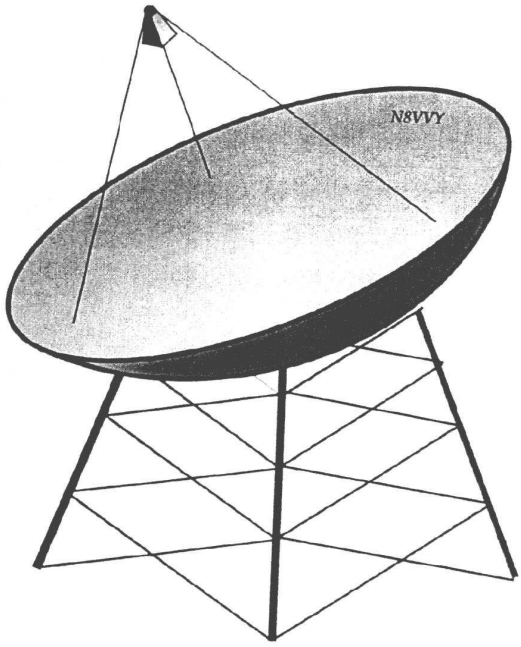
Meeting: Fri 27th at the MCL Cafeteria in Kettering

Apr/May 2012

ANOMALOUS PROPAGATION

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



Editors:
Gerd Schrick, WB8IFM
4741 Harlou Drive
Dayton, OH 454 32
(937) 253-3993
WB8IFM@ARRL.net

Steve Coy, K8UD
3350 Maplewood Dr.
Beavercreek, OH 45434
(937) 426-6085
K8UD@ARRL.NET

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

Hamvention is May 18-20
MVUS Booth No 332

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.

Notice Something? Our "This and That" is missing. We almost lost the entire Bulletin due to a computer infection. We were able to restore/ reconstruct and add material but not the "This and That" This page is slowly (over a month's time accumulated, the sources are noted but usually hard to retrace! However, the page is hiding somewhere in the Pc. So we hope it can be found shortly. As they say: **Stand by, OM!**

DE N8ZM

Only a few short weeks until Hamvention, so I hope you folks are getting your plans together and organizing the stuff you want to sell or making a list of things you absolutely must buy at Dayton (YL's take note of the word 'must'). Gerd and I have taken on the VHF forum for this year, and have a pretty good line up of speakers. I can say that since three of the speakers are Gerd, Mike Murphy, and me. We'll also have a fun talk by Kent Britain. Hopefully, Gerd has included the details somewhere in this edition. If not, you can check out the forum schedule on the Hamvention web site for them at www.hamvention.org.

I hope some of you will make time on the Thursday before the show to swing out to the arena to help Gerd setup the booth, SA-332 is the space number. Same location as last year. Also, Mike, W8RKO, will be installing the 2m beacon on the Hara roof on Wednesday or Thursday, and he might like a bit of help lugging stuff up there. He is also planning to have the 1296 beacon back on the air by then. Mike sure keeps busy. As I write this, he is setting up for the April 19th FMT, as he is the one who makes W8KSE's participation as one of the sources possible. If you need his phone number or email, contact me for it.

As I mentioned last month, we will have Noise Sources available in the booth, but I would like to have them ordered in advance so we can be properly prepared. I have received some orders already, so please let me know if you want one so that you can pick it up at the show and save the shipping costs. The Model 6V which goes up to 3 GHz will be $50 plus shipping if not picked up at Hamvention, and the Model 6M good for 3 GHz to 10 GHz will be $90 plus shipping. Both are nominally 5 dB ENR.

Don't forget the balloon launch on Friday at about 2:45. WB8ELK plans to have slow-scan from the balloon camera available this year, as well as an on-board recorder for either videos or stills. Hamvention has on their web site several pictures taken from the balloon during last year's launch and flight. Very cool!

We have been talking about an MVUS field trip to see the NRAO radio telescopes in Greenbank, WV in June, to coincide with SARA's annual conference which is held there. However, when I took an interest survey, the responses came back with an almost deafening not interested / can't go. So be it. Not sure what happened there, maybe just bad timing for the conference. However, if any of you are interested in SARA, the Society of Amateur Radio Astronomers. They will have a booth at Hamvention. Check it out, if only for curiosity's sake.

