HAM-MAG

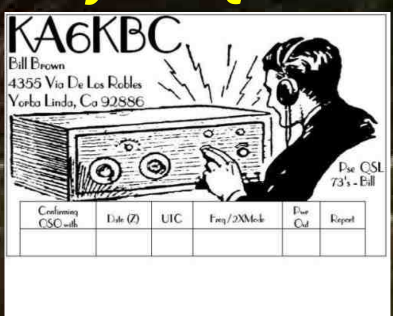
F5SLD's Free HAM Magazine - 100% HAM RADIO

November 2009

[N.10]

NOISE MEASUREMENT

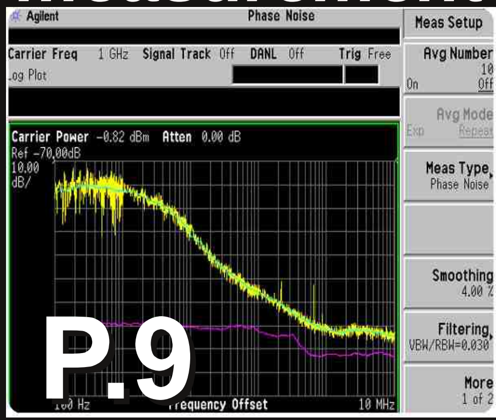
Make your QSL card



MF & HF Antenna

TABLE OF CONTENTS

The Noise, measurement



POST-IT !

The breaking News

Four Radio Amateurs Killed in Plane Crash En Route to CQWW Phone Contest (Oct 21, 2009 [REVISED Oct 22, 2009 11:05 ET]) -- Just after take-off -- around 6:30 AM on Wednesday, October 21 -- a twin-engine plane carrying four Amateur Radio operators crashed into the woods, only 250 yards off the end of the runway in Jedburg, South Carolina, about 20 miles northwest of Charleston. The plane -- piloted and owned by Peter Radding, W2GJ -- carried Ed Steeble, K3IXD, Dallas Carter, W3PP, and Randy Hargenrader, K4QO. The four men were on their way to the Bahamas to operate in this weekend's CQ World Wide Phone Contest as C6APR, competing in the Multi/2 category. (Tnx ARRL)

GB7OK D-Star gateway is now live

The long awaited D-Star gateway for GB7OK is now live.

I would like to thank all who have assisted me with this project - Darren Storer G7LWT from the UK D-Star Interconnect Team for installing G2 Software and spending many days commissioning the gateway, also technical support of Justin Johnson G0KSC installing and configuring Centos operating system on the server.

Also not forgetting Martin Maynard G8CIX for contacting me in the first place to use GB7OK for Amateur Radio Station live from the Plinth in Trafalgar Square, (One & Other Live Artwork) which gave me the push to continue with this long-awaited project and the support I received from Ian Lockyer M3INL (Marketing Manager Icom UK).

Tony, G1HIG

Sunspot 1029 puts on a show

Since it emerged last weekend, new-cycle sunspot 1029 has become the biggest and most active sunspot of 2009. It is crackling with B- and C-class solar flares and putting on a good show for amateur astronomers.

This one sunspot does not put an end to solar minimum, but it is a remarkable break from the calm. Check : htttp://spaceweather.com for images and updates

Keep tabs on ISS with an iPhone

A report on The Register describes new software for the iPhone/iPod Touch that provides real time tracking of the International Space Station

The report says that on Friday NASA released an iPhone/iPod Touch application that delivers up-to-the-minute Agency news, videos, and other scienc-tastic content from the convenience of your Apple device.

Read the full The Register report at

http://www.theregister.co.uk/2009/10/23/nasa_iphone_app/

D-I-Y PATCH BOX
by Peter ZS2ABF

A practical Patch Box that works. The Patch box can be used to relay audio from one radio to another without having to use the microphone held next to a loudspeaker.
I used an old Midland CB radio mike. This allows me to break in and talk or switch off the relayed signal and just talk without having to changer plugs etc. The VU meter monitors the Audio into the output part of the circuit, at the output of the step down transformer.

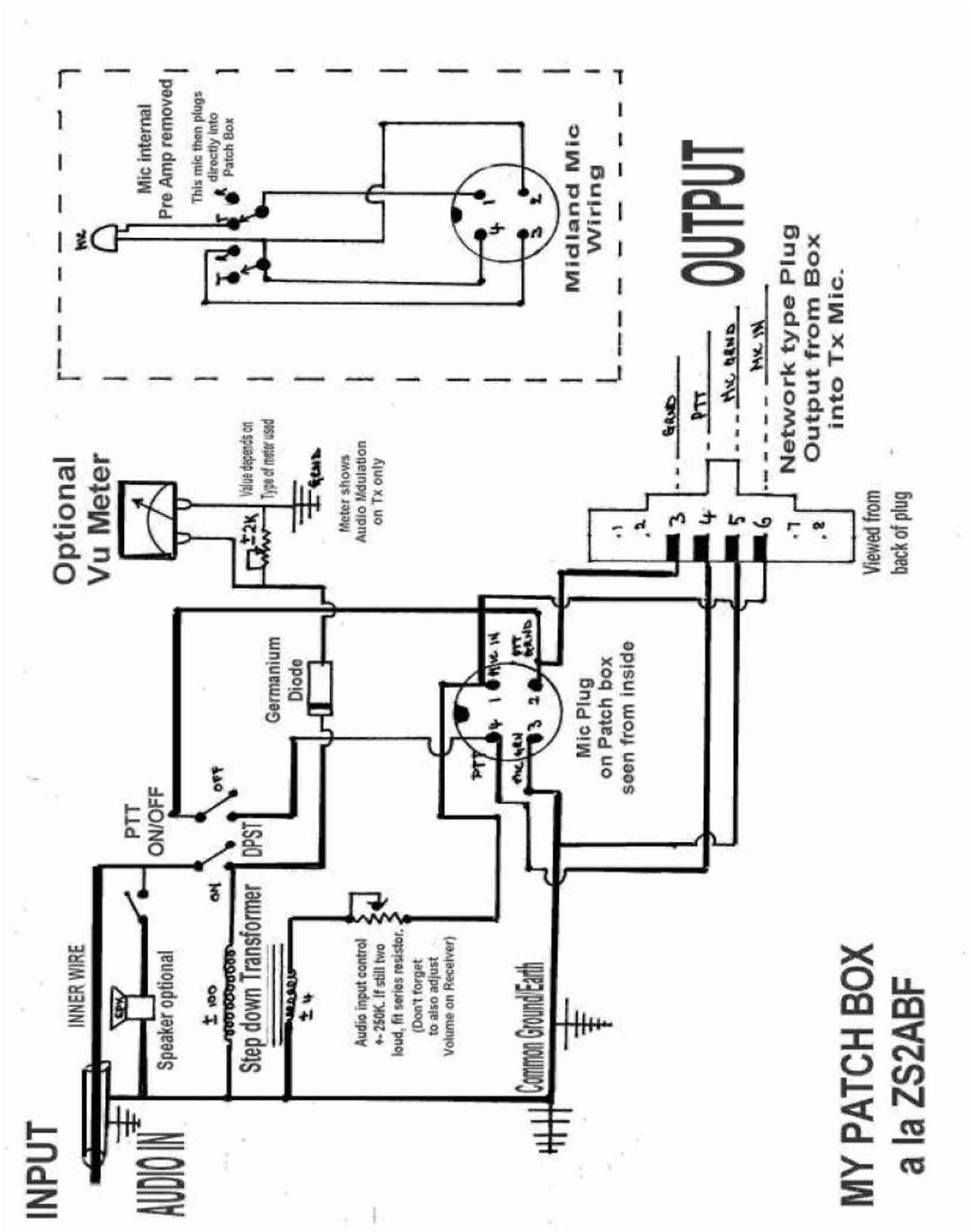
If you are recording sounds from a radio in a computer and you do not have enough audio output from this box, then just reverse the step down transformer. The position shown works ok for my set up. The meter, diode and, potty circuit are not necessary, but can be added as a “Brag” feature.
I am using this output into a Kenwood which has the Network type mic socket. You may have to modify the output cable to attach a plug of the type to suit your personal equipment.

The two variable potties are shown with a + - value and can be substituted for another suitable value that works for you. It’s a nice easy to build project, and can be a useful gadget to have in your Shack.

73’s ZS2ABF

Photo of the finished BOX

CIRCUIT DIAGRAM – Patch box circuit



HomeBrew - QSL Cards
By KA6KBC, Bill

I remember as a young amateur the excitement of going to the mailbox and finding a QSL card from an earlier QSO. This is what it's all about. It reinforces the personal aspect of the hobby. I encourage you to experiment with your photography and desktop publishing techniques to produce QSL cards you are proud of. A QSL card is a specially designed postcard that hams exchange in the mail whenever they make contact with one another for the first time. Hams exchange cards in friendship and to prove that they actually made radio contact.

Each ham’s QSL card has a unique design that may include words and pictures about his or her family, friends, and places that are special to them. The cards also include information about the ham’s call sign, radio contact equipment, date, time and type of contact, and geographic location of the ham. One of the best things about being a ham radio operator is the chance to talk to people on the other side of town, the other side of the state or even the other side of the planet that you wouldn't have otherwise met. Ham radio operators traditionally exchange QSL cards through the mail to confirm that mutual contact has occurred. A custom QSL card is truly a collector's item for the people you contact. Fortunately, with a little help from your computer and printer, they're easy and fun to make.

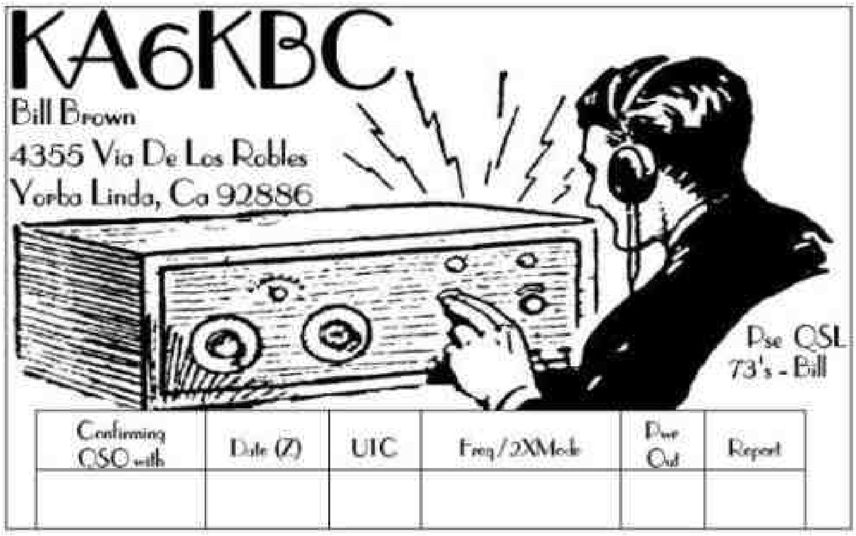
How to Make a Custom QSL Card:

From your PC:

There is nice software that can be down loaded – QSL Maker, developed by WB8RCR let’s you design and print your own QSL cards, allowing to personalize background, by importing pictures or just filling with a plain color, and let’s you personalize headings and address as well as your own callsign. It can import ADIF log file for fields auto-filling during the print process, or allow you to insert directly QSO Data into a table. It runs on Windows, I've tested it on Windows XP, and is completely Free ! Works great. You can make a very custom QSL Cards.

http://qslmaker.mi-nts.org/

Sample Card:

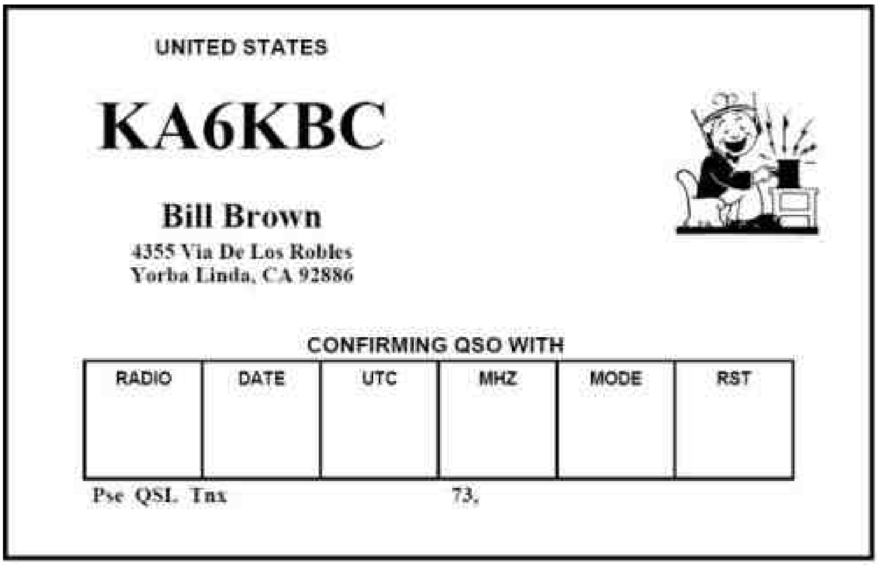


On-Line Only:

