Meeting: Fri 23rd at the MCL Cafeteria in Kettering

Mar. 2012

ANOMALOUS PROPAGATION

Newsletter: ***The Midwest VHF/UHF Society***

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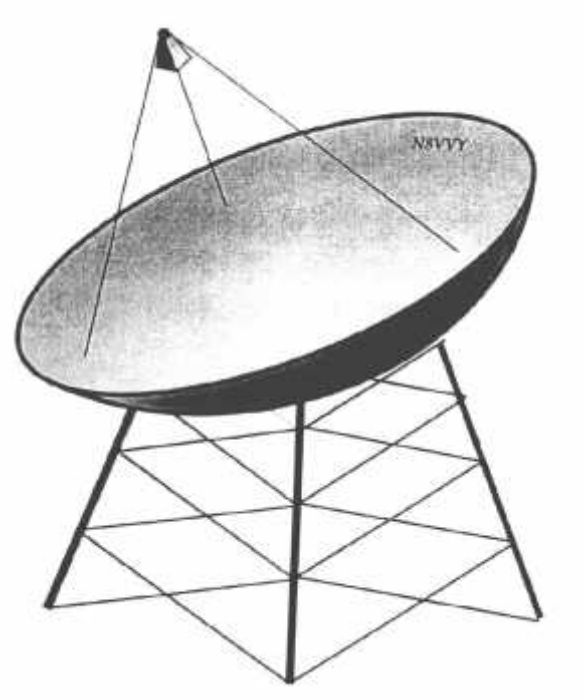

Annual Society membership is $ 12.00. Please make checks payable to Gerd Schrick

MIDWEST VHF-UHF SOCIETY

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Mtg Fri 23th of MAR. (6:30PM) MCL Cafeteria on 4485 Far Hills Av (Rt. 48) in Kettering. Going South from Dayton drive past the Town and Country Shopping Center on your left. At the next light turn right, then left into a small shopping center. MCL is at the end on the right

Contents

Upcoming Events

SVHF Society Conference: April 20th and 21st, Charlotte, NC.

Frequency Measurement Test (FMT) on April 19, a Thursday night this time. The **Test begins at 22:00 EDT and will be conducted on 20, 40, and 80 meters. 20 meter from K5CM only. We will pick up with 40 and 80 meters. Mike W8RKO. The exact schedule can be found in the April QST on Page 76**

Hamvention is May 18-20
MVUS Booth No 332
Noise Sources available, see next page, the highlighted part!

De N8ZM

Only two months until Hamvention, and there is a lot to do yet to get ready, but a few things have fallen into place.

We have our booth confirmed. No. 332 (same as last year)

There will be a **VHF/Microwave Forum.**

There will be a 2m beacon on the roof at HARA, and the 1296 Beacon will be on the air from its lofty 800 ft HAAT in SW Dayton. Frequencies to be published in the next Anom Prop.

There WILL be Noise Sources for sale in the MVUS Booth. Two models will be available. The model 6V will provide a nominal 5 dB ENR (calibrated) usable up through 2.5 GHz, while the model 6M will offer a nominal 5 dB ENR from 3 GHz through 10 GHz, also calibrated. The model 6V will sell for $50, while the 6M will be $90 due to the higher cost of the noise diode. These units are compatible with most Automatic Noise Figure Meters such as the HP 8970 models.

Let me know now if you want one (or more) to pick up at the show so we can have enough on hand.

There will be another High Altitude Balloon Launch from the Flea Market area this year, approximately 30 minutes after the end of the Balloon Forum on Friday. That translates to about 2:45.

In other news, at the last meeting we discussed a flied trip to the NRAO in Greenbank, WV, to see the radio telescopes there. The best time to do that is in conjunction with the Society of Amateur Radio Astronomers annual conference, which will be held June 24th through 27th, a Sunday through Wednesday. It is not too early to make travel arrangements, as this is a heavily attended gathering relative to the number of hotel rooms available. Be thinking about whether you want to go for just 1 or 2 days, or attend the entire conference. If less than the 4 days, then we need to pick the best days to be there. I am working on contacting the folks at SARA to see what they recommend. As there was a high percentage of you at our last meeting who expressed an interest in going, the headcount may give us some leverage. By the way, membership in SARA is $20 / year, not much worse than MVUS. And since I don't write a monthly column for them, it is a much better read.