Our tour of the 10 GHz EME installation at the former VOA site in Mason was interesting and a lot of fun. Of course, being the 'eating society', we started out at a restaurant before the tour. There were 8 or 10 of us, I didn't count, and all were quite impressed with what Jim and Mike have accomplished, especially when there is a live demo of signals coming back from the moon! Thanks to Greg Jump, who took pictures and provided the captions, you can see what we saw in this issue of Anom Prop. Check it out!

See you all on April 27th at the MCL! Tom, N8ZM.

So what am I reading these days…

By Tom, N8ZM

OK, enough about Lulu itself. What I really wanted to talk about was the books I purchased from them. Last fall I ordered the proceedings of the following: the 2010 EME conference, the 2011 joint Microwave Update and SE VHF Conference, and the 2008 SARA Conference. I guess that gives you some idea of where my interests are, if you didn't already know that. About 60 bucks worth, plus shipping by USPS, which was the cheapest way offered.

All three of these books had several interesting papers, and it would be tough to pick a list of my top ten favorites. The SARA papers were interesting because it gave me a glimpse into a different way of using radio. And as some of the SARA authors are not hams, their approach to the subject gave a different perspective on how to solve the challenges of building and using HF, VHF, and microwave gear for detecting really weak signals. Often in radio astronomy (or RA), it requires a long time monitoring a frequency band and processing the data to see meaningful results. And these folks are no strangers to the use of DSP and such. They also do their work at frequencies which are not in the ham bands (that's for obvious reasons, of course) so the surplus equipment that they can press into service is frequently stuff that hams wouldn't look at twice. A couple of articles covered observing the Sun using 12 GHz satellite TV gear and interferometry techniques, for example.

The MUD-SEVHF book had the expected articles on preamps, antennas, power amplifiers, and more. Noise figure is always a hot topic, and the availability of high power transistors for VHF and UHF has allowed the development of KW class homebrew amplifiers that put out clean signals and have decent reliability if you take the necessary care in the design and construction. The guys who do this work are to be commended for not only the technical achievement, but also for taking the time to share what they have learned with the rest of the ham community. I can tell you from many years of writing for Anom Prop that putting coherent and meaningful words on paper takes a lot of time and thought (OK, in my case the latter may not be so obvious). Finally, the proceedings from the 2010 International EME Conference was by far the thickest, being roughly the same size as the typical ARRL Handbook. Again, many of the same topics as above, but pushed a little further to get the performance needed for EME work. A terrific addition to the book was the inclusion of Dick Turin's, W2IMU, EME notes from the '60's, known as the Crawford Hill notes. Dick was a pioneer in EME, and his notes give real insight into what it took to work off the moon with the technology of the day, but also shows how much of what he learned still applies.

A couple of interesting papers told about doing mobile EME, driving over 6000 miles to get on the moon from states that otherwise have no EME activity. How else does one get WAS via EME only? Another couple of articles showed how many hams lately have used the well known JT65 digital mode to work EME using a single yagi and relatively low power (<200 watts on 432 or 1296, for example) to work other similar stations. No big dishes or arrays required on either end!

All of this lead me to start thinking about setting up a station for either EME or radio astronomy, or both. Which lead very quickly to the challenge of antennas which lead to me thinking about the work in the early 50's of Penzias and Wilson, who discovered the cosmic background from the Big Bang using a horn antenna* that was the predecessor to those big sugar scoops you see on the old AT&T Long Lines towers around the country. Very quickly I learned that while many of those have been taken out of service and scrapped, there are also many left unused on towers that are free if you can get them down and hauled away. Something that weighs 1500 pounds, is thirty feet long and is located 300 feet above the ground id, frankly, a bit out of reach for me in more ways than one.

After struggling with and finally letting go of that idea, I am now contemplating what would be needed to build something similar, on a smaller scale and out of lighter weight materials. Maybe foil-backed insulation, for example. Or thin plywood lined with galvanized sheet metal, or even spray painted with conductive paint.