The website RadioQTH offers a very nice service. You can use this web page to create QSL cards. You don't even need to get a login to use the service. The cards will be created in the form of a PDF document that you can then print on light-weight card stock. The individual cards can then be cut out and the information filled in and mailed to the intended recipient. You have the option of printing a single QSL card or printing up to four cards per page. The cards are printed 5.5 inches wide by 3.5 inches high. This is a standard size for a QSL card. It allows you to personalize background, by importing pictures and you can also do some color selection. Less custom, but very easy to use and nothing to download.

http://www.radioqth.net/qsl.aspx

Sample:



73's – Bill – KA6KBC
http://billbrwn.tripod.com/id23.html

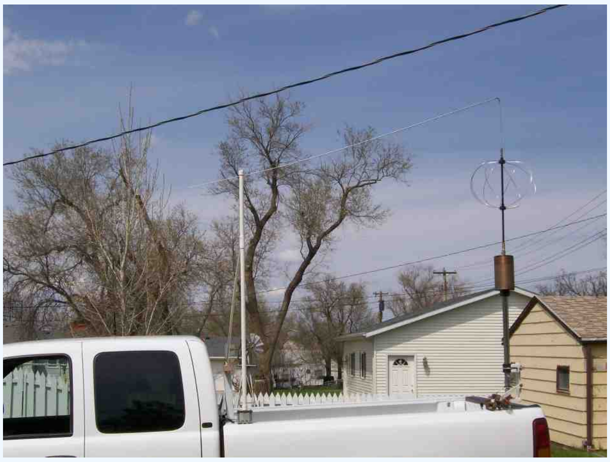
Note from F5SLD.
You can also have you QSL on line (with your log) in the website :
http://www.eqsl.cc/qslcard/Index.cfm

Sample :

NO SPACE LEFT ? TRY A MOBILE STATION BY K0HL

Hello,

I have a modest ham radio station installed in my pickup truck, you and your readers may find it interesting. My intention is to supply you some raw material; if you feel the material has merit for your magazine, feel free to ask for more information. I am supplying you essentially teaser pictures, you may use them in any way you desire. I can supply better photos if you need them.



This is not meant to be a step by step article on how to do a mobile installation. I will be very brief, if you want more, you will have to ask?

Background information:

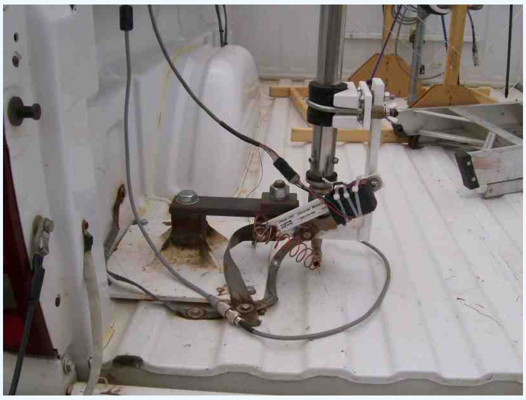
My QTH is not amenable to installing a base station. If I am to participate in ham radio then it has to be from my mobile.

Installing a ham radio station in a mobile is not an endeavor for the faint of heart. There are many difficulties along the road to having a good working EFFECTIVE ham radio station in a mobile. I do not want to discourage anyone from trying this, but, go in with both eyes open, and expect this to be moderately costly.

Difficulties you should expect:

1) Getting adequate 12 DC through the firewall of your vehicle, firewalls are crowded to the extreme, the surfaces available are either at an acute angle and hard to drill, or access is blocked. One of the key ingredients in a good EFFECTIVE mobile ham radio station is an adequate supply of DC.

2) Mounting you antenna: Ground losses are your biggest problem. If you mount your antenna properly, your ground losses will be low and your signal will be large. It's your choice, mount your antenna in the proper location, or suffer the loss of performance that is a certainty with a poor location. Physically mounting the antenna to withstand a driving speed of 80 MPH into a 25 MPH headwind, along with the normal pitching and heaving of the vehicle as it traverses the roadway is a serious problem. You need a strong mount. NO MAG MOUNTS! If you cannot bring yourself to drill holes in your vehicle, give up now - take up playing cards.



3) Common mode (CM): The nemesis of mobile installations. Plan on having CM, ferrite beads and lots of them. Do not spare the beads.

4) Noise: Electronic nose of a dozen varieties will test your patience to the limit. EXPECT IT, expect it to be very hard to eliminate.

There, that is my teaser.

73, K0HL

NOISE: Measurement and Generation
By Paul Wade N1BWT

Introduction

As anyone who has listened to a receiver suspects, everything in the universe generates noise. In communications, the goal is to maximize the desired signal in relation to the undesired noise we hear. In order to accomplish this goal, it would be helpful to understand where noise originates, how much our own receiver adds to the noise we hear, and how to minimize it.
It is difficult to improve something unless we are able to measure it. Measurement of noise in receivers does not seem to be clearly understood by many amateurs, so I will attempt to explain the concepts and clarify the techniques, and to descrive the standard “measure of merit” for receiver noise performance: “noise figure.” Most important, I will describe how to build your own noise generator for noise figure measurements. A number of equations are included, but only a few need be used to perform noise figure measurements. The rest are included to as an aid to understanding, with, I hope, enough explanatory text for everyone.

Noise

The most pervasive source of noise is thermal noise, due to the motion of thermally agitated free electrons in a conductor. Since everything in the universe is at some temperature above absolute zero, every conductor must generate noise. Every resistor (and all conductors have resistance) generates an rms noise voltage:

$$e = \sqrt{4kTRB}$$

Where R is the resistance, T is the absolute temperature in degrees ***K***, B is the bandwidth in Hertz, and k is Boltzmann’s constant, 1.38 x 10-23 joules / ***K***.
Converting to power, e^2/R , and adjusting for the Gaussian distribution of noise voltage, the noise power generated by the resistor is:

$$P_n = kTB \text{ (watts)}$$

Which is independent of the resistance. Thus, all resistors at the same temperature generate the same noise power. The noise is white noise, meaning that the power density does not vary with frequency, but always has a power density of kT watts/Hz. More important is that the noise power is directly proportional to absolute temperature T, since k is a constant. At the nominal ambient temperature of 290 ***K***, we can calculate this power; converted to dBm, we get the familiar -174 dBm/Hz. Just multiply by the bandwidth in Hertz to get the available noise power at ambient temperature. The choice of 290 ***K*** for ambient might seem a bit cool, since the equivalent 17° C or 62° F would be a rather cool room temperature, but 290 makes all the calculations come out to even numbers.
The instantaneous noise voltage has a Gaussian distribution around the rms value. The gaussian distribution has no limit on the peak amplitude, so at any instant the noise voltage may have any value from -infinity to +infinity. For design purposes, we can use a value that will not be exceeded more than 0.01% of the time. This voltage is 4 times the rms value, or 12 dB higher, so our system must be able to handle peak powers 12 dB higher than the average noise power 1 to if we are to measure noise without errors.

Signal to Noise Ratio

Now that we know the noise power in a given bandwidth, we can easily calculate how much signal is required to achieve a desired signal to noise ratio, S/N. For SSB, perhaps 10 dB S/N is required for good communications; since ambient thermal noise in a 2.5 KHz bandwidth is -140 dBm, calculated as follows:

P_n = kTB = 1.38 x 10^{-23} x 290 x 2500 = 1.0 x 10^{-17} watts
dBm = 10log (P_n x 1000) [multiplying the power by 1000 to get milliwatts]

The signal power must be 10 dB larger, so minimum signal level of -130 dBm is required for a 10 dB S/N. This represents the noise and signal power levels at the antenna. We are then faced with the task of amplifying the signal without degrading the signal to noise ratio.

Noise Temperature

Any amplifier will add additional noise. The input noise Ni per unit bandwidth is kT_g is amplified by gain G to produce an output noise of kT_gG. The additional noise, kTn is added to produce a total noise output power No:
$No = kTgG + kT_n$
To simplify future calculations, we pretend that the amplifier is noise-free but has an additional noise generating resistor of temperature Te at the input, so that all sources of noise are inputs to the amplifier. Then the output noise is:
No = kG (T_g + T_e)
And Te is the Noise Temperature of the excess noise contributed by the amplifier. The noise added by an amplifier is then kGT_e, which is the fictitious noise source at the input amplified by the amplifier gain.

Cascaded Amplifiers

If several amplifiers are cascaded, the output noise No of each becomes the input noise Tg to the next stage, we can create a large equation for the total. After removing the original input noise term, we are left with the added noise:

Nadded = (k T_e1G1G2... GN) + (kT_e2G2... GN) + ... + (kT_eNGN)
Substituting in the total gain GT = (G1G2... GN) results in the total excess noise:
$T_eT = T_e1 + T_e2 /G1 + T_e2 /G1G2 + ... + T_eN /(G1G2... GN-1)$

With the noise of each succeeding stage reduced by the gain of all preceeding stages.
Clearly, if the gain of the first stage, G1, is large, then the noise contributions of the succeeding stages are not significant. This is why we concentrate our efforts on improving the first amplifier or preamplifier.

Noise Figure

The noise figure of an amplifier is the logarithm of the ratio (so we can express it in dB) of the total noise output of an amplifier with an input T_g of 290 ***K*** to the noise output of an equivalent noise-free amplifier. A more useful definition is to calculate it from the excess temperature T_e:
NF = 10log(1 + T_e /T_0) (dB) @ T_0 = 290 ***K***
If the NF is known, then Te may be calculated after converting the NF to a ratio, F:
T_e = (F -1) T_0
Typically, Te is specified for very low noise amplifiers, where the NF would be fraction of a dB, and NF is used when it seems a more manageable number than thousands of ***K***.

We know that any loss or attenuation in a system reduces the signal level. If attenuation also reduced the noise level, then we could suppress thermal noise by adding attenuation. We know intuitively that this can't be true. The answer is that the attenuator or any lossy element has a physical temperature, Tx, which contributes noise to the system while the input noise is being attenuated. The output noise after a loss L (ratio) is:

$T_{g'} = T_g /L + [(L-1)/L]\ Tx$

If the source temperature Tg is higher than the attenuator temperature Tx , then the noise contribution is the familiar result found by simply adding the loss in dB to the NF. However, for low source temperatures the degradation can be much more dramatic. If we do a calculation for the affect of 1 dB of loss (L = 1.26) on a T_g of 25 K:

$T_{g'} = 25/1.26 + (0.26/1.26) \times 290 = 80$ K

The resultant $T_{g'}$ is 80 K, a 5 dB increase in noise power (or 5 dB degradation of signal to noise ratio). Since noise power = kT and k is a constant, the increase is the ratio of the two temperatures 80/25, or in dB, 10log(80/25) = 5 dB.

Antenna Temperature

How can we have a source temperature much lower than ambient? If an antenna, assumed to be lossless, is receiving signals from space, rather than the warm earth, then the background noise is much lower. The background temperature of the universe has been measured as about 3.2 K. An empirical number 2 for a 10 GHz antenna pointing into clear sky is about 6 K, since we must always look through attenuation and temperature of the atmosphere. The figure will vary with frequency, but a good EME antenna might have a T_g of around 20 K at UHF and higher frequencies.

A couple of examples of actual antennas3 might bring all of this together.

1. A 30 inch conventional dish at 10 GHz, with measured gain of 36.4 dBi and efficiency of 64%. The estimated spillover efficiency is 87% for a 10 dB illumination taper. With the dish pointing at a high elevation as shown in Figure 1, perhaps half of the spillover is illuminating earth at 290 K, which adds an estimated 19 K to the 6 K of sky noise, for a total of 25 K. In a 500 Hz bandwidth, the noise output is -157.6 dBm.

2. An 18 inch DSS offset-fed dish at 10 GHz, with measured gain of 32.0 dB and efficiency of 63%. The spillover efficiency should be comparable, but with the offset dish pointing at a high elevation as shown in Figure 2, far less of the spillover is illuminating warm earth. If we estimate 20%, then 8 K is added to the 6 K of sky noise, for a total of 14 K. In a 500 Hz bandwidth, the noise output is -160 dBm.

