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April / May 2000

### Club Memorial Call W8KSE

**April Meeting.** Friday, the 28<sup>h</sup>, at 7:30 PM at the Perkins Restaurant at SR 73 and I 75.  
Meeting Topic: The upcoming Hamvention  
and Tom, N8ZM will finally talk about the need to use a preamp at the antenna.  
We will have the noise meter available for a few measurements

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### Upcoming Events.

Dayton Hamvention / ARRL Natl. Conv.....	19/20/21 May
Central States Conference/Winnipeg, Canada.....	20/22 July
Microwave Update/ Philadelphia, PA.....	28/30 Sept.
AMSAT Symposium/Portland, Main.....	27/29 Oct.

As I write this,

Hamvention is just a month away. Not much time at all to get all my plans in place, either for myself or for MVUS. A few things are coming together on time, so maybe there is a chance that all will turn out well. Red and Merle have once again assembled an excellent group of speakers for the VHF/UHF/Microwave forum. We have our booth space, #718, which I believe is the same or close to where we were last year. And so far, you guys have been very responsive to signing up to help with the booth. I have badges in hand for Gerd, Steve Coy, Clyde Schaffnit, Sam Laube, and Bruce Lundy. Additional volunteers include Sherwin Kidde, John Human, Bob French, Daun Yeagley, Joe Muchnij, and Chuck Riechers. At the April 28<sup>th</sup> meeting I'll try to have the rest of the badges, and we'll set up a work schedule. If any of you are available on Thursday before the show, I know Gerd will appreciate some help getting things assembled. A reminder, the inside exhibits open at 9:00 a.m. on Friday, closing at 6:00 p.m. Saturday hours are 8:00 a.m. to 5:00 p.m., and Sunday hours are 8:00 a.m. to 1:00 p.m., at which time we can tear down.

In past years, we have had various equipment displayed, from antique VHF/UHF gear, to member's latest projects. Let's bounce some ideas around at the meeting for this year.

At the February meeting, the membership approved the donation to AMSAT, and I passed around a letter for the members to sign. As I missed the meeting last month, I'll bring the letter along for anyone who hasn't yet signed it. We want to present it to AMSAT at Hamvention.

I have a few more boxes of radar detectors to be dismantled, so I'll bring those along. We have done quite well on this project, and hope to finish it up before the big show. Thanks for your support on this.

This month I will deliver (I hope) on the Noise Figure talk and demo promised for the March meeting. My back is much better, thanks to some physical therapy, so I expect to be there this time. Hope you are, too!