But for now, this is all just ideas to be thought through.

Wait, wasn't this supposed to be

* see the pictures in the article: Echo, part 2 following this write-up

Part two ….Project Echo

By Mike Murphy, KA8ABR

Due to problems encountered with the first balloon, a second was launched in 1964 that had improvements in the separation and inflation systems as well as being larger in diameter at 135 feet. By 1964, the experiments with the Telstar system had shown Ma Bell that active repeating satellites were much more useful than the passive reflectors, but the second Echo satellite was still used extensively for experimental purposes as noted above. The reflected signals were very weak and not amenable to wide band communications as practiced in the early '60's. Active repeater satellites developed much stronger signals at the receiving antenna, improving the margins needed for commercial, wide band communication. The success of active repeating satellites like Courier, Relay, Telstar and Syncom was the death knell for passive reflector satellites as communication tools.

Echo II was launched in January of 1964 from Vandenberg Air Force Base in California on a Thor Agena launch vehicle into a 640 X 817 mile high polar orbit inclined 81^0 to the equator. Echo II was even brighter than its predecessor as it was in a lower orbit and physically larger than Echo I with a diameter of 135 feet. In addition to the experiments in UHF and microwave communication, Echo II was also used for a reflector of VHF signals at 162 MHz. VHF was used for the first direct contact between the US and USSR via satellite from Jodrell Bank.

With two balloons in orbit, a lingering interest by the public in satellite viewing seemed to hang on after most had lost interest when that Space Age craze wore off. In the early to mid '60's, the once popular Moonwatch program faded towards obscurity as the "Space Age" fad waned and radar provided more useful and timely tracking data.

The two Echo balloons were observed extensively to study the shape of the earth and the location of places on the surface, as they were in high orbits. Being visually bright and high in altitude allowed them to be observed easily from almost any point on the earth, and the location of the observing station could be determined using the known orbital parameters as the basis for back calculating that position. The location of the city of Moscow was determined more accurately by observing the Echo balloons from the US Embassy grounds, thus insuring a closer "hit" if nuclear war had broken out at the dawn of the missile age.

Eventually, because of their low mass and large surface area, the orbits of both Echo balloons were perturbed to the point where they decayed from orbit, Echo I burning up in May of 1968 and Echo II coming down in June of 1969. Balloon satellites still held some interest in the field of geodesy, and a balloon satellite called PAGEOS (**PA**ssive **G**eodetic Earth **S**atellite) was launched by NASA in 1966 to be used for locating points on the earth's surface using triangulation. This balloon was very well observed over the years, and the data collected contributed to improved knowledge about the shape and layout of the earth's surface. It finally was brought low enough by atmospheric drag that it broke up in 1975, leaving a trail of fragments that moved along the sky like a ghostly progression of dots. By 1976, most of these fragments had decayed, but one defies air drag and is still in orbit.