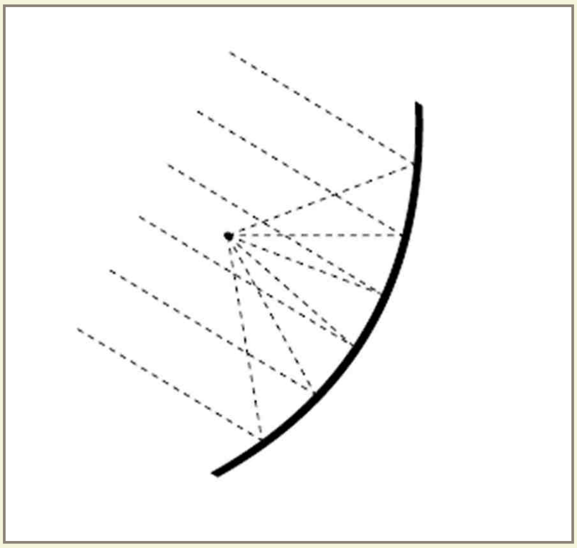


Fig.1. Parabolic Dish Antenna Aimed at Satellite

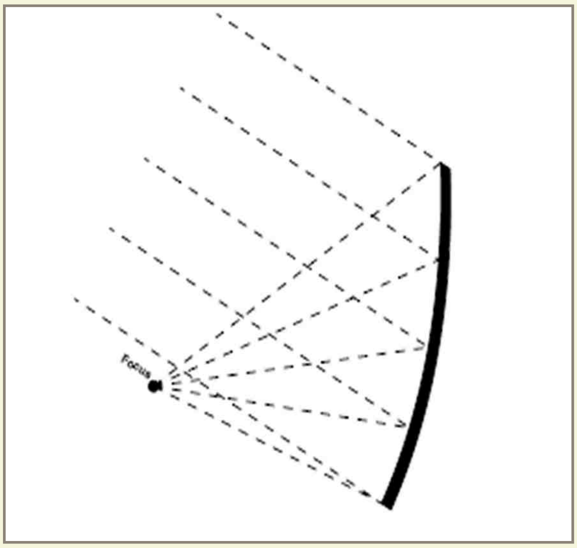


Fig.2. Offset Parabolic Dish Antenna Aimed at Satellite

The larger conventional dish has 2.4 dB higher noise output, but 4.4 dB higher gain, so it should have 2.0 dB better signal to noise ratio than the smaller offset dish when both are pointing at high elevations. However, the while the offset dish is easy to feed with low loss, it is convenient to feed the conventional dish through a cable with 1 dB of loss. Referring back to our loss example above, the noise temperature after this cable loss is 80 K. In a 500 Hz bandwidth, the noise output is now -152.6 dBm, 7.4 dB worse than the offset dish. The convenience of the cable reduces the signal to noise ratio by 5 dB, making the larger conventional dish 3 dB worse than the smaller offset dish. Is it any wonder that the DSS dishes sprouting on rooftops everywhere are offset-fed?

If the dishes are pointed on the horizon for terrestrial operation, then the situation is much different. At least half of each antenna pattern is illuminating warm earth, so we should expect the noise temperature to be at least half of 290 K, or about 150 K. Adding 1 dB of loss increases the noise temperature to 179 K, a 1 dB increase. At the higher noise temperatures, losses do not have a dramatic effect on signal to noise ratio. In practice, the antenna temperature on the horizon may be even higher, since the upper half of the pattern must take a much longer path through the warm atmosphere, which adds noise just like any other loss.

Image Response

Most receiving systems use at least one frequency converting mixer which has two responses, the desired frequency and an image frequency on the other side of the local oscillator. If the image response is not filtered out, it will add additional noise to the mixer output. Since most preamps are broadband enough to have significant gain (and thus, noise output) at the image frequency, the filter must be placed between the preamp and the mixer. The total NF including image response is calculated:

$NF = 10\log[(1 + T_e /T_0)(1 + G_{image}/G_{desired})]$

assuming equal noise bandwidth for desired and image responses. Without any filtering,

$G_{image} = G_{desired}$ so $G_{image}/G_{desired} = 1$

Doubling the noise figure which is the same as adding 3 dB. Thus, without any image rejection, the overall noise figure is at least 3 dB regardless of the NF of the preamp. For the image to add less than 0.1 dB to the overall NF, a quick calculation shows that the gain at the image frequency must be at least 16 dB lower than at the operating frequency.

Noise Figure Measurement

So far we have dixcussed the sources of noise, and a figure of for evaluating the a receiving system's response to noise. How can we measure an actual receiver?

The noise figure of a receiver is determined by measuring its output with two different noise levels, Thot and Tcold, applied at the input. The ratio of the two output levels is referred to as the "***Y-factor***". Usually, the ratio is determined from the difference in dB between the two output levels,

Ydb: $Y_{(ratio)} = \log^{-1}(Ydb / 10)$

Then the receiver Te may be calculated using $Y_{(ratio)}$:

$Te = (T_{hot} - YT_{cold}) / (Y-1)$

and converted to noise figure:

$NF = 10\log (1 + T_e /T_0)$ (dB) where $T_0 = 290$ K

The two different noise levels may be generated separately, for instance by connecting resistors at two different temperatures. Alternatively, we could use a device that can generate a calibrated amount of noise when it is turned on. When such a device is turned off, it still generates noise from its internal resistance at T_{cold}, the ambient temperature (290 K); usually this resistance is 50 ohms, to properly terminate the transmission line which connects it to the receiver.When the noise generator is turned on, it produces excess noise equivalent to a resistor at some higher temperature at Thot.

The noise produced by a noise source may be specified as the Excess Noise Ratio (ENR_{dB}), the dB difference between the cold and the equivalent hot temperature, or as the equivalent temperature of the excess noise, Tex, which is used in place of Thot in the previous equation. If the ENR is specified, then the calculation is:

$NF_{dB} = ENR_{dB} - 10\log(Y_{(ratio)} - 1)$

The terms Tex and ENR are used rather loosely; assume that a noise source specified in dB refers to ENR_{dB}, while a specification in degrees or K refers to Tex.

An automatic noise figure meter, sometimes called a PANFI (for Precision Automatic Noise Figure Meter), turns the noise source on and off at a rate of about 400 Hz and performs the above calculation electronically. A wide bandwidth is required to detect enough noise to operate at this rate; a manual measurement using a narrowband communications receiver would require the switching rate to be less than one Hz, with some kind of electronic integration to properly average the gaussian noise.

Noise figure meters seem to be fairly common surplus items. The only one in current production, the HP 8970, measures both noise figure and gain, but commands a stiff price.

AIL (later AILTECH or Eaton) made several models; the model 2075 measures both NF and gain, while other models are NF only. The model 75 (a whole series whose model numbers start with 75) shows up frequently for anywhere from $7 to $400, typically $25 to $50 and performs well. Every VHFer I know has one, with most of them waiting for a noise source to be usable. Earlier tube models, like the AIL 74 and the HP 340 and 342, have problems with drift and heat, but they can also do the job.

Another alternative is to build a noise figure meter5.

Using the Noise Figure Meter

I'll describe the basic procedure using the Model 75; others are similar, but the more complex instruments will require studying the instruction manual. Input to almost all noise figure meters is at 30 MHz, so a frequency converter is required (some instruments have internal frequency converters; except for the HP 8970, I'd avoid using this feature). Most ham converters with a 28 MHz IF work fine, unless the preamp being measured is so narrowband that a MHz or two changes the NF. The input is fairly broadband, so LO leakage or any other stray signals can upset the measurement ¾ this has been a source of frustration for many users. There are two solutions: a filter (30 MHz low-pass TVI filters are often sufficient) or a tuned amplifier at 30 MHz. Since a fair amount of gain is required in front of the noise figure meter, an amplifier is usually required anyway.

A noise source (which we will discuss in detail later) is connected to the rear of the instrument: a BNC connector marked “DIODE GATE” provides +28 volts for a solidstate noise source, and high voltage leads for a gas tube noise source are also available on many versions. The noise figure meter switches the noise source on and off. The noise output coax connector of the noise source is connected to the receiver input. The model 75 has four function pushbuttons: OFF, ON, AUTO, and CAL. The OFF and ON positions are for manual measurements: OFF displays the detector output with the noise source turned off, and ON displays the detector output with the noise source turned on. If all is working, there should be more output in the ON position, and a step attenuator in the IF line may be used to determine the change in output, or Y-factor, to sanity-check our results. The knob marked “GAIN” is used to get the meter reading to a desirable part of the scale in the OFF and ON positions only; it has no effect on automatic measurements.

The AUTO position causes the instrument to turn the noise source on and off at about a 400 Hz rate and to calculate the NF from the detected change in noise. The model 75 has a large green light near the meter which indicates that the input level is high enough for proper operation ¾ add gain until the light comes on. Then the meter should indicate a noise figure, but not a meaningful one, since we must first set the ENRdB using the CAL position. The lower scale on the meter is marked for from 14.5 to 16.5 dB of ENR; adjust the “CAL ADJ” knob until the reading in the CAL position matches the ENR of the noise source. If the ENR of your noise source is outside the marked range, read the section below on homebrew noise sources.

Now that we have calibrated the meter for the ENR of the noise source, we may read the noise figure directly in the AUTO position. Before we believe it, a few sanity checks are in order:

1. Manual Y-factor measurement and calculation.

2. Insert a known attenuator between the noise source and preamp ¾ the NF should increase by exactly the attenuation added.

3. Measure something with a known noise figure (known means measured elsewhere; a manufacturers claim is not necessarily enough).

Finally, too much gain in the system may also cause trouble, if the total noise power exceeds the level that an amplifier stage can handle without gain compression. Gain compression will be greater in the on state, so the detected Y-factor will be reduced, resulting in erroneously high indicated NF. The Gaussian distribution of the noise means that an amplifier must be able to handle 12 dB more than the average noise level without compression. One case where this is a problem is with a microwave transverter to a VHF or UHF IF followed by another converter to the 30 MHz noise figure meter, for too much total gain. I always place a step attenuator between the transverter and the converter which adjust until I can both add and subtract attenuation without changing the indicated noise figure.

One final precaution: noise figure meters have a very slow time constant, as long as 10 seconds for some of the older models, to smooth out the random nature of noise. If you are using the noise figure meter to “tweak” a receiver, tune very slowly!

Sky Noise Measurement

Another way to measure noise figure at microwave frequencies is by measurement of sky noise and ground noise3,6. Sky noise is very low, around 6 K at 10 GHz, for instance, and ground noise is due to the ground temperature, around 290 K, so the difference is nearly 290 K. At microwave frequencies we can use a manageable antenna that is sharp enough that almost no ground noise is received, even in sidelobes, when the antenna is pointed at a high elevation. A long horn would be a good antenna choice. The antenna is pointed alternately at clear sky overhead, away from the sun or any obstruction, and at the ground. The difference in noise output is the Y-factor; since we know both noise temperatures, the receiver noise temperature is calculated using the Y(ratio):

$T_e = (T_{hot} - YT_{cold}) / (Y-1)$

The latest version of my microwave antenna program3, HDLANT21, will make this calculation. Since the measured Y-factor will be relatively small, this measurement will only be accurate for relatively low noise figures. On the other hand, they are the most difficult to measure accurately using other techniques. A system for measuring sun noise was described by Charlie, G3WDG7, which also works well for measuring noise figure from sky noise. He built a 144 MHz amplifier with moderate bandwidth using MMICs and helical filters which amplifies the transverter output to drive a surplus RF power meter. The newer solid-state power meters are stable enough to detect and display small changes in noise level, and the response is slow enough to smooth out flicker. Since my 10 GHz system has an IF output at 432 MHz, duplicating Charlie’s amplifier would not work. In the junk box I found some surplus broadband amplifiers and a couple of interdigital filters, and combined these to provide high gain with a few MHz bandwidth, arranged as shown in Figure 3. I found that roughly 60 dB of gain after the transverter was required to get a reasonable level on the power meter, while the G3WDG system has somewhat narrower bandwidth so more gain is required.

Several precautions are necessary:

1. Peak noise power must not exceed the level that any amplifier stage can handle without gain compression. Amplifiers with broadband noise output suffer gain compression at levels lower than found with signals, so be sure the amplifier compression point is at least 12 dB higher than the indicated average noise power.

2. Make sure no stray signals appear within the filter passband.
3. Foliage and other obstructions add thermal noise which obscure the cold sky reading.
4. Low noise amplifiers are typically very sensitive to input mismatch, so the antenna must present a low VSWR to the preamp.

A noise figure meter could also be used as the indicator for the sky noise measurement, but a calibrated attenuator would be needed to determine the Y-factor. Using different equipment gives us an independent check of noise figure, so that we may have more confidence in our measurements.

W2IMU8 suggested that the same technique could be used for a large dish at lower frequencies. With the dish pointing at clear sky, the feedhorn is pointing at the reflector which shields it from the ground noise so it only sees the sky noise. If the feedhorn is then removed and pointed at the ground, it will then see the ground noise. Noise figure meters are convenient, but if you don't have one, the equipment for measuring sun and sky noise could also be used indoors with a noise source. The only complication is that the Y-factor could be much larger, pushing the limits of amplifier and power meter dynamic range.