So please let me know if you are interested in going so that I will have a meaningful headcount to discuss with the SARA folks.

See you on March 23rd at the MCL! de Tom, N8ZM

Microwave Update 2012

The 50 MHz and Up Group is hosting this year's Microwave Update conference from Oct. 18 to 21 in Santa Clara, CA, (near San Jose and San Francisco). Please see www.microwaveupdate.org for more info!

If you plan to submit a paper contact Mike at mud20120papers@gmail.com,

More Info coming up shortly!

This and That 3-12

Convoluted. The way we talk about paper in the United States is amazingly convoluted. The short answer is that 500 sheets of bond paper with a size of 17" by 22" have a weight of 20 pounds. The manufacturer would cut a sheet that big into four letter-size sheets, so a 500-sheet ream of 20-pound bond paper weighs 5 pounds. [Howstuffworks]

Multitasking. “Any man who can drive safely while kissing a pretty girl is simply not giving the kiss the attention it deserves,” Albert Einstein is purported to have said. The quote acknowledges a fundamental characteristic of human attention. Sometimes there simply is not enough of it to go around. [Scientific America.]

Stay Active. I tell my patients: ”The slower you walk the faster you die.” Exercise improves mood, deters diseases, increases energy, promotes better sleep and strengthens immunity. Fat is stored fuel waiting to be burned. So start burning it. [Dr Van D Merkle]

Scenic Route. Alcohol may lead to nowhere, but it sure is the scenic route. [Molly Ivins]

Sunspots. If you’re into sunspot theory, increased negative ionization during sunspot maximum periods increases human excitability. [Alexander Cockburn]

Traveling. If you don’t travel, it’s like only reading one page of a book.
[From the play “Wittenberg”by David Davalos]

Dust and Gas. You are made up of the same elements as stars and planets, such as: Oxygen, Carbon, Hydrogen, Nitrogen - with smaller amounts of other elements like Calcium, Phosphorus and even Iron. The combined value of the elements in your body comes to about a Dollar. [Brewster Rockit – Space Guy]

Almost Nothing. The different elements are made of atoms. Other than protons, electrons and neutrons, all atoms are well over 99% empty space! In fact if you remove all empty space from all the atoms in your body, you’d be smaller than a grain of sand. [Brewster Rockit –Space Guy]

Loosing Weight. Be tough on yourself like the determined matron who told her waiter, “If I order dessert, say ‘Nix, Fatso!’ “ [“The Doctor’s Quick Weight Loss Diet” By Irwin Maxwell Stillman, M.D. and Samm Sinclair Baker]

Computer Viruses. To-day there are more than a million viruses vying to infect your computer; it’s estimated that half of all PC’s are or have been infected. Consumers shell out more than $4 billion per year for software to fight these digital dragons. [Jason Kersten]

You Guys! According to the online Mirriam Webster dictionary, a guy is: ”a rope, chain, rod, or wire attached to something as a brace or guide.” So, clearly, it is not appropriate to use the phrase ”you guys,” unless you happen to be addressing a group of ropes, chains, rods or wires. [D. L. Stewart]

Fine Print. Two researchers at Carnegie Mellon University have calculated that if the average person would actually read al the privacy policies governing every website he or she visits (best estimate: about 1,460 sites), it would take 76 full-time working days. The median privacy policy, they found, is 2,500 words long. [The Week, Mar16-2012]

“Here and There”

Johnny W8RHH old C.W. hound has graduated ?? to 160 phone. How does it feel not to be pounding brass John.

Here’s a hot newsflash Dick W8LCO is rebuilding . Who said that was news ??.

If any of you hams is thinkin of changing QTH’s don’t move to Upper Dayton View, because it has a new name and you judge accordingly. Its called “Kilowatt Korner”.

Whats This about Jerry Watt , W8GCG using frequency modulation on 160 phone. Tell us about it at the next meeting Jerry is it narrow band modulation or what ??

Lowell Ditmer W8VMJ has taken on an XYL . I wonder if ham radio has taken a back set ??