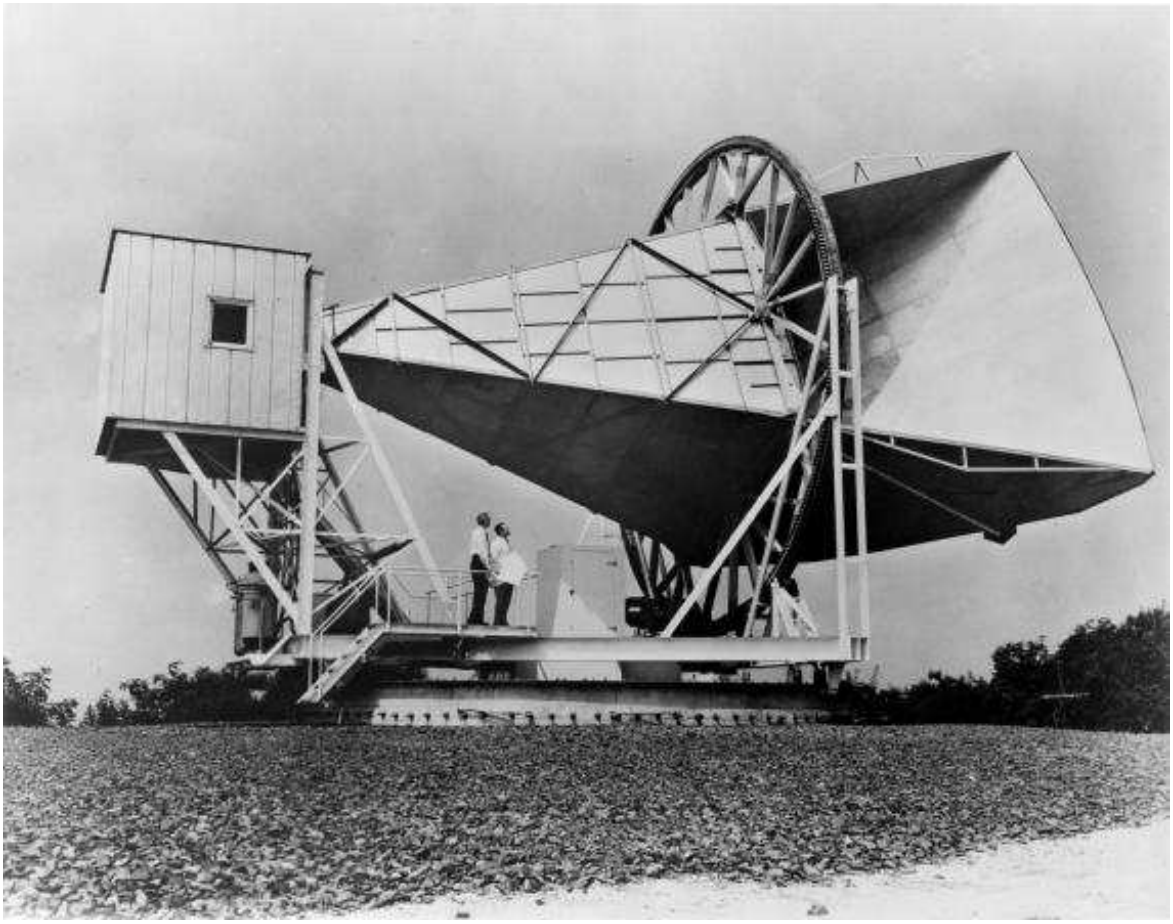
The successful balloon satellite experiments led to the more modern geodetic satellites that use reflected laser light and small, spherical and massive satellites in high orbits. Since 1976, several "mirror ball" satellites have been launched to continue the geodetic studies of the earth's surface. Satellites like LAGEOS I, LAGEOS II, EGP, SeaSat 1 and the recently launched LARES continue the tradition of optical satellite geodesy.

Two rather famous gentlemen were instrumental in the Echo program from the Bell Labs end, including John Pierce and Rudy Kompfner. Rudy invented the traveling wave tube, and John Pierce improved it by perfecting the electron gun. John went on to the Telstar project and many other interesting things throughout his career at Bell Labs.

There was a somewhat "local" connection to the Echo balloon project. A facility was established at Ohio State on the agricultural land west of the main campus that the Air Force used to combine signals from four independent dish antennas. This site was receive only, and depended on sites at Ohio University ("Radar Hill") and Rome Air Force base in New York State that transmitted signals to the Echo satellites. The antennas are now gone, but the building is still in use. It currently houses the Argus SETI radio telescope, but that is a different story!

85 foot dish built for the Echo project by JPL at Goldstone Dry Lake

Horn Antenna built by Bell Labs for Echo satellite experiments



Transponder Update.

By Steve, K8UD, John, N8VZW and Gerd, WB8IFM

We had a very mild March and on one of the first warm days we did get the transponder mounted in our box on the Roof of Steve K8UD business building. We had "bench tested" checked everything out (or so we thought). But as they say: the proof is in "Eating the pudding".