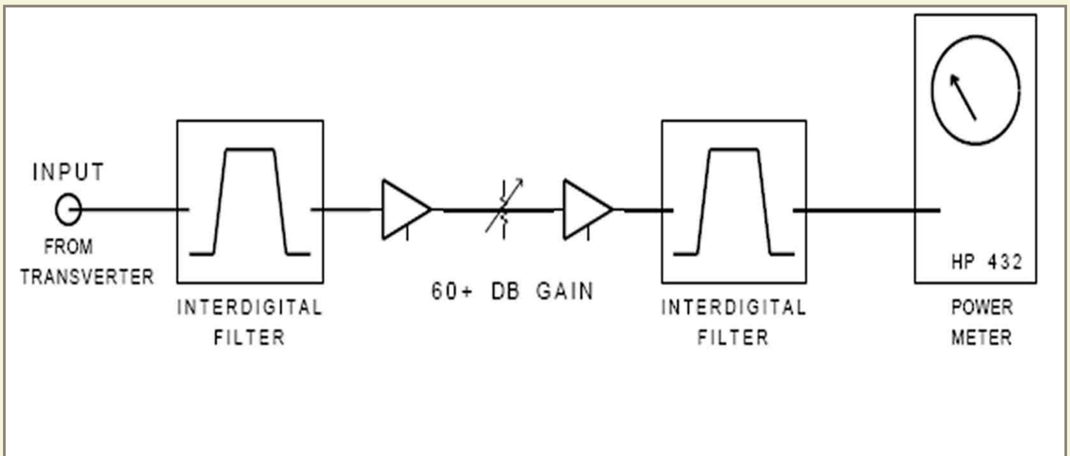


FIGURE 3. INDICATOR FOR SUN NOISE

Noise Sources

The simplest noise source is simply a heated resistor ¾ if we know the temperature of the resistor, we can calculate exactly how much noise it is generating. If we then change the temperature, the noise output will change by a known amount. This would work if we could find a resistor with good RF properties whose value does not change with temperature, an unlikely combination. There are commercial units, called Hot-Cold Noise Sources, with two calibrated resistors at different temperatures with low VSWR. Typically, one resistor is cooled by liquid nitrogen to 77.3 K (the boiling point of nitrogen), while the other is heated by boiling water to 100°C, or 373.2 K. The preamp is connected to first one resistor, then the other; the difference in noise in noise output is the Y-factor. Using the Y(ratio), the preamp noise temperature is calculated:

$T_e = (T_{hot} - YT_{cold}) / (Y-1)$

Since the boiling point of pure liquids is accurately known, this type of noise generator can provide very accurate measurements. However, they are inconvenient to use, since the receiver must be connected directly to alternate resistors (the loss in an RF switch would significantly reduce the noise output and accuracy). Also, few amateurs have a convenient source of liquid nitrogen.

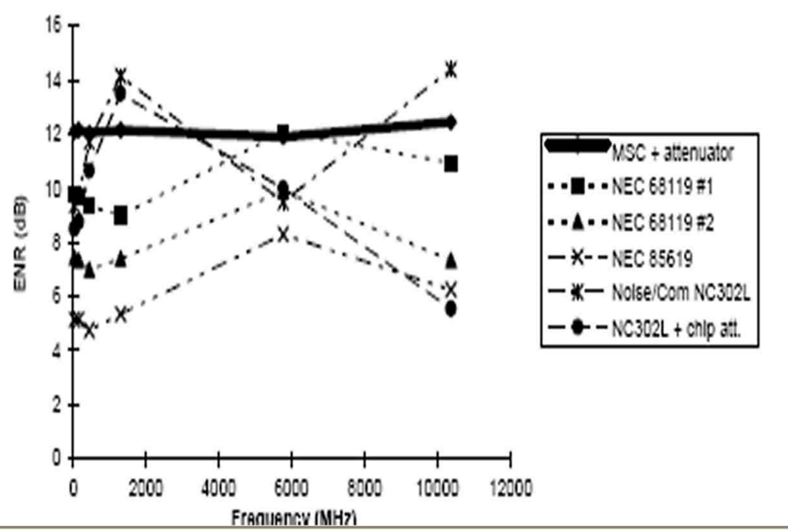
Three types of noise sources are commonly available and convenient to use:

1. Temperature-limited vacuum tube diode. The noise output is controlled by the diode current, but is only accurate up to around 300 MHz due to limitations of the vacuum tube. These units generate around 5 dB of excess noise.
2. Gas tube sources. The noise is generated by an ionized gas in the tube, similar to a fluorescent light ¾ homebrew units have been built using small fluorescent tubes. The noise tubes use a pure gas, typically argon, to control the noise level. These units typically generate about 15 dB of excess noise. Coaxial gas tube sources work up to around 2.5 GHz, and waveguide units to much higher frequencies. One problem using these is that a high voltage pulse is used to start the ionization (like the starter in a fluorescent light) which is coupled to the output in the coaxial units and is large enough to damage low-noise transistors. Since a noise figure meter turns the noise source on and off continuously, pulses are generated at the same rate. Since waveguide acts as a high-pass filter, the starting pulses are not propagated to the output, so waveguide gas-tube noise sources are safe to use, though bulky and inconvenient. However, they could be used to calibrate a solid-state noise source. Another problem with all gas tubes is that the VSWR of the noise source changes between the on and off states. If the source VSWR changes the noise figure of an amplifier, as is almost always the case, then the accuracy of the measurement is reduced.
3. Solid-state noise sources. Reverse breadown of a silicon diode PN junction in causes an avalanche of current in the junction which would rise to destructively high levels if not limited by an external resistance. Since current is “electrons in motion,” a large amount of noise is generated. If the current density of the diode is constant, then the average noise output should also be constant; the instantaneous current is still random with a gaussian distribution, so the generated noise is identical to thermal noise at a high temperature. Commercial units use special diodes designed for avalanche operation with very small capacitance for high frequency operation, but it is possible to make a very good noise source using the emitter-base junction of a small microwave transistor.
Typical noise output from an avalanche noise diode is 25 dB or more, so the output must be reduced to a usable level, frequently 15 dB of excess noise to be compatible with gas tubes or 5 dB of excess noise for more modern equipment. If the noise level is reduced by a good RF attenuator of 10 dB or more, then the source VSWR (seen by the receiver) is dominated by the attenuator, since the minimum return loss is twice the attenuation. Thus, the change in VSWR as the noise diode is turned on and off is minuscule. Commercial noise sources consist of a noise diode assembly and a selected coaxial attenuator permanently joined in a metal housing, calibrated as a single unit.

Homebrew Noise Sources

There are three components of a noise source: a noise generator, an attenuator, and the calibration data of ENR at each frequency. The most critical one is the attenuator; it is very important that the noise source present a very low VSWR to the preamp or whatever is being measured, since low-noise amplifiers are sensitive to input impedance, and even more important that the VSWR does not change when the noise source is turned on and off, since a change causes error in the measurement. Because an attenuator provides twice as many dB of isolation as loss (reflections pass through a second time), 10 dB or more of attenuation will reduce any change in VSWR to a very small value. Commercial solid-state noise sources occasionally appear in surplus sources, usually at high prices but occasionally very cheap if no one knows what it is. I have found two of the latter, and one of them works! It produces about 25 dB of excess noise, which is too much to be usable. I went through my box of hamfest attenuators and found one which has excellent VSWR up to 10 GHz and 13 dB of attenuation. Mated with the noise source, the combination produces about 12 dB of excess noise — a very usable amount.
Finally, I calibrated it against a calibrated noise source for all ham bands between 50 MHz and 10 GHz; not exactly NTIS traceable, but pretty good for amateur work.
While noise sources are hard to locate, noise figure meters are frequent finds. If we could come up with some noise sources, all the VHFers who have one gathering dust could be measuring and optimizing their noise figure.

Figure 6. Noise Source ENR



Several articles have described construction of homebrew noise sources, which work well at VHF and UHF, but not as well at 10 GHz. All of them have the diode in a shunt configuration, with one end of the diode grounded. When I disassembled my defective commercial noise source (even the attenuator was bad), I found a bare chip diode in a series configuration ¾ diode current flows into the output attenuator. Obviously I could not repair a chip diode, but I could try the series diode configuration. I found the smallest packaged microwave transistor available, some small chip resistors and capacitors, and soldered them directly on the gold-plated flange of an SMA connector with zero lead length, as shown in the photograph, Figure 4. We've all soldered components directly together in "dead-bug" construction; this is more like "fly-speck" construction. The schematic is shown in Figure 5, and it works at 10 GHz! I built several versions to evaluate reproducibility, and measured them at several ham bands from 30 MHz to 10 GHz, with results shown in Figure 6. All units were measured with the same 14 dB attenuator, so the diode noise generator output is 14 dB higher (Later I found that the MIT Radiation Laboratory had described12 a noise source with a series diode 50 years ago, so we aren't giving away anyone's trade secrets.)

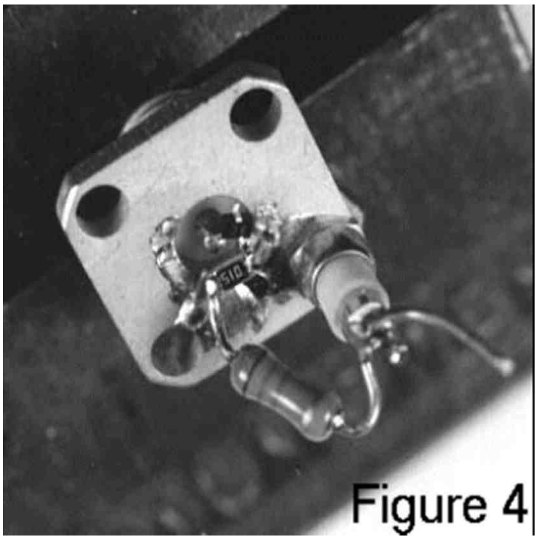
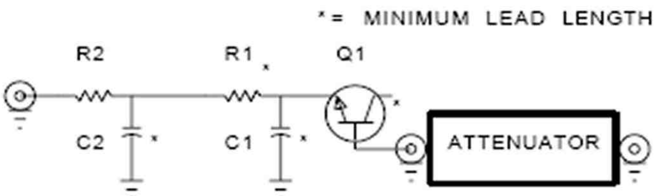


Figure 4



PARTS LIST

ATTENUATOR - MICROWAVE COAXIAL

C1 - CHIP 1.0 pF ATC
C2 - CHIP 1000 pF or more

Q1 - NPN, Tiny Silicon RF like NEC 68119
Alternate: NC302L Noise Diode

R1 - 51 OHM CHIP
R2 - Sets Current, Minimum 1K 1/4 Watt

FIGURE 5. NOISE SOURCE

I then remembered that I had a commercial noise diode, a Noise/Com NC302L, which was used in a noise source described in QST11, with the diode in the shunt configuration. The diode is rated as working to 3 GHz, so, in the amateur tradition, I wanted to see if I could push it higher, using the series configuration. Since I didn't expect to reach 10 GHz, I increased the value of the bypass capacitor, but otherwise, it looks like the units in Figure 5. When I measured this unit, it not only worked at 10 GHz, but had more excess noise output than at lower frequencies, probably due to an unexpected resonance. The performance is shown in Figure 6 along with the other units. Also shown in Figure 6 is the output of my pseudo-commercial noise source; even with the external attenuator, the excess noise output is pretty flat with frequency. Commercial units are typically specified at + or - 0.5 dB flatness. In Figure 6, none of the homebrew ones are that flat, but there is no need for it; as long as we know the excess noise output for a particular ham band, it is perfectly usable for that band. All the above noise sources relied on a coaxial microwave attenuator to control the VSWR of the noise source. Attenuators are fairly frequent hamfest finds, but ones that themselves have good VSWR to 10 GHz are less common, and it's hard to tell how good they are without test equipment. An alternative might be to build an attenuator from small chip resistors. I used my PAD.EXE program13 to review possible resistor values, and found that I could make a 15.3 dB p attenuator using only 140 ohm resistors if the shunt
lugs were formed by two resistors in parallel, a good idea to reduce stray inductance. I ordered some "0402" size (truly tiny) chip resistors from DigiKey, more NC302L diodes from Noise/Com, and built the noise source shown in Figure 7 on a bit of Teflon PC board, cutting out the 50 ohm transmission line with an X-Acto knife. The schematic of the complete noise source is shown in Figure 8. The chip resistor attenuator works nearly as well as an expensive coaxial one. The measured VSWR of two noise sources, one with the chip attenuator and the other with a coaxial attenuator, is shown in Figure 9. Curves are shown in both the off and on states, showing how little the VSWR changes. The VSWR of the chip attenuator unit is 1.42 at 10 GHz, slightly over the 1.35 maximum specified for commercial noise sources, but still fine for amateur use.

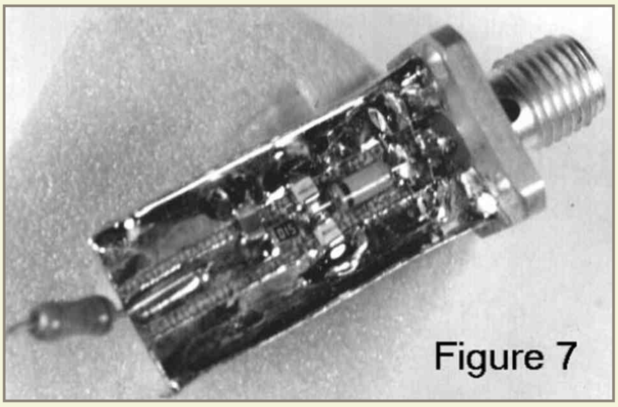
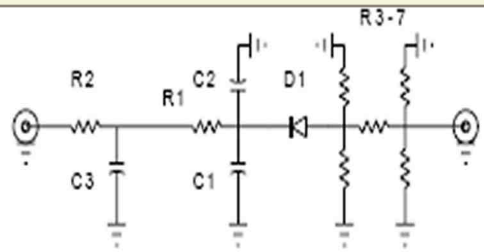


Figure 7



NOISE SOURCE WITH CHIP ATTENUATOR
FIGURE 8.