[Excerpted from The oldest DARA bulletin (so far) posted on the DARA website. This is marked 1941 Issue Nr. 5 Mar. 24, 1941]

What the h... is LuLu?

By Tom Holmes, N8ZM

Gerd asked to write up a short bit about some of the books I have brought to the MVUS meetings recently. But first I thought I would talk about where I bought them.

Some of you have probably heard of LuLu, which is basically an internet business providing print-on-demand publishing services. Basically, they have a wide range of books stored in electronic format, and when you order a copy, they print it and mail it to you. Saves the cost printing copies of a lot of books which might sit in a warehouse forever, and also the cost of the environmentally controlled space to store them all. From what I have seen, their price is about the same or better for most publications.

As yuo may know, ARRL has been using LuLu for a few years to provide the Proceedings of some of the ham radio conferences which occur each year, such as Microwave Update and the TAPR DCC, as well as the Central States VHF Conference. The books are usually printed by ARRL before the event to provide hard copies for the attendees, but once those are gone, any further demand is handled through LuLu. It appears that the ARRL is insisting on holding the price through LuLu at the original cover price of the book (typically $20), but a number of other books I have found are quite inexpensive. LuLu also offers some books in downloadable PDF format for those who simply can't wait a week to get their hands on real paper.

Another interesting feature of LuLu is that you can publish and sell your own literary masterpieces through them. They will assist with many of the details of creating the book so that you don't need to be a knowledgeable editor/publisher. Other than maintaining some standards for decency, they appear to accept just about anything offered. The result is an inventory of over 10,00 titles, by their claim. When you sell a title, LuLu gets a piece, of course, and you get the rest. Because there is no first run of some minimum number of hard copies, the up front costs to get your book out are pretty small.

Last fall, I responded to some on-line ad for LuLu and went to their site (lulu.com) to see what it was like. It was easy to search for books by title or subject, although like most search engine results, you have to take the relevant with the not so. Two categories that seem to have the kind of stuff I am looking for were 'Crafts & Hobbies' and 'Engineering'. Under the first category, if you then search for radio you will find those conference proceedings I mentioned, as well as books on antennas, setting up a commercial broadcast station, and the amateur license exam question pools, among many other things. Under Engineering, be prepared for books heavy on theory and math, as well as flight control manuals for B-17s, P-38's, and the SR 71. You fly-boys might want to check this out! In all, LuLu claims to find 333 web pages on just Engineering topics.

Although the titles found by searches sometimes seem to be way off the mark, and often there are dupes, it works well enough to make it easier to see if something has been published on a topic you are seeking.

One thing to keep in mind is that since this is mainly a site for self-publishing, there may be some less than outstanding examples of prose or poetry (lots of that, it seems) offered. But that just goes with the territory.

And not to worry, I haven't published anything on LuLu yet.

"New' trends in VHF/UHF Power Amplifier Designs"

Joe Muchnij, N8QOD *

Last month I attended a joint meeting of the Society of Broadcast Engineers and the Society of Motion Picture and Television Engineers at the Harris Corp. facility in Mason OH, where Harris engineers designs and builds solid-state VHF and UHF transmitters for FM and TV broadcast stations. Their engineers gave us a peek at latest trends in VHF/UHF Power Amplifier design, with major emphasis on overall efficiency "...converting AC into RF." The digital waveforms being transmitted nowadays have high peak to average power ratios and need linear amplifiers, so class C amps can't be used; class AB amps consume a lot more power. While we hams haven't often considered the cost of input power, a 50KW broadcaster has to; I suspect efficiency will become increasingly important to us as well in the future.

The discussion began with praises for Laterally Diffused MOS transistors that provide lower channel resistance and higher electron mobility than previous VMOS devices. Relatively new and still expensive, LDMOS devices were credited with recent efficiency gains in broadcast transmitters.

The engineers are pursuing a number of approaches to increased efficiency, but three REALLY caught my attention.

Harris has switched to Grounded-Gate MOSFET amplifiers because they reduce feedback capacitance and provide lower input and output impedances, thereby simplifying the matching networks with their inherent losses. ...Gee, that's precisely why Grounded-Grid PAs were so popular in the fifties & sixties!