So John, N8VZW and I got ready to check it out from the distance. We had picked locations roughly ½ mile, 1 mile and 2 miles away, the last one being my home QTH. We were using two HTs, one 70cm as the TX and one 2m as the IF following a converter. There was just one minor problem with the converter: it needed a 15V DC source. So I cobbled 2 strings of batteries, one with10 NiMHs and one with 4 NiMHs together. That worked fine but we had to constantly worry about this battery and the total voltage! Later John took a Drake converter and modified the supply voltage to 12V and used his car's on board battery for power.

Another feature that irritated us was the inability to get quantetative readings on the HT that we could record and later on use to make calculations. Ever since we got into using FM and HTs I have marveled about these curious signal reports like "full quieting" or "there is some noise, but not bad", I guess they could have said "half quieting" or "quarter Quieting" etc. Some classy FM transceivers have "S-meters" and some HTs have segmented LCD bars. But they still deal basically with noise and carriers. In our case extra noise was added from the converter and I remembered from the good old high orbit satellites that your report would either be S8 or S3, depending on whether this noise was included or subtracted. Your real signal was, of course, S3, the 5 extra units were compliments of the converter noise!

Anyhow we made good connection to our first two destinations, but from my house: no way. I had both antennas mounted at about 15 feet above ground, a 13 el Yagi for 70cm with RG8 to the HT and a medium size 13cm helical with connected converter and then RG 58 to the HT. Cables were 30' long leading to the basement. I raised the 13 cm helical to the 50' level of the tower, still no reception.

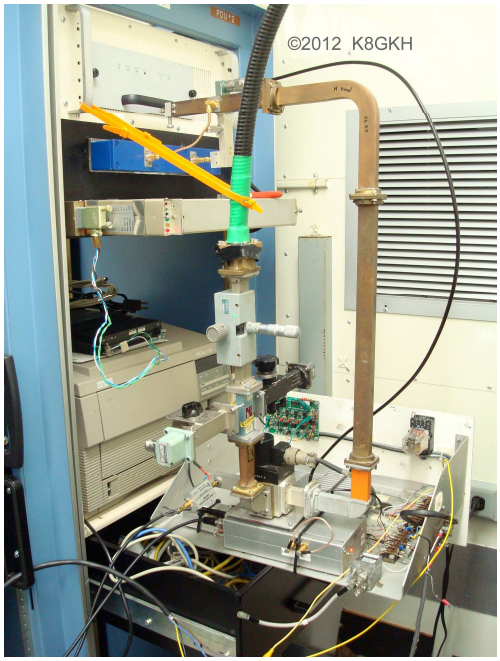
Occasionally a cell phone comes in very handy, I was in contact with Steve, who at the repeater location could transmit using an HT while I was listening: voila "full quieting". So this told us the transmit part of the transponder worked just fine and with practically full output (this is set to limit at the 20W level. We ought to get a whopping signal for a few miles.

I kept scratching my head, how to check the Amplification of the 70cm receive path. But my 500MHz signal Generator and my 10GHz spectrum analyzer had conked out so a trip to one of our measurement gurus was in order. Tom, N8ZM offered help. In less than two hours we not only had determined the overall gain of the Transponder from input tp output, but also measured the output, the gain of the PA and calibrated the Power meters of the build in VSWR meter. What I learned here is that you have to allocate a portion of the output power to each input signal. Let's say you expect to accommodate 20 users simultaneously, then each should receive 1 W of the 20 we have available.

The major find was that we were approximately lacking between 20 to 30 dB of gain, sure seemed to indicate a bad input stage. A quick E-mail exchange with Mike, DB6NT, made us check the drain voltage of the input transistor, which was insufficient indicating a fault. It took us a few days but we got a couple of transistors and with great care, fine feeling tiny tip solder iron and a huge magnifying ring light Steve, K8UD, took the old transistor out and put in a new one.

Before putting the transponder back into the box on the roof, of course, we checked out everything. All seemed ok, but it is very difficult to get a feeling on "how good" it really is. So we turned it on and went our way to again measure our way points one and two. Both delivered good and repeatable signal strengths. Next came the test from my house. On returning several "honey does" were waiting and it took me a few hours before I got in the air and low and behold: there was the return signal loud and clear. The beauty of the transponder: you can check it out all by yourself. It was Friday night and I quickly I called Steve before he left for the weekend and also called John to pass on the good news.