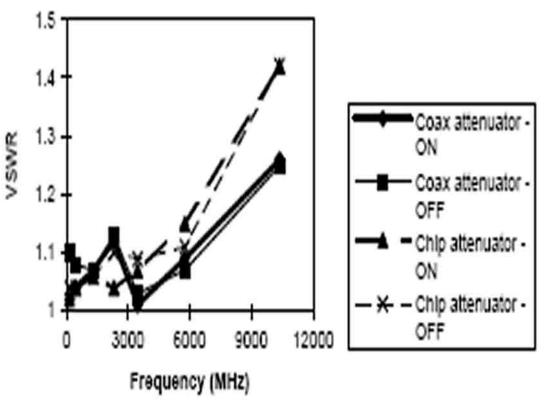


Figure 9. VSWR of Homebrew Noise Sources

Noise Source Alignment

The only alignment requirement for a solid-state noise source is to set the diode current; the current is always set at the highest frequency of interest. A noise figure meter must be set up with converters, etc., for the highest frequency at which the noise source might be used, and set to display the detector output (OFF position on a model 75). Then voltage from a variable DC power supply is applied to the noise diode through the 1K currentlimiting resistor. The detector output should increase as the voltage (diode current) increases, reach a peak, then decrease slightly. The optimum current is the one that produces peak output at the highest frequency (I set mine at 10 GHz). Then additional resistance must be added in series with the current-limiting resistor so that the peak output occurs with 28 volts applied, so that the noise source may be driven by the noise figure meter. Once the proper resistor is determined and added, the DC end of the noise source is connected to the diode output of the noise figure meter, and the meter function set to ON. This should produce the same detector output as the power supply. Then the meter function is set to AUTO, and the meter should produce some noise figure indication, but not a calibrated one yet. However, it is good enough to tune up preamps ¾ a lower noise figure is always better, even if you don't know how low it is.

Noise Source Calibration

Much of the high price of commercial noise sources pays for the NTIS-traceable calibration. Building a noise source only solves part of the problem ¾ now we need to calibrate it. The basic calibration technique is to measure something with a known noise figure using the new noise source, then calculate what ENR would produce the indicated noise figure. Fortunately, the calculation is a simple one involving only addition and subtraction; no fancy computer program required. Simply subtract the indicated noise figure, $NF_{indicated}$, from the known noise figure, NF_{actual}, and add the difference to the ENR for which the meter was calibrated, ENR_{cal} :

$$\text{ENR (noise source)} = ENR_{cal} + (NF_{actual} - NF_{indicated})$$

This procedure must be repeated at each frequency of interest; at least once for each ham band should be fine for amateur use. The known noise figure is best found by making the measurement with a calibrated noise source, then substituting the new noise source so there is little opportunity for anything to change. Next best would be a sky noise measurement on a preamp. Least accurate would be to measure a preamp at a VHF conference or other remote location, then bring it home and measure it, hoping that nothing rattled loose on the way. If you can't borrow a calibrated noise source, it would be better to take your noise source elsewhere and calibrate it. Perhaps we could measure noise sources as well as preamps at some of these events.

Using the noise source

Now that the ENR of the noise source has been calibrated, the noise figure calibration must be adjusted to match. However, the model 75 in the CAL position has only two dB of adjustment range marked on the meter scale. Older instruments have no adjustment at all. However, we can just turn around the equation we used to calculate the ENR and calculate the NF instead:

$$NF_{actual} = NF_{indicated} + (ENR_{(noise\ source)} - ENR_{cal})$$

There is a short cut. My noise source has an ENR around 12 dB, so I set the "CAL ADJ" in the CAL position as if the ENR were exactly 3 dB higher, then subtract 3 dB from the reading. Even easier, the meter has a +3dB position on the "ADD TO NOISE FIGURE" switch. Using that position, I can read the meter starting at 0 dB. Any ENR difference from 15 dB that matches one of the meter scales would also work ¾ rather than an involved explanation, I'd urge you to do the noise figure calculations, then try the switch positions and see what works best for quick readout.

Reminder: noise figure meters have a very slow time constant, as long as 10 seconds for some of the older models, to smooth out the random nature of noise. Tune slowly!
Don't despair if the ENR of your noise source is much less than 15 dB. The optimum1 ENR is about 1.5 dB higher than the noise figure being measured. The fact that today's solid state noise noise sources have an ENR around 5 dB rather than the 15 dB of 20 years ago shows how much receivers have improved.

Conclusion

The value of noise figure measurement capability is to help us all to hear better. A good noise source is an essential part of this capability. Accurate calibration is not necessary, but helps us to know whether our receivers are as good as they could be.

Best 73's N1BWT.

Notes:

1. R. Pettai, Noise in Receiving Systems, Wiley, 1984.
2. M.B. Graves, WRØI, "Computerized Radio Star Calibration Program," Proceedings of the 27th Conference of the Central States VHF Society, ARRL, 1993, pp. 19-25.
3. P. Wade, N1BWT, "More on Parabolic Dish Antennas," QEX, December 1995, pp 14-22. HDLANT21 program may be downloaded from http://www.arrl.org/qexfiles
4. W.E. Pastori, "Direct-Reading Measurement of Receiver-Noise Parameters," Microwave Journal, April 1973, pp. 17-22.
5. R. Bertelsmeier, DJ9BV, & H. Fischer, DF7VX, "Construction of a Precision Noise Figure Measuring System," DUBUS Technik 3, DUBUS, 1992, pp. 106-144.
6. H. Fasching, OE5JFL, "Noise Figure Measurement using Standard Antennas," DUBUS Technik 4, DUBUS, 1995, pp. 23-25.
7. C. Suckling, G3WDG, "144MHz wideband noise amplifier," DUBUS, 2/1995, pp.5-8.
8. R. Turrin, W2IMU, "Method for Estimating Receiver Noise Temperature," Crawford Hill Technical Note #20, September 1986.
9. K. Britain, WA5VJB, "10 GHz Noise Source," Microwave Update '87, ARRL, 1987, p 63.
10. P. Wade, N1BWT, & S. Horsefield, NR1E, "Homebrew Solid State Noise Sources," Proceedings of the 1992 (18th) Eastern VHF/UHF Conference, ARRL, 1992.
11. W.E. Sabin, WØIYH, "A Calibrated Noise Source for Amateur Radio," QST, May 1994, pp. 37-40.
12. G.E. Valley, Jr., & H. Wallman, Vacuum Tube Amplifiers, MIT Radiation Laboratory Series, McGraw-Hill, 1948.
13. P. Wade, N1BWT, "Building VHF Power Attenuators," QEX, April 1994, pp. 28-29. PAD.EXE program may be downloaded from http://www.arrl.org/qexfiles

DX NEWS From the Web

C91, MOZAMBIQUE

Mike, ZS6TAF, who works in Maputo from time to time, operate mobile using the callsign C91BA. He uses Yaesu 857D and Watson Multiranger mobile antenna for 80/40/20/15/10/6 meters. He was heard this past week on 7083 kHz at 1539z. QSL via his home callsign.

CCF/OHDXF CONTEST & DX CONFERENCE

Dates for the CCF/OHDXF Contest and DX conference have been announced by the Contest Club of Finland(CCF) and OH DX Foundation (OHDXF). It will be held between January 22-24th (2010). Look for more details to become available on the following Web page at:
http://contestclubfinland.com/CCF

CE9, SOUTH SHETLAND ISLANDS (Update)

A team of operators will be operating from Arturo Prat-Greenwich Island-South Shetland archipelago (IOTA AN-010, WW Loc. GC07FQ), between January 10-24th. Team members mentioned are: Luis/XQ5CIE, Carlos/CE6UFF, Didier/F6DXE and Dagoberto/CE5COX. Their callsign will be XR9JA. Activity will be on 160-6 meters using CW, SSB, PSK31 and the AO-51 Satellite. QSL via CE5JA. For more information, go to:
http://www.ce5ja.cl

FT5W, CROZET ISLAND

Florentin, F4DYW, currently active as FT5WO, is expected to be on the air until November 15th, but will leave the island on November 23rd. He is usually on 20 or 17 meters during Saturdays and Sundays between 0600-1300z usually between 14260-14280 kHz. QSL via F4DYW.

MARCONI NOBEL 100 AWARD

To celebrate the 100th anniversary of Marconi receiving the Nobel Prize, listen for and work 10 different special event "SI" stations between November 9th and December 10th. The following special anniversary callsigns will be on the air: SI0GM, SI1GM, SI2GM, SI3GM, SI4GM, SI5GM, SI6GM and SI7GM. Other SM stations may be using the special prefix SI, but only the above stations count. Each anniversary station counts once per band. No endorsements. The fee is 50 SEK, 5 Euro or 5 USDs. Apply with log entry to SSA Awards Manager, Bengt Hogkvist, Ostbygatan 24 C, SE-531 37 Lidkoping, Sweden

P4, ARUBA (SA-036)

John, W2GD, will be active as P40W during the CQ WW DX CW Contest (November 28-29th) as a Single-Op/All-Band/Low-Power or QRP entry with limited antennas. QSL via N2MM. Logs will be loaded on LoTW upon his return to USA.

P4, ARUBA (SA-036)

Andy, AE6Y, will be active as P49Y during the CQ WW DX CW Contest (November 28-29th) as a Single-Op/All-Band/High (or Low)-Power entry. QSL via AE6Y.

T30, WESTERN KIRIBATI

Operators David/N1EMC and Mike/N1IW will be active as T30KI and T30IW, respectively, between November 10-16th. Activity will be on 60-6 meters as conditions permit using SSB/CW. QSL via N1EMC.

T6, AFGHANISTAN

David, CT1DRB, will be active as T6AG from here the next 6 months as of October 21st. Activity will only be CW. QSL via EA3GHZ direct.

TZ, MALI

Mac, JA8SLU, will once again return to Mali and be active as TZ6JA between November 2-23rd. Activity will be SSB only. QSL direct only to: Mac Obara, P.O. Box 59, Tama, Tokyo, 206-8691 JAPAN.

V3, BELIZE

Wil, AA4NC, will be active as V31RR between February 17-23rd. Activity will be on the HF bands including 30/17/12m using CW, SSB and RTTY. His activity will also include the ARRL DX CW Contest (February 20-21st) as a Single-Op entry. QSL via his home callsign or LoTW.

XV, VIETNAM (Update/IOTA Op)

Operators Manfred/DK1BT, Wolf/DL4WK, Andy/ DL5CW, Sigi/DL7DF and Frank/DL7UFR will be active as XV4D from Phu Quoc Island (AS-128) between November 4-17th. Activity will be on 160-10 meters using CW,SSB,RTTY,PSK and SSTV. QSL via DL7DF, direct or by the Bureau.

YN, NICARAGUA

Eric, K9GY, will once again be active as YN2GY from Octavio's, YN2N, QTH in Grenada, during the 2010 ARRL DX CW Contest (February 20-21st) as a Single-Op/All-Band/Low-Power entry. He will be there between February 18-22nd. Outside of the contest, look for CW activity on 30/17/12 meters. QSL via LoTW or to his home callsign, direct or by the bureau.

CONTESTS OF THE MONTH

Date	UTC	Mode	Contest
06-07	1200-1200	All	Ukrainian DX Contest
06-08	2100-0300	CW	ARRL Sweepstakes
06-08	2100-0300	CW	Collegiate Championship
13-14	0700-1300	SSB	Japan International DX Contest
13-14	0000-2400	RTTY	Worked All Europe DX Contest
13-14	1200-1200	CW	OK/OM DX Contest
20-21	1400-0800	CW	IARU 160m Contest
20-22	2100-0300	SSB	ARRL Sweepstakes
20-22	2100-0300	SSB	Collegiate Championship
20-21	2100-0100	CW	RSGB 1.8MHz Contest
20-21	1200-1200	CW	LZ DX Contest
27-28	0000-2400	CW	CQ WW DX Contest

SM3CVM Presents :

SM3CVM DX-kalender

THE DXCALENDAR

November 2009

- 1/11 ANTARCTICA; VKØBP AN-016

is currently working at Antarctic Davis Base Station, Gridsquare MC81xk. His activity is limited due to his workload, but he is expected to be on all HF bands. He seems to like 20 meters between 1500-1800z. Operations have been on SSB and PSK31, but he plans to operate on other modes later on during his stay at the Davis Station. QSL via VK2CA. PLEASE NOTE: There is also a possibility of activating other field huts in the area, and he will sign as VK0BP/P. Look for more details on his Web page at http://www.vk0bp.org/

- 1/11 - 7/11 ARGENTINA; LU/PY2TJ SA-008

from Isla Tierra Del Fuego (WLOTA L2448). Activity will be on all HF bands. QSL via PT2OP, direct is preferred or by the Bureau.

- 2/11 - 9/11 UNITED STATES OF AMEICA: KG8DP NA-062

from Grassey Key. Operations will be stationary at Grassey Key and mobile as he travels to Key West and all points on the ocean. He will use the callsign KG8DP, as well as his club callsign NA8KD. This will be a week trip. QSL both KG8DP/NA8KD via info on QRZ.com (w/SASE). Mark will be using an IC-7000, 1.2 kw amp mobile and GLA-1000B portable amp. Antennas were not mentioned.

- 2/11 - 23/11 MALI; TZ6JA

by JA8SLU. Activity will be SSB only. QSL direct only to: Mac Obara, P.O. Box 59, Tama, Tokyo, 206-8691 JAPAN.