They are also working on modulating the amplifier's supply voltage, reducing it when peak output isn't needed. This is apparently a new development that came out of Europe and is taking the broadcast industry by storm, but the approach took me way back to my first AM transmitter and its Plate Modulation. Their goal is to minimize internal losses by keeping the amplifier in saturation at various instantaneous output levels. Note that while Harris' emphasis is on FM and TV, related efforts are being used to reduce AM transmitter carrier power; there's an article about Modulation Dependant Carrier Level (MDCL) in the April 2012 QST that I just received.

Their third attempt at improving PA efficiency is also out of the past, a circuit invented by W. H. Doherty of Bell Labs in 1936. A class C auxiliary amp in parallel with the primary (class AB) is normally biased into cutoff, but provides bursts of power needed for output peaks. The linear primary amp is allowed to saturate at a reasonably low level as the auxiliary amp turns on to efficiently handle the peak. The downside of the Doherty circuit is that it requires hybrid quarter wave phase shift networks between the two amps (to isolate them?), which limits it to narrow bandwidth applications. The engineers said while they achieved up to 15% better efficiency, a circuit could only cover a 6% bandwidth/frequency range.

*Joe is on the Board of Directors for Southwest Ohio Public Radio and the Chief Engineer for its low power FM broadcast station, WSWO, in Huber Heights, OH. He attended the meeting at Harris as a member of The Society of Broadcast Engineers.

Project Echo

Early passive satellite experiments. (1950s/60s)

By Mike Murphy, KA8ABR

In the late 1950's, when it became obvious that space flight was just around the corner, many scientific minds started to make plans for practical experiments to explore ideas whose time had come.

The newly formed NASA had access to launch vehicles developed by the US Air Force and Army for scientific investigation and industrial experiments. An idea gelled that would lead to the first application of several ideas in one project. Many scientists were curious about the tenuous outer reaches of the atmosphere, and a low mass satellite with a large surface area could be used to study outer atmospheric phenomena by observing the perturbations of the satellite motion optically from the ground. An ARPA project was eventually turned over to NASA, laying the groundwork for the Echo project in 1959.

The Bell Laboratories were interested in studying the use of satellites as relay stations for the long distance portion of the telephone system, and a passive reflector of large size was, in theory, capable of carrying telephone and television traffic through space. The idea of a passive reflector in space was not new, as since 1944 it had been proven that the moon could be used as a reflector for radio waves. The US Navy used the moon as a reflector for a practical Teletype system that was in service in the late '50's.

An agreement was reached between NASA and Bell Labs wherein the government would fund the development and construction of the balloon, as well as creating one ground station in California through the Jet Propulsion Laboratory. The Bell System would develop a ground station to use on the east coast, and the government would also provide the launch vehicle and launch operations to place the satellite in orbit.

The first Echo satellite was a Mylar balloon that was aluminized so radio waves would reflect off of the surface, and the bright finish (and large size of the balloon - 100 feet in diameter when inflated) would make the satellite easily visible from the ground. In the early days of the space age, much of the tracking data was gathered optically, as space radars were still being developed. On the RF side of the project, the Bell Labs decided to use a duplex circuit for telephone-like communication, and two bands were chosen. One signal (east to west) would use a channel near 960 MHz and the other (west to east) would use 2390 MHz. This would give the engineers practical experience with UHF and microwave techniques in space communication where new problems arose, with very weak signals and Doppler shift being encountered. Propagation effects could be studied as well as the signals passed through the atmosphere and ionosphere on their way from coast to coast via satellite reflection.

Bell Labs built a huge horn antenna and large parabolic reflector, both steerable at their Holmdel, New Jersey facility. Both antennas were carefully optimized since the reflected signals were expected to be very weak indeed. The horn antenna gained fame again in 1965 when Penzias and Wilson used it to detect the 3 degree Kelvin background radiation left over from the beginning of the universe.

JPL built a steerable parabolic reflector at Goldstone Dry Lake in the Mojave Desert for the project, using an existing antenna nearby for the other portion of the duplex link.

