SHACKNEWS

HIGHVELD AMATEUR RADIO CLUB

MAY 2008

COMMUNICATION IS THE NAME OF THE GAME

Meeting The next one will be held on Saturday 7 June. The speaker will be ZS6BUN who will talk and demonstrate EME and Meteor Scatter methods of communication.

SSC Meeting This will take place at the home of Berridge and Sandra on June 14.

---oooOOOooo---

Voices in the noises

Most hams who work on HF will have noticed a strange phenomenon. When you listen for weak stations coming through the noise, and you listen long and hard enough, sometimes you seem to hear fragments of voices. It doesn't really sound like a clear voice and you haven't been able to make out anything at all, but yet you stay on that frequency a bit longer to try and make out if there's a station there, trying to come through... but somehow there never is, and what we thought we heard turns out to be a figment of the imagination. Or does it? What's going on here?

One of the main reasons why computers have not been able to match the human capacity for sound and image recognition is that human observation is extremely fault-tolerant. What we see and hear can be garbled to an astonishing degree, and still we will be able to make out enough to interpret the observation. For example, put three dots on a piece of paper; what we will see is a triangle. The lines between the dots are missing, but our mind fills in the blanks and so we "see" a triangle. When we listen to someone speak in a very noisy environment (e.g. a in car, in a factory, or during a rock concert) it's amazing how bad the "signal to noise ratio" can be while we still are able to make out what the other person is saying.

Our voice is essentially a spectrum of harmonics that we hear as more or less separate groups of tones, called "formants", and the "voiceless" sounds that do not involve the vocal cords but that are generated by the air flowing past our tongues and lips. Because there are so many different separate elements in the human voice, a surprising amount of it may be lost while communication is still possible. If a human voice is "chopped up" in, say, 50ms blocks and many of these blocks are replaced with white noise, or are played back in reverse, speech is still clearly audible through the noise.

The interesting thing here is that the missing information is supplied by the human brain. When the formants are reduced to their dominant frequencies only, it turns out that the resulting "sine wave speech" is unintelligible. BUT... as soon as one knows what is being said (e.g. when a known sentence is being pronounced) suddenly the meaningless noises become intelligible speech. And even more remarkable is that once we have managed to make out a known sentence, unknown sentences suddenly become intelligible as well! It is as if the cognitive centre in our brain has a certain "hysteresis" and once it has switched from "noise" to "speech", it remains switched to "speech" until another signal comes along that is powerful enough to reverse the situation.

And that explains these "ghost voices" that we sometimes her in the noise on the HF bands. We listen for voices, and our brain is all geared up to recognise human speech in otherwise meaningless noise. As soon as a bit of random noise is close enough to a partial formant or voiceless sound, the fault-tolerant mechanisms of our brains kick in and try to interpret the noise as a voice, on the basis of our assumption that there is one. And so we "hear voices"... but not quite.

(Frank van Wensveen PA3GMP / ZS6TMV. Based on an article by Hans PA0CX.)

(Cont'd page 4)

Understanding Engineers -1

Two engineering students were walking across a university campus when one said, "Where did you get such a great bike?"
The second engineer replied, "Well, I was walking along yesterday, minding my own business, when a beautiful woman rode up on this bike, threw it to the ground, took off all her clothes and said,
"Take what you want."
The first engineer nodded approvingly and said, "Good choice; the clothes probably wouldn't have fitted you anyway."

Understanding Engineers - 2

A priest, a doctor, and an engineer were waiting one morning for a particularly slow group of golfers. The engineer fumed, "What's with those guys? We must have been waiting for fifteen minutes!"
The doctor chimed in, "I don't know, but I've never seen such inept golf!"
The priest said, "Here comes the green-keeper. Let's have a word with him."
He said, "Hello George, what's wrong with that group ahead of us? They're rather slow, aren't they?"
The green-keeper replied, "Oh, yes. That's a group of blind firemen. They lost their sight saving our clubhouse from a fire last year, so we always let them play for free anytime."
The group fell silent for a moment. The priest said, "That's so sad. I think I will say a special prayer for them tonight."
The doctor said, "Good idea. I'm going to contact my ophthalmologist colleague and see if there's anything he can do for them."
The engineer said, "Why can't they play at night?"

---oooOOOooo---

Calculating a link budget

By Frank PA3GMP / ZS6TMV

From numerous discussions among radio hams it is clear that many hams struggle with the concept of link budgets. Bold statements are not unheard of:

- "Antenna X is always better than antenna Y."
- "If A can hear B it doesn't mean that B can hear A, which is proof that propagational paths are not bidirectional."
- "RG-58 coax should never be used for serious DX."
- "If both stations use the same amount of power, their signal reports should be the same."

These and other fallacies could all be heard on the air here in Gauteng during the past few months. Clearly many hams have trouble grasping the fact that a QSO between two stations is a chain with many links.

What is a link budget?

Simply put, a link budget is the sum and total of all gains and losses in the radio connection between two parties from end to end, including antenna's, feed lines and the path between the antenna's, but also the relevant portions of the transmitter and the receiver, as well as miscellaneous gains and losses.