- 3/11 - 15/11 MONTSERRAT; VP2MUM, VP2MXO and VP2MNK

by DL2RUM (VP2MUM), DM2XO (VP2MXO) and DJ8NK (VP2MNK). Activity will be on 160-10 meters using CW, SSB and RTTY. QSL via their home callsigns per the QRZ.com address or by the Bureau.

- 4/11 - 11/11 VIRGIN IS; KP2/homecall

from St. Croix by N3XF, K1ZE and W1EQ. Activity will be on 160-10 meters using CW, SSB and possibly RTTY. Look for KP2M during the ARRL CW Sweepstakes Contest (November 7-8th). QSL KP2M via info on QRZ.com. All other QSLs via home callsign and LoTW.

- 4/11 - 17/11 VIET NAM; XV4D AS-128

from the Island of Phu Quoc by DL7DF, who will lead a crew of operators. Their callsign has not been announced yet, but it is expected to be the XV prefix. Activity will be on 160-10 meters using CW and SSB with several stations on the air. One station will be exclusively dedicated to RTTY, PSK31 and SSTV. Their equipment consists of 3 transceivers (two K2 and one IC7000) with three kW linears into two 18m lowband verticals, a 2 element vertical for 40m, a 2 element vertical for 30m, two Spiderbeam for 20/17/15/12/10m, and some beverage antennas. Operatorsmentioned are: DK1BT, DL4WK, DL5CW, DL7DF and DL7UFR. Pilot station for this DXpedition is Bernd, DF3CB. QSL via DL7DF, by the German QSL Bureau or direct to: Sigi Presch, Wilhelmsmuehlenweg 123, D-12621 Berlin, Germany. For complete details, visit http://www.dl7df.com/xv/index.html

- 4/11 - 18/11 BERMUDA; VP9KF NA-005

from Baileys Bay by W4/VP9KF (G4BKI). Activity will only be CW on all bands. QSL via W4/VP9KF: Paul Evans, 6809 River Road, Tampa, FL 33615. Visit his Web page at http://vp9kf.com/
Please, DO NOT send to the VP9 bureau.

- 6/11 - 8/11 EAST MALAYSIA; 9M6DXX/P and 9M6XRO/P OC-133

from Pulau Labuan Island by 9M6DXX and 9M6DXX. The operations will be as follows: 9M6DXX/P - On 80-10 meters; SSB only. 9M6XRO/P - On 160-10 meters; CW and RTTY. Each stations will be using amplifiers to a multi-band vertical and a 160m inverted-L, both mounted very close to the ocean. Operators hope it will be possible to operate on 160m CW at the same time as SSB on the other bands. QSL both 9M6DXX/P and 9M6XRO/P via M0URX, either direct, by the bureau or LoTW.

- 6/11 - 9/11 VENEZUELA; YW5F SA-058

from Farallon Centinela Island by members of the Grupo DX Caracas. Activity is to celebrate the 20th anniversary of the Caracas DX Group. Operations will be on 80-2 meters using CW, SSB and FM. QSL via DM4TI.

- 7/11 NIUE; ZK2DL OC-040

by DL2FAG. He plans to operate mainly RTTY, PSK and SSB on 10-80 metres, using a Triple leg multiband and dipoles. After Niue and before Samoa he will be visiting New Zealand's South Island (OC-134) and be active sporadically as ZL4/DL2FAG. QSL via home call. Log searches will be available at www.qsl.net/dl2fag/

- 9/11 PAPUA NEW GUINEA; P2 OC-102, OC-231 and OC-205

G3KHZ (P29NI) has announced a new IOTA DXpedition from the Tanga Islands (OC-102), the Green Islands (OC-231) and the Woodlark Group (OC-205). He and other four operators, CT1AGF, G3USR, G4EDG and SM6CVX) will operate CW, SSB and RTTY on 160-15 metres, using new single band vertical dipoles for 30-15m and a ground plane for 40m.

- 11/11 NEW CALEDONIA; FK/F5NHJ OC-032 or OC-033

from either Grande Terre (OC-032) and Lifou or Mare (OC-033).He plans to focus on 30 metres digital modes. QSL via F5NHJ.

- 10/11 - 16/11 W. KIRIBATI; T3ØKI and T3ØIW

by N1EMC and N1IW. Activity will be on 60-6 meters as conditions permit using CW/SSB. QSL via N1EMC.

-11/11 - 13/11 PAPUA NEW GUINEA; P29VCX OC-117

from Hastings Island by SM6CVX. QSL via home call. The web page for the expedition is at http://www.425dxn.org/dxped/p29_2009/

- 11/11 - 16/11 BRAZIL; PW6C SA-062

from Coroa Vermelha Island by PP1CZ, PY0FF, PY7RP, PY7XC, PY7ZY and K9AJ. Activity will be on 80-10 meters using CW and SSB. QSL via K9AJ. Web site at http://www.pw6c.com/

- 11/11 - 18/11 SAMOA; 5W OC-097

from the Island of Upolu by IK1PMR, K2LEO/PA3LEO, PA0BWL, AA4NN, OE2SNL, DJ5IW and OZ1IKY are planning a DXpedition to three semi-rare entities (and possibly some other operations) in the Pacific between November 11th and December 13th. Callsigns have not been announced yet. Focus will be on the lower bands, but activity is planned for 160-10 meters using CW, SSB and the Digital modes. The team will use three Elecraft K2/100 with DSP and amps. For more information and updates, watch: http://www.ik1pmr.com/plans/a3/index.php?s=intro/

- 13/11 - 14/11 PAPUA NEW GUINEA; P29VCX OC-116
from Normanby Island by SM6CVX. QSL via home call. The web page for the expedition is at http://www.425dxn.org/dxped/p29_2009/

- 13/11 - 23/11 COMOROS; D68F AF-007
by F6AML. He will operate CW (1828, 3520, 7020, 10115, 14020, 18071, 21020, 24951 and 28020 kHz) and SSB (3775, 7075, 14265, 18140, 21265, 24960 and 28480 kHz), with a focus on the low bands. QSL via F6AML, direct or bureau.

- 13/11 - 27/11 GHANA; 9G5TT and 9G5XX AF-084
Their activity will also include an IOTA trip to Abokwa Island (AF-084). Operations on the mainland will use the callsign 9G5TT, while operations on AF-084 will use 9G5XX. Activity will be on all HF bands (160-10 meters) and modes. On AF-84 there will be one station on 20 meters only. The time of the operation on the island will be on a day to day basis and will depend on the sea condition and weather forecast. QSL via I2YSB, direct only. More information can be found at http://www.i2ysb.com/

- 13/11 REPUBLIC OF KOREA; HL9QST
by KE7WRJ. This is a rare prefix only assigned to U.S. Service members assigned to Korea. His tentative schedule is to operate from 4 different locations in South Korea as follows: September 10-12th: Seoul, September 14-24th: Camp Casey, September 25th-October 18th: Camp Humphreys, October 19-29th: Camp Carroll October 30th-November 13th: Seoul. Activity will be on 40-10 meters, depending on the propagation, using CW and SSB. Operations will be at least 8 hours a day during the week and longer over the weekends. Look for him to be in both the Extra and General portions of the bands. His equipment will consist of a 5000A by Flex Radio, a "3 element Yagi in a Bag" from Super Antennas. QSL via KE7WRJ, direct or LoTW.

- 14/11 - 21/11 FALKLAND IS.; VP8BUG (digital) and VP8BUH (SSB)
by members of the Uruguay DX Group's globetrotters. Their activity will focus on the lower bands, Digital modes and the 30/17/12 meter bands. Operators mentioned include: Gus/CX2AM, Gus/CX3CE, Bert/CX3AN, Mario/CX4CR and Luis/CX4AAJ. Probably QSL Manager is EB7AEY. More details are forthcoming.

15/11 - 16/11 PAPUA NEW GUINEA; P29VCX OC-240
from Loloata Island by SM6CVX. QSL via home call. The web page for the expedition is at http://www.425dxn.org/dxped/p29_2009/

15/11 - 3/12 TURKS & CAICOS IS.; VP5/homecall NA-002
from Providenciales by W7VV, VE7XF and possibly some other operators.Activity will include the CQWW DX CW Contest (November 28-29th) as a Multi-? entry and possibly a special callsign (TBA). QSL route TBA. Operators will be active before and after the contest on all bands (160-6 meters) and modes signing VP5/homecall. QSL via their home callsigns.

15/11 - 20/2 2010 ANTARCTICA; KC4USV AN-011
from McMurdo Station by K7MT. He will be on the HF bands on 14243 kHz, Sundays at 0000z. He will also be active on PSK-31 (on 14070 kHz) and CW (14043 kHz) if time permits. He has also mentioned that he will take an Arrow II antenna and his Kenwood TH-7 to work the Amateur Satellites into VK and ZL land. He also has plans to be on APRS VHF/HF with a Kam Plus, so you might just see him driving around on the Ross Ice Sea as K7MT-7 on APRS. QSL via K1IED. Visit his home page for some interesting pictures at http://www.mt.net/~k7mt/

- 15/11 CROZET I; FT5WO
by F4DYW. He is usually on 20 or 17 meters during Saturdays and Sundays between 0600-1300z usually between 14260-14280 kHz. QSL via F4DYW.

- ca 16/11 LEBANON; OD/W5YFN
has received approval from the local authorities while in Lebanon, for one year starting on 16 November.

- 17/11 AUSTRALIA; VK7ACG OC-006
from Tasmania by GØWFH. He will operate SSB on 160-10 metres, with a focus on the low bands. QSL via home call, direct or bureau.

- 17/11 - 30/11 SAMOA; 5WØKH OC-097
from Upolu Island by DL2FAG. He plans to operate mainly RTTY, PSK and SSB on 10-80 metres, using a Triple leg multiband and dipoles. QSL via home call. Log searches will be available at www.qsl.net/dl2fag/

- 17/11 - 15/12 MADAGASCAR; 5R8IC AF-090
from Saint Marie Island by F6ICX. Activity will be on 80-10 meters. QSL via his home callsign.

- 18/11 - 24/11 CANADA; VY2/W7ASF NA-029
from Prince Edward Island. Activity will include an entry in the ARRL Sweepstakes Phone ontest (November 21-23rd). QSL via his home callsign, direct or by the Bureau.

- 19/11 - 23/11 NEW CALEDONIA; FK/JA1NLX OC-033
from Ouvea Island along with his XYL. Activity will be on all HF bands (80-10 meters) using CW and RTTY with a IC-706MK2 100 watt transceiver and vertical antenna. QSL via the LoTW or by his home callsign, direct or by the Bureau. For more details and log after his operation, visit the following Web page at http://www.ne.jp/asahi/ja1nlx/ham/fk_2009.html

- 19/11 - 9/12 TONGA; A3 OC-049
from the Island of Tongatapu by IK1PMR, K2LEO/PA3LEO, PA0BWL, AA4NN, OE2SNL, DJ5IW and OZ1IKY are planning a DXpedition to three semi-rare entities (and possibly some other operations) in the Pacific between November 11th and December 13th. Callsigns have not been announced yet. Focus will be on the lower bands, but activity is planned for 160-10 meters using CW, SSB and the Digital modes. The team will use three Elecraft K2/100 with DSP and amps. For more information and updates, watch: http://www.ik1pmr.com/plans/a3/index.php?s=intro/

- 20/11 - 26/11 CANADA; VY1RST
from near Beaver Creek, Yukon by KL7JR, WL7MY and KL7BO. Emphasis will be on 160/80 meters SSB (using a 160m Inverted L) with a 2nd station on for 40-10 meters (vertical) SSB and PSK-31. QSL Manager is KL7JR. E-mail skeds are welcome at John.ReisenauerJr@alyeska-pipeline.com

- 20/11 - 10/2 2010 CANARY ISLANDS; EA8/homecall AF-004
from Tijoco Bajo, Tenerife Island by ON5JV and ON6AK. Activity will be on 40-10 meters during their evenings. They plan to use 100w into a vertical 14AVQ. QSL via their home calls, bureau is preferred.

21/11 - 5/12 CHRISTMAS I.; VK9XX OC-002
by DM5TI, DL2JRM and DL2RMC. Activity will be on 160-10 meters using CW, SSB and the Digital modes. They plan to use verticals and beams, and also be an entry in the CQWW DX CW Contest as VK9XW (November 28-29th). QSL via DL1RTL, by the Bureau or direct. For complete details, visit the VK9XX Web site at http://www.dl2rmc.com/tom/VK9X2009/

- 22/11 - 2/12 BARBADOS; 8P9SS
by ND3F. Activity will probably be on all bands, but he will also be in the CQWW DX CW Contest (November 28-29th) as a Single-Op/All-Band/Low-Power entry. QSL via LoTW or direct to ND3F.

- 23/11 - 1/12 BOTSWANA; A25NW
by K9NW. Activity will include the CQWW DX CW Contest (November 28-29th). QSL via his home callsign (QRZ.com).