To test the ground systems before the satellites were available in orbit, JPL and Bell Labs used the moon as a reflector as the signals returning from the moon were about as strong as those expected from the satellites. An early weather satellite, TIROS I, was also used as a target. It moved rather quickly, as Echo would, but tracking proved feasible for both stations.

A MASER amplifier was used on the microwave portion of the receiving systems at Bell Labs to achieve low noise performance. Since the goal of the program was wide band communication (telephony and television), amplifier noise had to be kept to an absolute minimum.
A first attempt to launch an Echo balloon ended up failing on Friday the 13th of May, 1960, when the orientation thrusters failed on the second stage of the rocket during a coast phase of the launch. The payload ended up on a sub-orbital trajectory and the balloon was lost.

Next, Echo 1A was launched in August of 1960 from Cape Canaveral in Florida aboard a Thor Delta rocket, and it inflated properly after being placed into a 600 X 1340 mile high orbit inclined
47 degrees to the equator. However, the balloon was hit by the container it rode in on its way to orbit. It did not achieve the planned spherical shape due to loss of pressure from a leak and this disturbed the reflections of radio waves. Communication between the coastal stations was successful, proving out the radio links and the tracking systems required to keep the antennas pointed at the satellite. In the early messages transmitted across the satellite path, one from President Eisenhower invited other countries to use the Echo balloon for their own communications experiments. No evidence was found that others did so with Echo I, but the later satellite, Echo II, was used by the US, Great Britain and the Soviet Union for communications experiments. Tests with the Soviets were conducted in England at the Jodrell Bank radio telescope near Manchester.

Experiments revealed that tracking the balloons was the most difficult part of using passive reflectors and UHF/micro-wave frequencies. Signal levels were adequate if the antennas could be kept on the balloon, but the high drag of the satellite and the strong affect of the solar wind made prediction difficult. Closed loop tracking by the automatic pointing system was temperamental, and the recommendation was for much larger balloons to be used in practice, with higher transmitter powers as well.

The Echo balloon was easily visible from the ground and quite bright when conditions were right. Many people viewed the satellite as it majestically drifted by, and press outlets around the world would indicate when periods of visibility occurred locally.

Scientists were able to use the optical and radar tracking data to learn about the forces that influenced the movements and the location of the satellite. Very little was known at the time about the far reaches beyond the atmosphere. These activities extended considerably the knowledge of the world and provided data for future satellite launches.

Mike was intrigued by satellites from an early age when people talked about Telstar and Echo, and the local newspapers listed times when various bright satellites were visible in the night sky. The first satellite he remembers seeing was one of the Echo balloons in the mid '60's. {Ed}

Can a $129 spectrum analyzer be any good?

An EMC consultant reviews the RF Explorer.

Kenneth Wyatt, Wyatt Technical Services -- Test & Measurement World, 3/1/2012 3:17:20 PM

Every EMC or design engineer should own a spectrum analyzer. Most new ones, however, are expensive, and used ones are large and heavy. Until recently, these instruments have been priced too high for electronics hobbyists or engineers on a budget. Imagine my surprise when I found the RF Explorer, a small handheld spectrum analyzer priced from as little as $99. Could it possibly be any good?

There are five RF Explorer models. Four are single-band units, each covering the most-used ISM (Industrial Scientific Medical) bands--433 MHz, 868 MHz, 915 MHz, and 2.4 GHz--and one model that encompasses all bands, except 2.4 GHz. The 2.4 GHz band may be retrofitted into the all-band model for an extra $55. The RF Explorer uses the Silicon Labs Si4431 receiver chip (240 MHz to 960 MHz). I purchased the $129 WSUB1G. It tunes from 240 MHz to 960 MHz.

Probing a crystal oscillator demo board with the RF Explorer displays usable harmonics. The sensitivity was sufficient to display usable harmonics.

The analyzer is relatively easy to configure for frequency and span (or high and low limits) and reference level. Once the span is set, pressing the left and right keys causes the frequency to change in half-span steps. Pressing the up/down keys changes the vertical range in steps according to the defined vertical scale. The RBW (resolution bandwidth) is automatically set and displayed at the bottom by pressing Return during a measurement. This displays the center frequency, span and RBW. Pressing Return once again displays the start, center, and stop frequencies.

