Official Bulletin

MHz to GHz

The West Australian VHF Group Bulletin

NOVEMBER 2018

THE WEST AUSTRALIAN VHF GROUP (INC)

Contents

1. **Editors Comments Terry VK6ZLT**

   This is another edition where there are signs of the members input beyond my own and Denis VK6AKR as well as Rick VK6RK. **COME ON** everyone has a little AR wish they could relate to in a technical article or two. All submissions considered.

2. **From the Vice President's desk Denis VK6AKR.**

Hello I am Denis VK6AKR and I'd like to take a few minutes to tell you something about the WA VHF Group, what we do and some of our plans for 2019.

The WA VHF Group is an activity-based group of operators keen on experimenting in ALL bands despite our name and history which is steeped in the VHF and above spectrum. We've been around since 1955 and have had more than 700 General Meetings over those years but this does not mean that we shun modern technology!

In 2019 we aim to grow Group membership in all license classes for the benefit of all, including the wider Amateur community. The more members we have, or can introduce to Amateur Radio, the more vibrant is our VK6 community. Activating interest in local and national contests is on our radar, too.

Our Activity Days take place on the first and third Saturdays of each month at our shack at Wireless Hill in Applecross. Members work on, discuss and socialise about their projects and special interests. You might find us working on loop antennas and their tuning capacitors, satellite-working antennas such as double crossed dipoles, Quadrafilar helix and Lindenblads. SDRs, SDR software and LNAs have been a recent focus, investigating site noise and ways to reduce the noise floor. During 2019 it is certain that we will increase our satellite activities.

Shack opens at noon and we finish up about 1700. Visitors are welcome at our events and to our evening meetings on the fourth

Monday of each month except for December. The surrounding parklands here at Wireless Hill are family friendly and those wanting to bring XYLs and harmonics on the Saturday afternoons are well catered for. Rainy? No worries, Booragoon Shopping Centre is minutes away for the family to be entertained.

In closing, you have doubtless heard our many requests throughout the year for Amateur Radio related artefacts and memorabilia to be displayed in a professionally-curated Museum exhibition. Well, next year we will be working even more closely with the City of Melville's museum staff and the results will be open to the public – at a date to be advised. Please set some time aside to visit, especially if you have donated or loaned some items for display. And yes we are still "open for business" to receive donations or loan items, oral histories, etc for possible inclusion.

Wishing you an enjoyable Christmas and New Year season and Best Wishes for 2019

73 from Denis VK6AKR and the WA VHF Group

http://www.giangrandi.ch/electronics/radio/smeter.shtml

3. S-meter and signal strength

The S-meter is an instrument present on the majority of radio receivers that measures the strength of the signal that is being received, and uses a special unit: the *S-point*. S-points are often used for RST reports.

S-points go from S1 to S9 and each S-point is defined as a 6 dB change in signal strength. This means that each time the voltage is halved (–6 dB) the signal strength decreases by one point. S9 is already a very strong signal, but to describe larger signals, steps of 10 dB are used instead of 6 dB, noted "S9+20" meaning 20 dB above S9.

Today two reference values exist: for frequencies **below 30 MHz,** S9 is defined as a voltage of **50 µV** over 50 Ω at the receiver antenna connector; for frequencies **above 30 MHz,** S9 is defined as a voltage of **5 µV** over 50 Ω at the receiver antenna connector. This refers to an unmodulated carrier signal (N0N) that uses almost no bandwidth; in case of real signals using a given bandwidth, this definition may not be enough since a smaller receiver bandwidth allows a weaker minimum detectable signal, but S-points are still a good tool for comparing received signals.