- 23/11 - 2/12 TUNISIA; 3V3S
by a German team from the "Radio Club Station of Tunisian Scouts" (3V8SS) in Sousse. Operators mentioned are DJ7IK, DJ8NK, DJ9CB, DL9USA and DF1LON. The team will set up, and use a spiderbeam and verticals antennas. All antennas will be donated to the 3V8SS station. Look for them to also participate in the CQWW DX CW Contest (November 28-29th) as a Multi-Single/Low-Power entry.
QSL via DL9USA. A Web page will be active soon at http://www.3V3S.tk/

- 23/11 - 6/12 CHESTERFIELD IS.; TX3A
by AA7JV and HA7RY. The TX3A license is valid for 14 days only between the dates listed above. Because these dates could change (due to weather and other things), they "may" have to operate as FK/AA7JV or FK/HA7RY before and after this period. Their priorities will be 160, 80 and 40 meters, in that order. They will be active on the higher bands the rest of the time. The operators will use the same antenna that they used on Mellish Reef, but they have developed a new RX antenna, which they hope will improve their RX capabilities. QSL via HA7RY. Mailing direct -Please include 2 USDs with every direct QSL request for up to three cards per envelope. If you send International Reply Coupons (IRC), please make sure that it is not expired or is not about to expire. DO NOT SEND IRCs that are valid only until end of 2009! Cards are likely to be posted only early 2010. Mailing address: Tamas Pekarik, Alagi ut 15, H-2151 Fot, HUNGARY. * The preferred way is using the "Online QSL Request Service" (OQRS) on their Web site which they will launch once the DXpedition is over. You can use that form to request your direct QSL and cover the costs of sending the QSL card to you direct by using PayPal. They request a minimum of 5 USDs or 4 EUROs for this service. * Bureau: They will launch an "Online QSL Request Service" (OQRS) on their Web site as soon as the expedition is over. If you want to receive your QSL via the bureau, please use that form to request the card. They will check your QSOs against the log and send your card to you via the bureau. This method will allow them faster processing, helps them protect the environment and you will receive your TX3A card faster. If you request your bureau card online, please do NOT request a direct card and do NOT send us your QSL card. More detailed information is available on their new Web page at http://www.TX3A.com/

- 24/11 - 1/12 BONAIRE, CURACAO; PJ4/homecall SA-006
from Bonaire by K4BAI and W4OC. Also look for them to be active as PJ4A during the CQ World Wide DX CW Contest (November 28-29th) as a Multi-Op entry. QSL all callsigns via K4BAI.

- 24/11 - 6/12 BELIZE; V31PT NA-073
from Ambergris Cay by K8PT. No other details were provided. However, in past operations, activity usually is 160-6 meters using CW, SSB, RTTY and some PSK-31. QSL via his home callsign.

- 25/11 - 27/11 MARTINIQUE; FM/JE1JKL/p
Activity will also include the CQWW DX CW Contest, signing as TO5T, and as a Single-Op/All-Band/High-Power entry. QSL via JE1JKL.

- 26/11 - 1/12 ANTIGUA & BARBUDA; V26K
by AA3B. His activity includes the CQWW CW Contest (November 29-30th) as a Single-Op/All-Band/Low-Power entry. This will be an all CW operation on the contest HF bands only. QSL via AA3B.

A Hundred Year of Amateur Radio

By G3NGD

"Part Two"

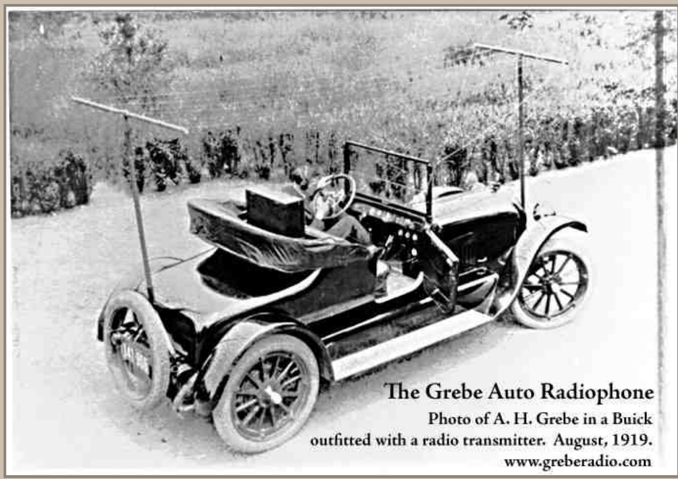
the next fifty years.

The war against Hitlers Germany ended, officially at one minute past midnight on Tuesday, May 8, 1945, but the struggle against Japan continued until August 14, 1945. During the weeks that followed, conditions near to chaos existed on the amateur bands, mainly because certain allied military commanders in widely different parts of the world had given permission for pre-war licence holders to operate service transmitting equipment. This was a direct contravention to the law, but was done to boost morale.

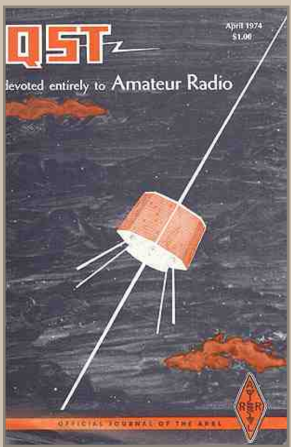
In March 1946, questions were asked in Parliament as to the sale of Government surplus radio equipment to amateurs. Already much use of the surplus apparatus had been purchased in large quantities at ridiculously low prices by dealers who had offered it for sale to show high profits. Three months later, the Admiralty announced that "electronic scrap" would become available to radio amateurs from Naval depots at a price of fifty shillings a hundredweight. (£2.50) How many complete receivers, transmitters and items of expensive measuring equipment was sold in brand new condition as "electronic scrap", no one can even hazard a guess, but fair minded amateurs regretted that due to abuse, this scheme was abandoned within six months.

Many radio operators from the war became interested in amateur radio and applied for licences. People tuning the short-waves on domestic receivers discovered the world of amateur radio and became fascinated. By 1947, more than five and a half thousand transmitting licences were in force compared with three thousand eight hundred a year earlier; and so the number grew.
After the war, the "Trans-Atlantic tests" and the "National Field Day" events were revived, and are still held annually to this day. These events are organized by the Radio Society of Great Britain (formerly the London Wireless Club).

In 1951, the RSGB offered to establish a communications network to meet any national disaster on land, at sea, or in the air, but the Post Office declined the offer.
During the last few hours of January 1953, a flood disaster of immense magnitude struck the East Coast of England; Post Office telephones, Government wireless stations and utility services were out of action for days. Radio Amateurs in these stricken areas, ignoring the terms of their licence placed their experience at the disposal of the authorities.
After long talks with the Post Office, the RSGB set up the Radio Amateurs Emergency Network (RAYNET) , which today works in collaboration with the British Red Cross Society, the St. Johns Ambulance Brigade and the Police.



Early in 1954, the Post Office introduced a new Amateur Mobile and Television licence. The mobile age had arrived; amateurs started to build mobile equipment and demonstrate it at mobile rallies. The first mobile rally was held at Binsey near Oxford, on October 9th, 1955, and was attended by over seventy-five radio amateurs and friends.
For several hours, mobile operators demonstrated their equipment and discussed the fine points of this absorbing new development in amateur radio. Many amateurs have become interested in space techniques, and this has led to the creation of the amateur satellite service in 1971. The OSCAR (orbiting satellite carrying amateur radio) satellites are now an accepted and exciting part of the amateur scene.



The 'seventies

Radical changes occurred during the 'seventies. The shelves of "electronic scrap" at the local amateur radio emporium were replaced by expensive Japanese radio equipment. The new generation of radio amateur has become a "black box operator" (not interested in how it works). The Post Office introduced a VHF (Very high frequency) only licence, which an applicant can obtain without passing a Morse test. This licence restricts the holder to VHF and UHF working only, and deprives him/her of the thrill and excitement in communicating with people all over the world using the short-wave bands. It is not until he/she has become proficient in the Morse code that he/she will be granted a FULL LICENCE.
On 14th September 1972, the first UK repeater was activated with the callsign GB3PI and was located in Cambridge at the Pye Telecom site. Soon after, other repeaters were set up and they operated on 2m and 70cm bands.
In 1977, the separate mobile and amateur television licences were abolished, and these modes of operation were included in the main licence (One Fee).
At the World Administrative Radio Conference in 1979, three new bands were gained: 10·100 - 10·150MHz, 18·068 - 18·168MHz, and 24·890 - 24·990MHz.

Many "old timers" like myself try to hold onto the past. This has been shown by the many people still building Amplitude Modulated (AM) Transmitters and Receivers, and participating in contacts on a regular basis on Top Band (1963KHz). Listen every Sunday morning at 1100Hrs - there is a lot of activity in the Greater Manchester Area. - G3NGD operates using his HOME BREW Chatterbox Transmitter & Receiver.

The 'eighties

In the early 'eighties, the old 405-line vhf television services finished broadcasting in the uk. This used to be an Amateur Radio band until the BBC acquired it for television after the second world war. Radio Amateurs requested the band be returned, and this was granted in 1983 (The band is 50 - 52MHz.).

In the 1980's, Information Technology and the Computer age arrived. Radio Amateur enthusiasts like myself started to purchase or build the Sinclair ZX81 micro-computer. This escalated to the introduction of the INTERNET.

Unfortunately, the Internet has led to a reduction in recruitment of Radio Amateurs - it is so easy to contact people world-wide using the 'Internet'. This is all well and good but one doesn't get the thrill of that exotic contact especially when using home constructed equipment. (Prior to the year 2006, the licence fee was only £15 per year - now it is FREE of charge!). On the positive side however,

Radio Amateurs put the Computer to excellent use in:
Slow Scan Television, RTTY, Packet Radio, Using the PC for Logging, Mail Box, Database, Satellite Tracking, Sending CW for Moon bounce and Meteor Scattering, Chordial Hop Predictions, Distance & Bearing for Beam Settings, Design Calculations, Echolink Communications, and many other applications...

Space Operation:

With the advent of the American Space Shuttle, space flight became a comparatively normal event and Amateur Radio was allowed on a number of missions. The first amateur operation from space was W0ORE using a Motorola hand-held.

Further missions took radio amateurs into space, and in 1985 an all-German crew operated with the callsign DP0SL. For Britain there has been operation from space, when the first British cosmonaut, Helen Sharman, went up with a Russian MIR space mission in May 1991 using the callsign GB1MIR.

The 'nineties

The number of people entering Amateur Radio began to fall, and so in 1991, a new Licence - 'The Novice Licence' was introduced. This was really a way of encouraging young people to participate in the hobby without having to take a full examination. To qualify for the licence, applicants needed only to take part in a course organized by the Radio Society of Great Britain and sit a simple examination.
Although many people took up the hobby via this route, the number of Licensees continued to fall, and so in 1999, the A/B Licence was introduced. For this licence, in addition to a pass being required in the RAE, one has only to take a Morse test at five wpm.
(Note: pressure was placed on the authorities to abolish the Morse code examination after the year 2000. This has now taken place and has made it very easy to obtain a licence). Many people today are in for the easy option. They want qualifications to be given away with very little effort being made by the individual. There were many Radio Amateurs that opposed this move, as Morse Code has many advantages:
using Morse with 'Q' codes for example, provides an "International language"
Morse Code gets through the interference
Morse Transmitters are simple for the novice to build (no modulator to build)
Morse Code Transmitters have a narrow bandwidth, occupy less radio spectrum and unlikely to cause EMC problems. In the 'old days', Radio Amateurs were very proud to be associated with the hobby, but today, the general public think that Amateur Radio is like C.B. radio. This is far from true, and should remain that way.
This has been shown in the year 2006, when a move to de-regulate Amateur Radio was defeated. Radio Amateurs still have to take an examination to obtain a licence.
However, if the Radio Amateur has an e-mail address, the licence is issued 'free of charge' for life. Unfortunately, people who don't have computer access have to pay a charge of £20.00 to Ofcom. (There are no age concessions). Radio Amateurs will
have to confirm their details every five years by e-mail. No doubt, Radio Amateurs will have to download the latest edition of the Licence Conditions from the Ofcom website, on an annual basis.
Throughout the world at the present time (Year 2000) there are just short of three million radio amateurs with their own radio stations communicating regularly with other enthusiasts in their own country and more distant countries. Japan heads the list with 1296000 licences, followed by the USA with 679864. The United Kingdom has 57124 not including club stations. To these figures, however, one must add the teens of thousands of amateurs who merely "listen" to amateur radio broadcasts. If amateur radio is to survive, we need to encourage more people, particularly youngsters into the hobby. With this in mind, there is a 'proposed future structure' of Amateur Radio Licensing currently in discussion, as follows: Full Class A, Full Class A/B and Full Class B becoming a new class 'ADVANCED'. The Novice Class A becoming an 'Intermediate' and the Novice Class B becoming an 'Intermediate - Foundation' Licence.

As the future unfolds, communications equipment will become more sophisticated; already with the advent of the "silicon chip", the conventional amateur radio station is becoming obsolete. Much use has already been made of computers as detailed above. Amateur Radio has already been used to make contact with astronauts in space. The future years will unequivocally show a considerable growth in the use of amateur artificial satellites for long distance VHF communication. Using the latest techniques and improvements in amateur radio equipment and satellites themselves, that which is now a very specialized field will become a major amateur activity. Trans-Atlantic contacts will become as simple as talking on the telephone to a friend across town.