de N8ZM

## This and That 4/5-00

- **MP3 Craze.** The latest Internet craze is MP3, the compression method for music, which permits users to download music pieces in reasonable time. On search engines the term “MP3” has now surpassed “Sex” for the number one spot. [Newspaper]
- **Paperless Society.** What do you do when someone gives you a telephone number over the phone? Scramble for a pencil and piece of paper? Maybe write on the palm of your hand? Now on the cell phone you just press a button and the number spoken is stored in memory!
- **How to Truly Discharge a Battery.** Discharge each cell to 1 Volt using successively less current. If the nominal charge current is e.g. 1 A, you might set the discharge current to  $1C = 1A$  initially then go to  $.1C = 100mA$  and finally to  $.01C = 10mA$ . If properly done the cells will come back to their full Voltage of 1.5 Volt after charging. [DL7DU]
- **Visual Inspection.** Modern manufacturing is doing away with visual inspections of circuit boards.  
X-rays now inspect these.
- **A Look Back in Time.** Using the de-lux “Koeln” rx German listening posts in WW2 would employ banks of those with operators tuned in at 20 kHz intervals on the SW bands. One location used was a large room in the “Sans Souci Castle” near Berlin.
- **Another Ghost from the Past.** In Germany during WW2 we used to listen to the wire-radio broadcasts which transmitted news that should be kept from the enemy over the powerline grid on very low frequencies. Now there is an effort underway to use the powerline for the internet using higher frequencies and a hellish digital modulation that promises to create a lot of interference in the electromagnetic spectrum. If you ask me, I consider this a rather idiotic idea and I hope it will run its course and die out, but the German hams are not so optimistic [WB8IFM]
- **Handies are the Big Thing in Germany.** Cell phones or “handies” are very big in Germany. In 1999 their number increased by 53% while the number of PCs increased 42%. Large screen TVs accounted for a meager 17% increase. You see cell phone towers everywhere, plus repeaters are installed on tall private homes, even on some churches, providing extra revenue for those. On my old hometown church I even spotted solar panels! [WB8IFM]
- **Mighty Small Brain.** Titus Neumann, a graduate student at Tuebingen’s Max Planck Institute, is working on the problem of autonomously guiding a helicopter in flight. Although an insect with a brain the size of a **cubic mm** can do it, for the larger, human carrying helicopter, this is quite an undertaking. But progress is being made, presently the controlling computer consisting of several CPUs measures roughly 20 cubic inches. In a flight simulation that was lacking crash avoidance control, Titus handed me the box with two joysticks to try my luck. Soon I was hitting buildings left and right and flying “underground” most of the time, great fun. The simulation of the surroundings on an I-Max type movie screen was so realistic, you were holding on for dear life and almost got sick to the stomach. Titus: “after this you will fall asleep fast and have a good night’s rest,” which turned out to be true!  
[WB8IFM]
- **American Fire Station.** The jewel of the place was its fire station, which looked like an automobile saloon. Behind the large glass plates you could see the chromium glistening fire trucks. At the entrance there were two greyhounds made from plaster of Paris sniffing the air for the smell of fire.  
[Sten Nadolny]

Visiting Germany this spring it was too late for me to attend the Munich VHF conference which is held every other year. However, Karl, DJ9HO, picked up the proceedings for me. The conference offered a wide range of topics and it looks like we missed some good presentations. Following a list in English of the presentations and write-ups, which are in German. The conference went on for two days with individual presentations lasting 45 minutes and 15 minute brakes in-between. [WB8IFM]

**Program / Proceedings of the 13<sup>th</sup> Biannual VHF/UHF/SHF Munich Conference  
11/12 March 2000**

- **Calculating Matching Circuit for Power Transistors at VHF/UHF/SHF** By Konrad Hupfer, DJ1EE
- VHF 2m – Successor of the IC 202 as SHF Base Receiver By Wolfgang Schneider, DJ2 ES
- 23cm Transverter using the latest Semiconductor Technology By Michael Kuhne, DB6NT
- International Space Station By Thomas Kieselbach, DL2MDE and Joerg Hahn, DL3LUM
- Ham Radio Satellite P3d By Norbert Notthoff, DF5DP
- Logarithmic Indicating Amplifier (S-Meter) with 140 dB Range (.1mV to 1V) with the IC AD8307  
By Eugen Berberich, DL8ZX
- Increasing Isolation for the 23/13cm Duoband Radiator (Feed) By Karl Weiner. DJ9HO
- FM Low Power Device (LPD) for 10 GHz HTs with Data Capability By Christian Huber, DL2MFB
- Analysis of the Transmit / Receive Switching Problem, Vox, Sequencers etc  
By Guenter Koellner, DL4MEA
- Patch Antennas in Ham Radio By Niels Koch, DG2MIM
- 13 cm Satellite Module for the YAESU FT-736 By Uwe Koch, DG3MIM
- Pacemaker and VHF/UHF Hamradio By Harald Wickenhaeuser, DK1OP

# Mir Amateur Radio SSTV Survives Dormant Period!

By Farrell Winder, W8ZCF

Many hundreds of Amateur Radio operators on Earth were thrilled and delighted to experience on April 16, 2000 the return of SSTV images from the MIR SPACE STATION. Mir was unoccupied beginning August 27, 1999 until April 6, 2000. (Some pictures can be found on the backpage, Ed)

Many excellent pictures were received as Mir with the new crew orbited Earth over areas which included Australia and the United States. A few of these images are shown here. They are images within and outside the spacecraft. On April 16 the crew attached the camera to a window and were showing a series of Earth pictures at precisely 2 minute intervals as was activated by the SSTV Auto Controller as Mir orbited planet Earth.