The 7.2meter,10 GHz dish that is used for moon bounce. EME The antenna is steerable and controlled by hardware and software developed by members of the Westchester Amateur Radio Association. ***[++]*** Note the red aircraft warning lights that were needed due to the VOA occasionally landing helicopters at the site. When the dish is in moon tracking mode, you can just perceive the periodic position adjustments if you listen and watch closely. Jim and Mike had to literally start from scratch with the positioning system, including the motor/gear drives because the VOS folks took the original drives to have as spares for their other locations that use this same dish design.



10 GHz, 60W transmitter - lots of wave guides / plumbing. ***[++]*** It was easy to hear the echoes of a short CQ sent to the moon. The echoes were pretty loud, no headphones needed. 55 dB of antenna gain sure helps with that! Jim, N8ECI and Mike, KA8ABR have done an excellent job of engineering this station, and keep working on improvements.

In the center, we see a spectrum analyzer and above it the temperature indicator that senses radiation from the moon (which is above absolute zero Kelvins). The dish guidance system uses the temperature radiation to determine when the moon is centered in the path of the 7.2meter dia antenna. Software keeps the moon centered as the earth and moon slowly change position relative to each other.***[++]*** Given the beamwidth of the antenna vs. the width of the moon, the antenna aiming needs to be adjusted every couple of minutes to keep the moon centered in the antenna pattern. It would be a real challenge to do that manually while also trying to make contacts. The temperature based tracking method does a superb job! Because the dish meant to aim at geostationary satellites cannot be pointed just anywhere in the sky, there are somewhat limited opportunities to work some parts of the globe.

Here we see the Icom IC-251 transmitter that is used as the exciter for the 10 GHz transmitter. The two keys are used to enable the 10 GHz transmitter and to send CW. The key to the upper left enables the transmitter and the one on the lower right is for those who can still operate a straight key.

MVUS Excursion to the Ex-VOA Site in Bethany Ohio --10 GHZ EME Station run by the Westchester Amateur Radio Association

Photos and Captions

By Greg Jump, K8GKH

Russia plans Moon base, Mars network by 2030 [Kurzweil bulletin]

March 16, 2012

Russia plans to send probes to Jupiter and Venus, land a network of unmanned stations on Mars and ferry Russian cosmonauts to the surface of the Moon — all by 2030, according to a leaked document from the country's space agency.

By 2020, the six-seater Angara rocket will replace the Soyuz as the spaceship of choice for launching Russian payloads.

By 2030, Russia will send robots to the Moon to collect samples. The program will be punctuated with a manned Moon landing.

The optimistic program also lays out plans for active exploration of other planets in the solar system, and ideas for a follow-up to the International Space Station after 2020.

NE8I/r 222 Spring sprint results.

25 QSO's 11 grids worked. Activated 3 grids. EN 74, 73, 72. Set up DEMI xvtr 100W into 8 el K1FO. Started in EN74oa, Harrison Mi. Spent about a half hour there. Then heading South on US127 to EN73. Usual stop there EN73ou, then to St Johns Michigan: EN72rx, then back to EN73ra each stop about half hour, then North and home for a 170 miles total. While driving, I can't operate CW. Plus, can't take my eyes off the road. GPS with 6 digits would be ideal to have. But … No GPS. Old fashioned maps. Also I forgot to bring my key this time. Really, need a full time driver.

Likely same route next week for the 432 sprint. 902 plus sprint, SBMS test and 6M will likely be something different. More fuel money or cheaper gas, it would be the Lenon 4 corners, or along Lake Michigan.

This was much better then the 2M sprint. Worked 2 of every 3 stations heard/called. Not one in 5 running barefoot. The 100W working amp really helped.