I like the fact the unit includes modes for normal, max, averaging, and max hold. Normal mode displays the signals with no calculations. Max takes the last (1 through 28 user-defined) sweeps and displays the peak amplitudes. Averaging takes the last (1 through 28 user-defined) sweeps and calculates the average. Max hold changes to a persistent display, recording the highest-level amplitudes detected.

The instrument firmware is open source, so the designer, Arial Rocholl (from Spain), and an active worldwide user group are always improving the performance and adding additional features. Units can be easily upgraded with the latest code. Another nice touch is that free client software is available for both the PC and Mac platforms for remote programming, display, and waveform capture through the USB port.

While the RF Explorer is certainly usable as a limited EMC troubleshooting tool and for general spectrum measurements, it does have a few drawbacks. The most obvious is the limited frequency range of 240 MHz to 960 MHz. I'd like to see the unit could tune down to at least 10 MHz or even 1MHz, and go up to 1.2 GHz. Unfortunately, the Silicon Labs Si4431 receiver IC limits the bandwidth. Rocholl is currently looking into alternatives.

The RF Explorer has an input-power limit of +5 dBm. Rocholl is very careful to bring this to the attention of the user, but this is another limitation of the receiver IC. Use a power limiter or attenuator prior to measuring an unknown signal.

While the frequency appears to be within the specified tolerance, I did notice that the unit seems to measure about 4 dB to 5 dB low at the frequencies I tried. Rocholl acknowledges this is an issue with some frequencies and is working on a user-based calibration procedure.

Use of a spectrum analyzer is vital for the EMC troubleshooting process and general RF design. While this model lacks a completely adequate frequency range, the price/performance is spectacular and may be just the ticket for cash-strapped companies who just need a minimal instrument to beat down their emissions problems.

The RF Explorer series is available through www.seeedstudio.com/depot/ (under "Hacking and Measurement") as well as a few other hobby-oriented sources. The online version of this article contains a link to a YouTube video that demonstrates the basic operation.

How to Check a Battery w/o any Instruments.

By Steve, K8UD and Gerd, WB8IFM

Last month's cartoon where the little boy was looking at two identical looking batteries and wondered which was the good one got some of us thinking. One often runs into this problem when an appliance gives up and one is ready to replace one or two AA cells with the same kind. My method is: put the ones I take out on the left and keep the new ones on the right after taking them out of the package. But then I go and get my trusted VOM, because I want to measure how far down the voltage went in the spent batteries. If the voltage is one Volt or less for a single cell that is a sign that the appliance is well designed. But you wouldn't believe how often the cells read 1.2 or 1.3 V, still in the useable range.

If you have no VOM what do you do? Then, well, it's hard to do with the AA, AAA or D cells, but Steve, K8UD relates how he used to check a 9V battery with his tongue. The terminals on the 9V battery are close spaced so that they can both be touched simultaneously with the tongue. The moist tongue lets a small current flow and gives you a tingling feeling. It also activates the taste buds and the taste is typical "metallic". I am sure you could practice and probably estimate or at least compare a full with a spent battery and tell the difference. Maybe one of our readers will do some experimenting and report to us!

Back in the "old country" (Europe) they have a 4.5 V battery and we kids would always "taste" this one with our tongues. You see, this battery has the cells arranged side by side forming a neat, almost square package. I see where this battery is now called a pocket battery. Appliances can be designed so that they fit nicely into pockets. This battery has the terminals coming out from the top, the positive being the short one and the negative the long one almost touching one another. So it's easy for a small tong to bridge them for testing. (See picture below)

A Simple Element to Boom Clamp?