The SSTV System performed flawlessly when activated by the crew, as was expected, but had undergone a dormant period aboard Mir of nearly 8 months as referenced above. As reported by Chris van den Berg in his Mir News Report 477 the crew found the space ship in good standing, but noted "the fact that there was no dinner ready after their arrival. When in the past a new crew arrived, all was ready and that is very convenient"

Many messages flooded the Sarex and AMSAT internet bulletin boards as the crew activated the Amateur Radio equipment and began voice and video transmissions. It was great to have the recipients of Mir contacts share their excitement of initial QSOs for this latest Mir Mission 28. The earliest noted contacts came from "down under" in Australia and included contacts by George, VK2WEL, Grant, VK2TU, Doug, VK3TRD, BR Golla, VK2JAI and Derek, ZL1AKJ in Auckland. There were no doubt many other unreported contacts.

There were also wav files of the actual voice contact made available. There was obvious real excitement in one of these. Apparently Alex, U8MIR had attempted to locate Maggie, VK3CFI via the Mir radio. Then apparently all Australia helped notify Maggie who was later successful in a documented excellent clear recording on a wav file. In one of the exchanges with Maggie, Alex discussed the beginning of his third stint on Mir and said, "For the first time, I arrived at the station which was unmanned *hez lade*" (without people).

From what is learned at this writing in the third week of April the crew remains very busy with scheduled experiments including preparation for an EVA. At some later date a school schedule with a Q & A and including SSTV is planned, time permitting in the crews duties.

The crew is to be greatly thanked for their taking time in their busy schedule to provide voice contact and the transmission of very exciting and informative pictures to us from outer space via the Mir Space Station.

For those who would like to know how the Mir Amateur Radio SSTV System came into existence, it was conceived by Dr. Don Miller, W9NTP, Hank Cantrell, W4HTB, and Farrell Winder, W8ZCF. Dr. Dave Larsen, N6CO and Miles Mann, WF1F initiated and received approval for the system via Sergej Samburov, RV3DR. Miles arranged for the delivery of 3 of 4 systems to Russia and further journeyed to Russia to train the Cosmonauts in the operation of the equipment.

A new SSTV system utilizing a software approach as opposed to the hardware system now aboard Mir is being developed and completed by Jim Barber, N7CXI and is being tested and engineering assisted by the above group for consideration and possible use aboard the International Space station (ISS).

A new QSL card is being prepared by MAREX-RU and MAREX-NA. It is expected that this card will be available sometime in June, 2000 to cover the requests of all those stations who have heard or have contacted the Mir Space Station during this current or past missions. Details will follow in various media as to contacts for these QSL cards.

Mir Amateur Radio is currently operating on a frequency of 145.985 MHz FM. Everyone is encouraged to listen for the crew and copy pictures when the crew has some free time.\*\*\*\*

# A B C of Noise

By Gerd Schrick, WB8IFM

The question came up: what improvement does a low noise amplifier (LNA) provide, and is it worth the investment in cost and effort? Well, the answer is: "It depends!"

There might be little improvement if the external noise, also known as antenna noise, is high. The same is true if the desired signal is already of reasonable strength. But for signals, that are of similar strength as the sky noise, there could be a discernable improvement! This is, of course, what we are interested in!

There are three sources for the pesky noise that we have to consider:

**A: Antenna Noise.** This is the extra noise you pick up when you connect the antenna. It is part sky noise, coming from the stars (or the sun) and part ground noise, coming from the warm earth. You say, you do not hear any additional noise when you connect the antenna. You definitely could use a preamp!

**B: Cable Noise.** No matter how good the cable that connects your antenna to the receiver, it will have some seemingly small loss. But since we deal with miniscule signals, even this small loss will directly add noise to your signal before it reaches the receiver.