73, Lloyd NE8I/r EN73 etc

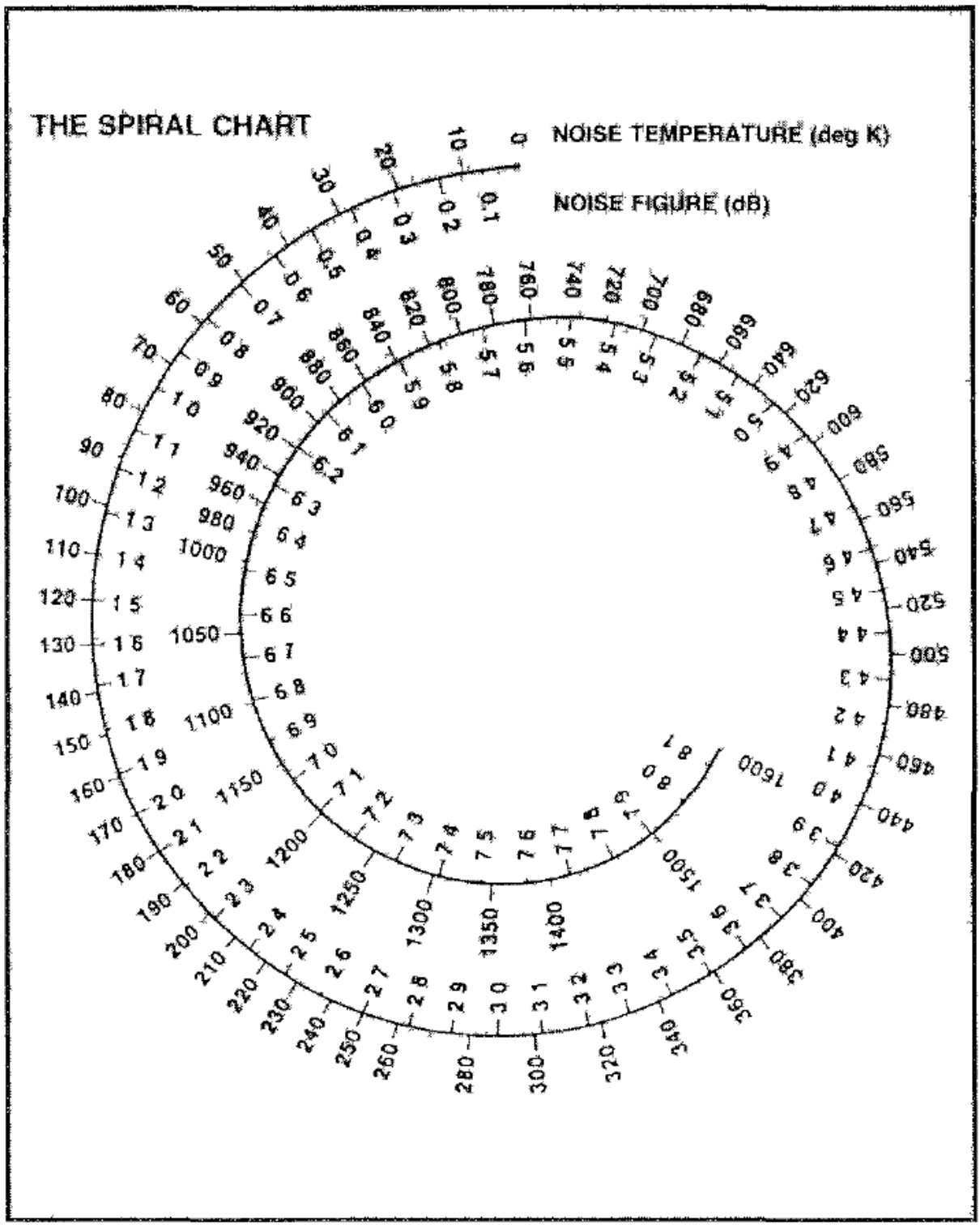
Fiber cables to Span the Arctic Ocean

The demand for better connection between Tokyo and London is driving construction of the first submarine fibre-optic cables to span the ***Arctic Ocean.***

Two routes are planned: one through the Northwest Passage in Canadian and Alaskan waters, the other through Russian waters on the other side of the Arctic.

[Complete article by Jeff Hecht in Laser Fucus World of April 2012]

NF (dB) = 10 lg (T/290 +1); **T** (^{0}K)= 290 (10 exp NF/10 – 1)



[Chart from the Internet]