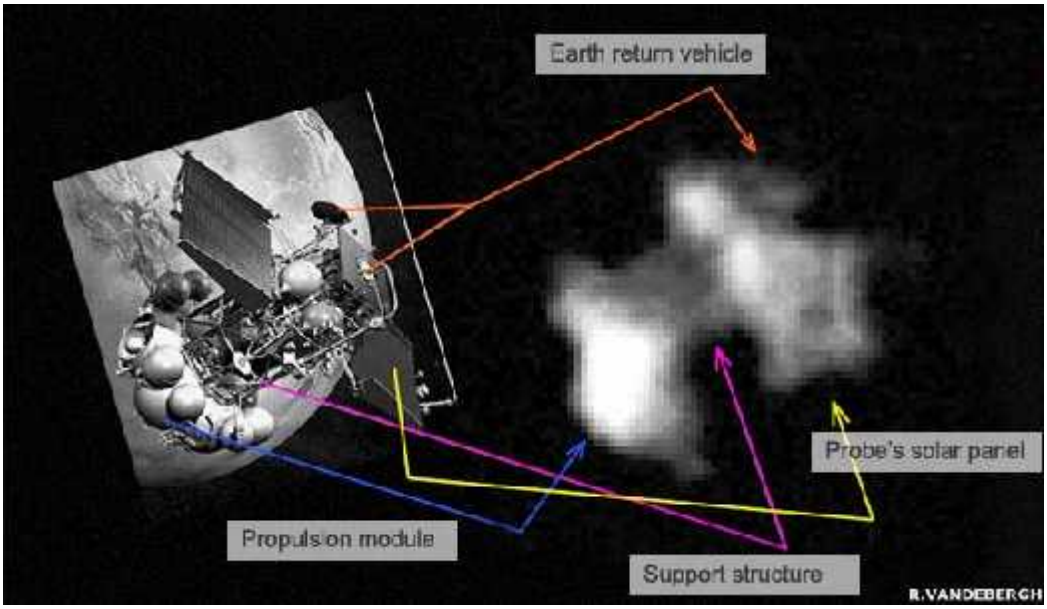
This special clamp which looks like an elongated U-bolt that has been bent and so is suitable to connect two tubes perpendicular. It is offered and used by Rohn to connect their tower sections

Why use COPPER GROUND STRAP?

Because of the “skin effect”, radio frequency currents tend to conduct along the surface of a conductor rather than through the middle. Because of this effect, COPPER STRAP is more efficient than wire at handling high frequency currents. This makes COPPER STRAP a logical choice in RF grounding applications and in applications requiring bonding and grounding for lightning protection. Currents encountered during a lightning strike can be compared to high-level RF currents. COPPER STRAP handles these currents more effectively and with less inductance than the same amount of copper in wire form.

Considering corrosion/ oxidation, Tape maybe a better choice (Ed)

Space Photography



Phobos-Grunt
imaged from the ground
on 29 Nov, 2011
at an altitude of 230km
and at a range of 274km

(ralfvandeburgh.startje.be)

North American softwood dimensional lumber sizes

Nominal (in)	Actual	Nominal (in)	Actual	Nominal (in)	Actual
1 × 2	¾ in × 1 ½ in (19 mm × 38 mm)	2 × 2	1 ½ in × 1 ½ in (38 mm × 38 mm)	4 × 4	3 ½ in × 3 ½ in (89 mm × 89 mm)
1 × 3	¾ in × 2 ½ in (19 mm × 64 mm)	2 × 3	1 ½ in × 2 ½ in (38 mm × 64 mm)	4 × 6	3 ½ in × 5 ½ in (89 mm × 140 mm)
1 × 4	¾ in × 3 ½ in (19 mm × 89 mm)	2 × 4	1 ½ in × 3 ½ in (38 mm × 89 mm)	6 × 6	5 ½ in × 5 ½ in (140 mm × 140 mm)
1 × 6	¾ in × 5 ½ in (19 mm × 140 mm)	2 × 6	1 ½ in × 5 ½ in (38 mm × 140 mm)	8 × 8	7 ¼ in × 7 ¼ in (184 mm × 184 mm)
1 × 8	¾ in × 7 ¼ in (19 mm × 184 mm)	2 × 8	1 ½ in × 7 ¼ in (38 mm × 184 mm)		
1 × 10	¾ in × 9 ¼ in (19 mm × 235 mm)	2 × 10	1 ½ in × 9 ¼ in (38 mm × 235 mm)		
1 × 12	¾ in × 11 ¼ in (19 mm × 286 mm)	2 × 12	1 ½ in × 11 ¼ in (38 mm × 286 mm)		