**C: Receiver Noise.** The ideal receiver with no noise of its own has not been built yet. In fact, because of other requirements, as receiving weak signals in the presence of near by (frequencywise) strong signals, in general means a less than optimum noise figure. So, for weak signal application a LNA will mean an improvement.

There is not much we can do about sky and ground noise, it will vary and at its maximum might blot out a weak signal. At 2m the minimum noise temperature is 200 and the maximum 3500 K, on 70 cm those values are a lot lower with 15 and 280 K resp. As you go higher in frequency yet these temperature get very low up to about 10 GHz. This range is referred to as the microwave window which explains in part why on microwave often rather low transmit powers are all that is needed for a contact. A clean antenna pattern helps since the sidelobes are only picking up extra noise. With a computer program you are able to tell what the skynoise will be, depending on the band, the position, and time of interest to you. This is a great help and is, of course, used by the EMER all the time and often by the satellite people. Fig.1. as an example gives you a contour map of skynoise temperatures at 300.

Often it is assumed that the ground inside the pattern of the beam contributes at the absolute temperature as a black body would. This is not so, and considering the fact, that at the grazing angle of our beams on a tall tower we almost get the theoretical 3 dB (doubling) of our signal, actually very little noise should be picked up (law of reciprocity). So I suggest to assume an average of  $100^0$  K ( and less on frequencies above 1 GHz) instead of the full  $290^0$  K is acceptable. See fig 2.

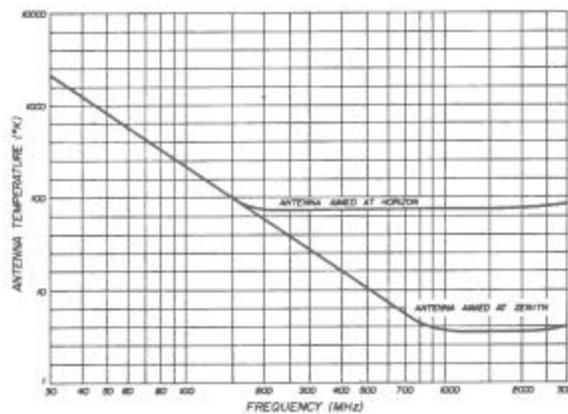
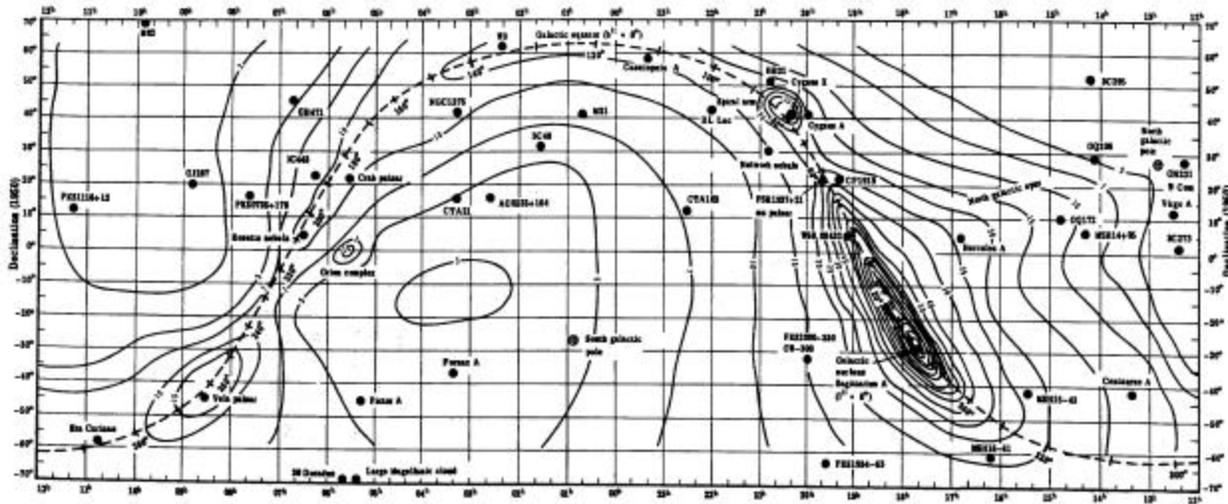
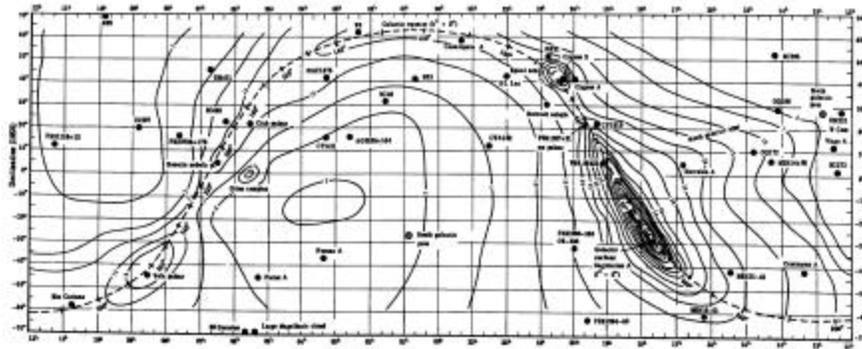
Now the other two factors are in our hands and easy to treat. The cable noise directly contributes additively to the signal and, in general, any cable between the antenna and the receiver or LNA should be avoided. There is nothing wrong with plenty of cable following a LNA with sufficient gain, in fact, any RG58 or RG8 type might suffice. Satellite TV on the microwaves uses LNBs ( which is a LNA + a converter) with 50 dB or more of gain and they run 100 feet or more of RG58 type cable carrying the 1 to 2 GHz IF. So on all but the 2 meter band, where there is a lot of external noise, it would make sense to use a *mast mounted LNA*.