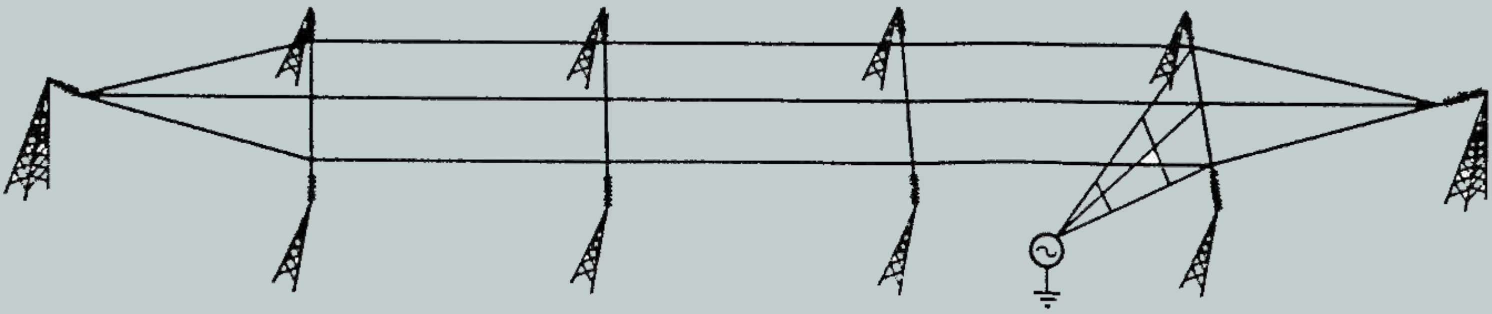
73's ! G3NGD

MF and HF Receiving Antenna
By VE7BPO

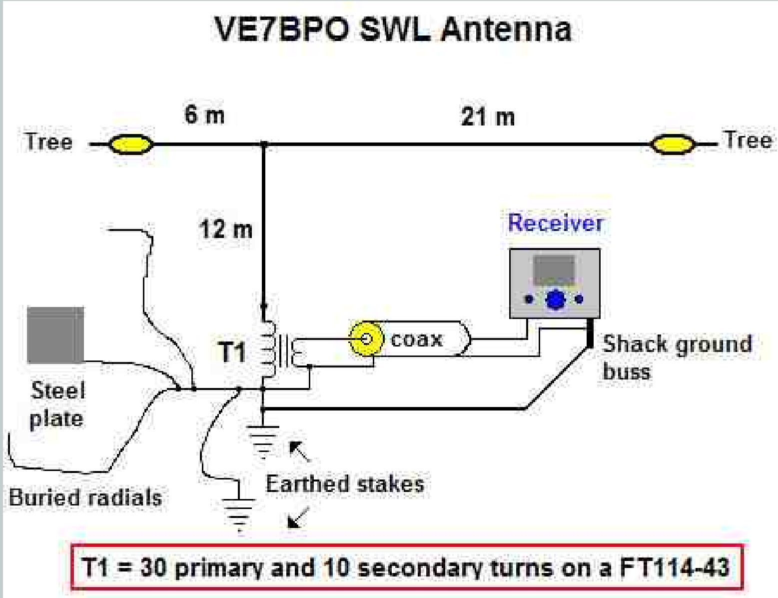
Introduction

My first shortwave antenna was a simple end-fed wire which started at my bedroom window and extended out horizontally to a tree which was 25 feet away from our house. The antenna feed line was a short piece of wire that connected to the near end of the antenna and entered the house through a small hole I made in my wooden window sill. This feed line was directly connected to my receiver's high impedance antenna input. My station ground was long piece of wire that was connected to a copper pipe located in the bathroom next door. While this antenna brought in "the world" to my bedroom, it was extremely noisy. Directly connecting your antenna feed line and house ground system to your receiver are not good RFI reduction practices. This web page will explore some experiments in trying to minimize the Radio Frequency Interference (RFI) arising from my local environment.

Indoor RFI sources are usually plentiful. Electrical appliances such as washing machines, televisions, DVD players, computers and electrical wiring may all emit RFI which your antenna, or directly connected house ground system may pick up and feed to your receiver. Certain indoor devices may be really strong RFI sources and will have to be eliminated or decoupled. Outside of your house are also potential sources of RFI. These may include such things as power transformers, electric fence and garage door openers. RFI location and reduction is out of scope for this web page, however a good place to learn more is the ARRL RFI book. To find RFI sources in your home and neighborhood, try using a battery powered AM radio. At my QTH, I located a noisy VCR inside the house my Grundig S350. We rarely use this VCR and now just leave it unplugged until we actually need to operate it. I tuned the receiver to an empty frequency and found this VCR by trial and error. Please note this web page is concerned with feeding a shortwave listening antenna and does not describe providing protection against lightning. For web sites which covers lightening plus RF ground please refer to this offering from W8JI or eHam.net.
Protect your home and family from lightening !!



Outdoor MF and HF Antenna



The schematic to the left summarizes the outdoor VE7BPO MF and HF receiving antenna system for summer 2007. Although modest for a big city lot, this antenna seems to pull in the DX and is relatively free of RFI. This antenna was just a case of "putting as much wire in the sky as possible" and the dimensions are indicated for interest sake only. The 27 meter long horizontal section is supported between 2 trees at a height of about 14 meters high. The weight of the vertical element wire plus slack in the horizontal wire droop it to about 13 meters high in the center. The vertical section is soldered to the horizontal wire 6 meters from the nearest anchoring tree and runs straight down to the antenna feed point which is about 1 meter off the ground. The feed point is a piece of copper-clad PC board (with isolated sections created with a hobbyist motor tool) and is bolted to a long copper pipe which serves as the first station earth-grounding stake. A transformer (T1) configured as a UNUN (unbalanced-to-unbalanced) is used to interface the antenna with 50 ohm coax that runs through the house and into the radio shack. Some rudimentary experiments with the UNUN and the earth-grounding system were undertaken.

The methods I used to potentially lower unwanted RFI to my antenna system are as follows:

1.The receiver and power supply are independently connected to a single, central ground point (ground buss) in the radio shack.
2.6-10 gauge wire is used for my ground system (not including the radials which are bare 12 gauge wire).
3.The ground wire connecting to my first earth stake to the station ground buss is just outside the shack window and is short as possible to provide a low impedance and low inductance path for MF and HF frequencies.
4.There is a second ground stake located 1 meter from the primary ground stake (I will add 2-4 more in time).
5.I have a large piece of steel buried underneath the soil tied in to my system as well as 3 bare copper radials. The radials are 3 - 7 meters in length.
6.New RG58/U coax was used as the feed line.
7.All wire splices in the grounding system are soldered and taped up. I used conductive grease (to prevent oxidation at the wire-stake interface) on any clamps connected to ground stakes. My ground stakes are ~ 2 meters long.
8.The earth grounding area soil is moist and peat-laden and is watered regularly.
9.I plan to maintain this ground system every 2 years.

Best 73's ! VE7BPO

The HAM-MAG's HALL OF FAME

List of generous donators

FEBRUARY 2009 :
PAØNCV, Nick
K6LCS, Clint
Richard Downey
VK2ETA, John
Laurent Horne
K4SHF, Tim
KE4IAP, Don
K3PB, Pat
W2FBS, Richard
VK2SJJ, Steven
CT1ADT, Manuel
KB1KRS, Hyrum
2IØCOS, Cornelius
KA5DON, Don
PY3ARS, Jocarli
W3ACO, Rich
NØAX, Ward
MØWAY, wayne
Antonio de Armas Medina
K3ZIV, Bill
Milan Puncer
EA6BB, Pedro
W1CRO, Arthur
KA8Q, Jerry

MARCH 2009 :
Kenneth Holloway
Wolfgang Hoeth
W7RDP, Doug
AB7OC, Michael
Clint Bradford
W2AFD, Howard
Joshua Emmott

APRIL 2009 :
AF6IM, Mark
F1AGR, Gilles
GMØMDD, John Clough

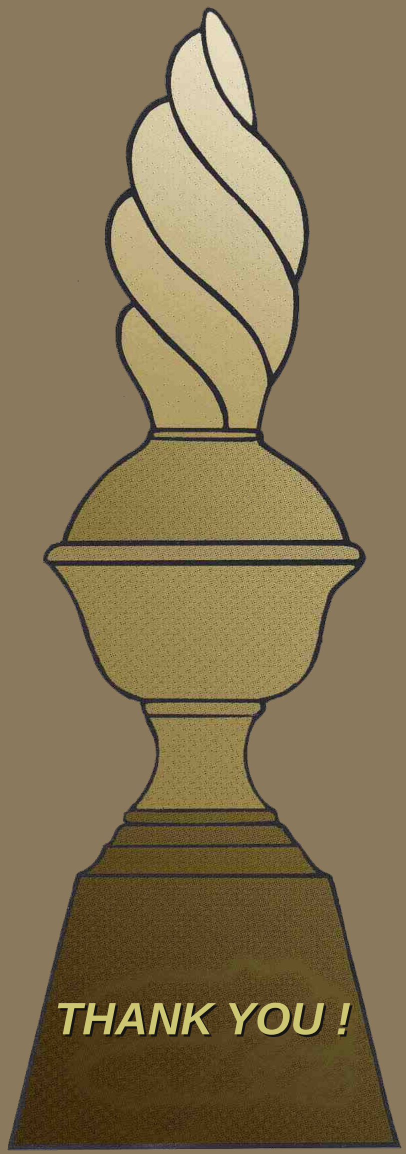
MAY 2009 :
Mark Wall
G3VFP, Dave
Ross Bell
Edwin Weal
KD5WQD, Don
MØWYM, Charlie
WE9C, Gene
EA2HI, Herman

JUNE/JULY 2009 :
WB5TKI, Doug
W9BF, Robert
WB8YWA, James
W2KRH, Ken
Gilbert Houck
Robert Mendelson
Robert Liesenfeld
M1ERF, Roy
PA3DOO, Nico
Jose Fernandez
www.soytives.com
Urszula GandorGraham
KD8IXP, Fred

AUGUST 2009 :
NQ9A, Carolyn
N8SHZ, Bela
Richard Vuillequez
Tony Humphris
OM3AG, Ladislav

SEPTEMBER 2009 :
Kirk W Bumgarner

OCTOBER 2009 :
Newton White
Jerry France
N6DVA, Paul
IZ1NEO, Gaetano
Dennis Finegan
work-sat.com

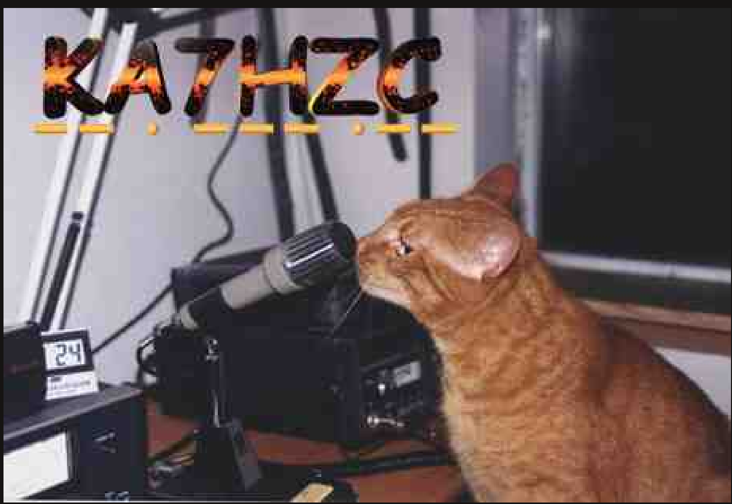


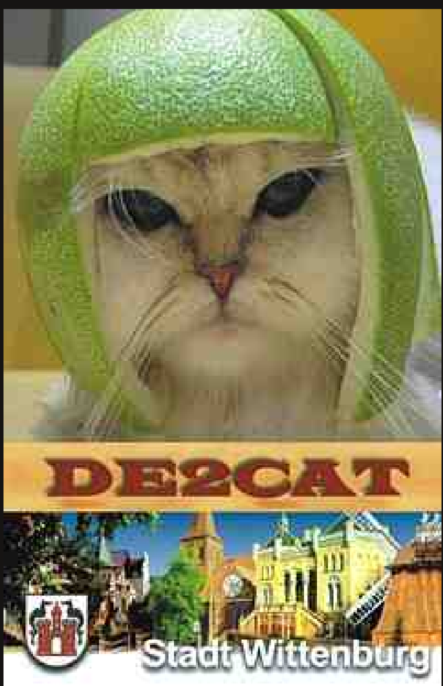
To make a donation, have a look on the website
http://www.hammag.com
And click on "Help us"

COMIC'S HAM

Have some fun...

HAM cats !





HAM-MAG N.10 - November 2009

Chief Editor : Vincent Faucheux F5SLD
Design & conception : V.N.A.C.E.
This issue does exist thanks to : G3NGD, K0HL, KA6KBC, N1BWT, OPDX, SM3CVM, southgatearc.org, VE7BPO, ZS2ABF.
Send your informations to : f5sld@free.fr
Website : http://www.hammag.com
This magazine has been sent to 6,900 Emails

Erratum : concerning the photo of the article "Tak-antenna" (Ham-mag N.9), the call was KI6HRH (not KI6RHR), sorry for this mistake.