For a line-of-sight radio link, the link budget might look like this:

$$Prx = Ptx + Gtx - Ltx - Lfs - Lm + Grx - Lrx$$

Where:

- P_{RX} = received power (dBm)
- P_{TX} = transmitter output power (dBm)
- G_{TX} = transmitter antenna gain (dBi)
- L_{TX} = transmitter losses (coax, connectors...) (dB)
- L_{FS} = free space loss or path loss (dB)
- L_M = miscellaneous losses (fading margin, body loss, polarization mismatch, other losses...) (dB)

- G_{RX} = receiver antenna gain (dBi)
- L_{RX} = receiver losses (coax, connectors...) (dB)

To dispense with the mathematical formula, in plain language the above means that:

1. We start with the power of the signal that comes out of the transmitter;
2. To that we add the gain of the transmitter's antenna, also known as *isotropic* antenna gain, or gain relative to an isotropic antenna;
3. From that we subtract the losses between the transmitter and the antenna, which includes all the antenna cables, connectors, baluns and other components;
4. Then we subtract the free space or path loss, which occurs between the two antennas and is a factor of the distance between the antennas (see below);
5. We also subtract whatever miscellaneous losses may occur, e.g. due to polarization mismatch;
6. We then add the receiver's antenna gain;
7. And once again we subtract all losses between the antenna and the receiver - cables, connectors, baluns, etc.

In order to add all these factors, all power levels must be specified in dBm or dBW. For example, if the transmitter puts out 10 Watts (or 10,000 mW) its power is 10,000 times the reference power of 1 mW. Since 10,000 is ten to the fourth power, this gives us a transmitter power of 40dBm. To clarify:

0.01 mW = -20 dBm
0.1 mW = -10 dBm
1 mW = 0 dBm
10 mW = 10 dBm
100 mW = 20 dBm
1000 mW = 30 dBm

and so on. Once we have expressed our power levels in dBm or dBW (where 30 dBm = 0 dBW and 40 dBm = 10 dBW) we can simply add or subtract all gains and losses. For example a power of 40 dBm is transmitted through an antenna with a gain of 6dB, which gives us an Effective Isotropic Radiated Power (EIRP) of 46 dBm, or 10 to the power of 4.6 (in mW) which comes to 39,8 Watts. That means that a 10W transmitter connected to a 6dB gain antenna delivers the same amount of power to the receiver at the other end as a 39,8W transmitter connected to an isotropic radiator.

(This is an eight page article. The whole one will be made available on the club website)

---oooOOOooo---

Here are some signs that you won't find anywhere else in the world except in Africa.

In a restaurant in Zambia: "Open seven days a week and weekends."

On the grounds of a private school in South Africa: "No tresspassing without permission."

On a window of a Nigerian shop: "Why go elsewhere to be cheated when you can come here?."

On a poster in Ghana: "Are you an adult who cannot read? If so, we can help."

In a hotel in Mozambique: "Visitors are expected to complain at the office between the hours of 9.00 am and 11.00am daily."

On a river in the Democratic Republic of Congo: "Take note: When this sign is submerged, the river is impassable."

On one of the buildings of a Sierra Leonne hospital: "Mental Health Prevention Centre."

Swop Shop

Doug ZS6BXU has the following:

A . a General Radio Co of Cambridge USA a STANDARD SIGNAL GENERATOR SERIAL NO 307 TYPE 1001-A covering Frequency in - Kilo cycles & Megacycles top unit in photo.
B . Bottom unit in photo, Radiometer Copenhagen NV Beat frequency Oscillator ,type HO 12d no 9450.
Modulating frequency 0 to 12.5c/s.
frequency Deviation 20 to 400 plus , minus c/s.
constant ,, variable x0.2 x0.5 x1.
1 mc/s Generator modulation 0 to 100% for 0.50 volts.
1mv 10 ohms.
10mv 10 ohms.
100mv 10 ohms.
0.3volts 25 ohms.
1.0 volts 10 ohms.
HF output , output course , output fine.
Volt meter 10 v to 25 v to 50v to 100v to 250v..
Impedance full range..

CONTACT OM DOUG ZS6BXU 0833004240 , 011 6804906.

From Page 1

An amazing demonstration of what cognitive science calls "phonemic restoration" may be found on http://asj.gr.jp/2006/data/kashi/kashi.pdf and http://asj.gr.jp/2006/data/kashi/index.html.

For a demonstration of sine speech see http://www.lifesci.sussex.ac.uk/home/chris_darwin/sws.

CLUB INFORMATION

Postal address PO Box 19937 Sunward Park 1470

Website http://www.gsl.net/zs6hvb/
http://www.gsl.net/zs6ssc/

e-mail zs6hvb@gmail.com

Bulletins Sunday morning - 145.7875 MHz & 7062 KHz @ 08h45.
Relay - 80M - 3662KHz

Monthly meeting venue

Witwatersrand Rifles HQ
Cnr Barlow and Cavaleros Str
Industries West
Germiston

First Saturday of the month at 14:30

Committee

Chairman	Doug Wetton	ZS6BXU	011-680-4906
Vice Chairman	Frank van Wensveen	ZS6TMV	082-294-2648
Secretary/Treasurer	Berridge Emmett	ZS6BFL	011-893-1291
Repeater/Packet/Technical	Ton van Dijk	ZS6ANA	011-432-5494
Shacknews Editor	Berridge Emmett	ZS6BFL	011-893-1291
Shacknews Printing	Harry Lautenbach	ZS6LT	011-888-5362
Webmaster	Yvonne van Dijk	ZR6TBL	011-432-5494

Repeater

145.1875 MHz input
145.7875 MHZ output
Linked on a Sunday morning during bulletin time to 70 cm - 438.850 MHz