As far as the receiver goes, a low noise figure and good strong signal capability does not go together. So for our weak signals we *need* the LNA.

Now to the calculation. Since we are adding up noise, we have to convert all our dB numbers into noise temperatures, which ought to be the preferred way to measure and report noise anyway. The conversion formulas are:

$$NF (dB) = 10 \log ( T + 1) \qquad T (K) = 290 ( 10^{NF/10} - 1)$$

Once all data are converted to temperatures K (Kelvin), it is a simple matter of adding up the numbers in the chain leading to and including the noise temperatur of the receiver or LNA. We assume that the LNA has sufficient gain to determine the receiving noise figure or in other words: it creates so much noise of its own (thanks to a high gain, usually 20 dB will do) that the receiver noise is swamped out. Now it is strictly a matter of forming the desired ratios and then converting them into dBs our preferred way of comparing signal strenght ( 5 dB = 1 S-unit)



**2000 Hamvention VHF/UHF Forum**  
Saturday, 20 May 2000, 8:30 to 10:30 AM  
Where?

At the **Medowdale Highschool** which is less than a mile to the SSE of Hara Arena or about a 15 Minute Walk,  
Shuttle Busses are also available.

**Agenda:**

8:30	Gerd Schrick, WB8IFM	The ABC of Noise
9:00	Bruce Lundy, KA8EDE	Microwave Beacons
9:30	Tom Whitted, WA8WZG	Maximizing the Microwave Station
10:00	Kent Britain, W5VJB	Mechanics in Constructing of Microwave Antennas for EME

**Mir SSTV Pictures**

On the left (Mir244) shows the Mir control room.  
(It is presumed Mir was on autopilot/computer control while the crew was attending other duties as none of the crew are visible). This was received by W8ZCF.



On the right (Mir 246) was received by Murray, VK2KGM in Wiley Park  
(a suburb of Sydney) shows Commander Sergei Zalyotin on the left and  
Flight Engineer Alexander Kaleri (his call is U8MIR) on the right.