FINDER type 40.31 S . PCB mounting 24V relay. They measure 1ins high by 1ins long by 1/2ins wide..approx)

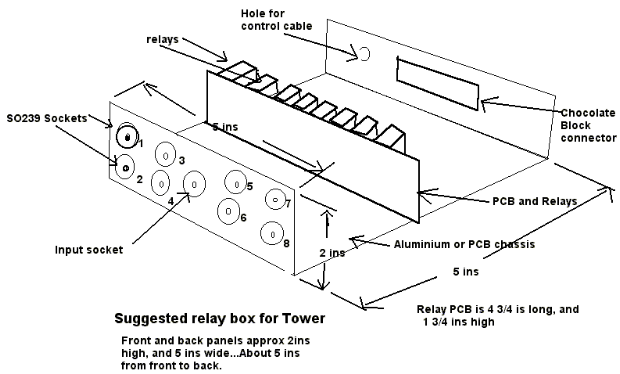


(Pic of relay box using PCB mounted relays, and PCB board chassis)



(Rough drawing of PCB layout)





EI7BA 14/10/99

HANDIMAN'S GUIDE TO
SOLAR ACTIVITY & HF PROPAGATION FOR THE QRPer

by Paul Harden, NA5N (na5n@zianet.com)
Very Large Array (VLA) Radio Telescope
Socorro, New Mexico USA

USEFUL LINKS:

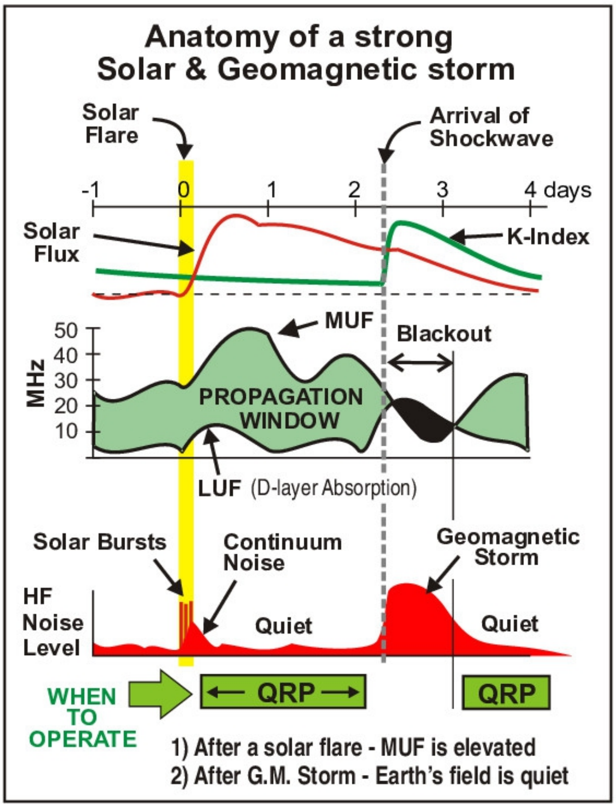
www.sec.noaa.gov/today.html
Official Space Environment Center current "Space Weather" from NOAA. Also check:
www.spaceweather.com

www.dxlc.com/solar
Graphical display of solar flux, sunspots and A-index by Jan Alvestad, SOHO images, and other very useful information.

http://umtof.umd.edu/pm/
Solar wind data (speed and density) from proton monitor on SOHO satellite.

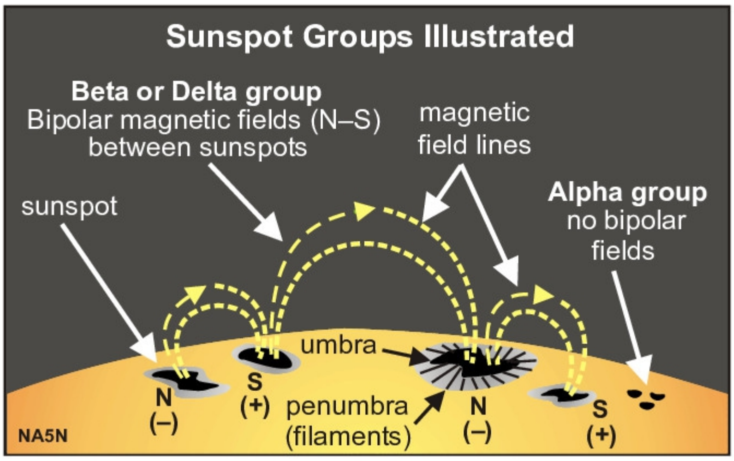
www.spacew.com/www/realtime.php
Near real-time MUF (max. usable freq.) map

www.drao-ofr.hia-iha.nrc-cnrc.gc.ca/icarus/www/current_flux.shtml
Current solar flux from the "horses mouth" - Pentictin



Classifications of Sunspots/Active Regions

Sunspot Class	Description of the Active Region	Potential for Solar Flare Activity
ALPHA	Unorganized, unipolar magnetic fields	Little threat, but watched for further growth
BETA	Bipolar magnetic fields between sunspots	C class flares and possible M class flares
DELTA	Strong, compact bipolar fields between sunspots	High potential for large M or X class flares



Geomagnetic Indices & Conditions

	K Index	Ap Index	Geomagnetic Conditions	HF Noise	Aurora
NORMAL	0	0–2	Very Quiet	S1–S2	None
	1	3–5	Quiet	S1–S2	None
	2	6–9	Quiet	S1–S2	Very low
	3	12–19	Unsettled	S2–S3	Very low
	4	22–32	Active	S2–S3	Low
STORM	5	39–56	MINOR storm	S4–S6	High
	6	67–94	MAJOR storm	S6–S9	Very high
	7	111–154	SEVERE storm	S9+	Very high
	8	179–236	SEVERE STORM	Blackout	Extreme
	9	300–400	EXTREME storm	Blackout	Extreme

Equivalent Planetary A-Index (Ap)
Geomagnetic conditions *yesterday*

For *current* 3-hour conditions, use K-index

Solar Flare Classifications

Flare Class	Type of Flare	HF Radio Effects (30M to 10M)	Geomagnetic storm (<20M)
A	Very small	None	None
B	Small	None	None
C	Moderate	Low absorption	† Active to Minor
M	Large	High absorption	† Minor to Major
X	Extreme	Possible blackout	† Major to Severe

† Conditions cited only if Earth is in the trajectory of the flare's shockwave.

YOUR COMMITTEE

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