S-points for frequencies below 30 MHz:

Signal strength	Relative intensity	Received voltage		Received power (Z_c = 50 Ω)	
S1	–48 dB	0.20 µV	–14 dBµV	790 aW	–121 dBm
S2	–42 dB	0.40 µV	–8 dBµV	3.2 fW	–115 dBm
S3	–36 dB	0.79 µV	–2 dBµV	13 fW	–109 dBm
S4	–30 dB	1.6 µV	4 dBµV	50 fW	–103 dBm
S5	–24 dB	3.2 µV	10 dBµV	200 fW	–97 dBm
S6	–18 dB	6.3 µV	16 dBµV	790 fW	–91 dBm
S7	–12 dB	13 µV	22 dBµV	3.2 pW	–85 dBm
S8	–6 dB	25 µV	28 dBµV	13 pW	–79 dBm
S9	0 dB	**50 µV**	34 dBµV	50 pW	–73 dBm
S9+10	10 dB	160 µV	44 dBµV	500 pW	–63 dBm
S9+20	20 dB	500 µV	54 dBµV	5.0 nW	–53 dBm
S9+30	30 dB	1.6 mV	64 dBµV	50 nW	–43 dBm
S9+40	40 dB	5.0 mV	74 dBµV	500 nW	–33 dBm
S9+50	50 dB	16 mV	84 dBµV	5.0 µW	–23 dBm
S9+60	60 dB	50 mV	94 dBµV	50 µW	–13 dBm

S-points for frequencies above 30 MHz:

Signal strength	Relative intensity	Received voltage		Received power (Z_c = 50 Ω)	
S1	–48 dB	20 nV	–34 dBμV	7.9 aW	–141 dBm
S2	–42 dB	40 nV	–28 dBμV	32 aW	–135 dBm
S3	–36 dB	79 nV	–22 dBμV	130 aW	–129 dBm
S4	–30 dB	160 nV	–16 dBμV	500 aW	–123 dBm
S5	–24 dB	320 nV	–10 dBμV	2.0 fW	–117 dBm
S6	–18 dB	630 nV	–4 dBμV	7.9 fW	–111 dBm
S7	–12 dB	1.3 μV	2 dBμV	32 fW	–105 dBm
S8	–6 dB	2.5 μV	8 dBμV	130 fW	–99 dBm
S9	0 dB	**5.0 μV**	14 dBμV	500 fW	–93 dBm
S9+10	10 dB	16 μV	24 dBμV	5.0 pW	–83 dBm
S9+20	20 dB	50 μV	34 dBμV	50 pW	–73 dBm
S9+30	30 dB	160 μV	44 dBμV	500 pW	–63 dBm
S9+40	40 dB	500 μV	54 dBμV	5.0 nW	–53 dBm
S9+50	50 dB	1.6 mV	64 dBμV	50 nW	–43 dBm
S9+60	60 dB	5.0 mV	74 dBμV	500 nW	–33 dBm

Older receivers were calibrated using the old standard that defined S9 as a voltage of 100 μV instead of 50 μV over 50 Ω at the receiver antenna connector.

Usually S-meters in amateur radio equipment are not calibrated and are not very precise. S-meter readings may also vary from one band to another and it's always interesting to check an S-meter with a precise generator and a step by step attenuator.

Bibliography and further reading

[1] Wolfgang Link, DL8FI. *Metodi di misura per radioamatori.* Franco Muzzio & C. editore, 1978, sezione 3.9.

4. Coming to grips with SDR receivers Check out the following;…….

Topic of SDRs arose at last night's meeting and I promised to share a link. Here it is. For the ones interested in eeking out maximum performance, especially from the "cheap and cheerful" generic SDR dongles this might be useful.

https://www.g8jnj.net/softwaredefinedradio.htm

73
Denis VK6AKR

Here's the link for the book I mentioned. Around 25Mb though.

https://www.surviveuk.com/wp-content/uploads/2016/07/The-Hobbyists-Guide-To-RTL-SDR-Carl-Laufer.pdf

73,
Rick VK6RK

5. VHF & Microwave - Sites of interest

https://www.rtl-sdr.com/rtl-sdrs-and-the-vhf-reverse-beacon-network/

https://qrznow.com/reverse-beacon-network-beta-testing-separate-spot-stream-for-ft8/

https://au.mouser.com/search/refine.aspx?Ntk=P_MarCom&Ntt=135893479

https://qrznow.com/remote-antenna-tuners-podcast-arrl-the-doctor-is-in/

https://www.sdr-radio.com/Software/3rd-Party/CWSkimmer

http://rudius.net/oz2m/ngnb/pres_rsgb_conv_2018_oz2m_pi4.pdf

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