

**LISTENING TO VANGUARD:
SOUND, TEXT, CODE**

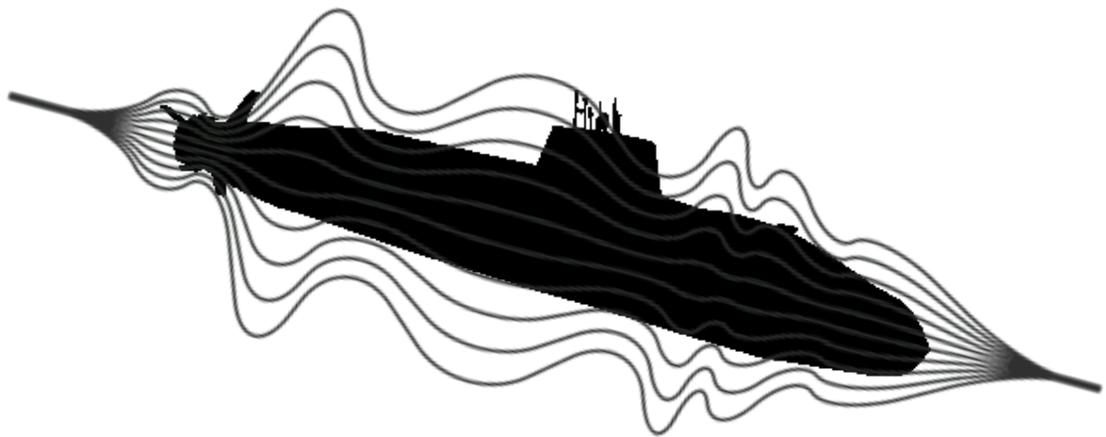


Table A-1. Submarine Communications Circuits

LINK	FREQUENCY	LINK TYPE	MODULATION	DATA RATE (bps)	CRYPTO	INFORMATION TYPE
ELF	40-80 Hz	R	MSK	LDR	KGV-11	Record
VLF/LF VERDIN (Tactical)	14-60 kHz	R	FSK/MSK/CW	50	KG-38	Record/Tactical
VLF/LF VERDIN (Strategic)	14-60 kHz	R	MSK	LDR	KG-38	Record
VLF/LF FSK (Verdin) (Strategic)	14-60 kHz	R	FSK	50	N/A	Record
VLF/LF VALLOR	14-150 kHz	R	FSK	50	KWR-46	Record/Tactical
VLF/LF VALLOR (NATO)	14-60 kHz	R	FSK/MSK/CW	50	KWR-46	Record
VLF/LF DOUBLE DECRYPT (Verdin)	14-60 kHz	R	MSK	50	KG-38/ KWR-46	Record
VLF/LF CW/FSK	14-60 kHz	R	CW/FSK	N/A	N/A	Audio (Morse)
HF SPECIAL COMMUNICATIONS	2-30 MHz	T	Special	Special	Off-Line	Record
HF SECURE TTY	2-30 MHz	HD T/R	FSK	75	KG-84C	Record/Tactical
HF VALLOR	2-30 MHz	R	FSK	50	KWR-46	Record/Tactical
HF LINK 11	2-30 MHz	HD T/R	ISB	2250	KG-40	Tactical
HF NARROWBAND SECVOX	2-30 MHz	HD T/R	SSB	N/A	KYV-5	Voice
HF CW	2-30 MHz	HD T/R	CW	N/A	N/A	Audio (Morse)
HF CLEAR VOICE	2-30 MHz	HD T/R	SSB	N/A	N/A	Voice
HF SCANNING	2-30 MHz	R	Multiple	N/A	N/A	Audio
SLOT BUOY	168-174 MHz	T	AM	N/A	Off-Line	Audio
LDR SATCOM	240-320 MHz	HD T	DPSK	75	KG-84C	Record/Tactical
UHF OTICIX	240-320 MHz	HD T/R	DPSK	2400	KG-84A	Record/Tactical
UHF SSIXS	240-320 MHz	HD T/R	DPSK	2400/4800	KG-84A	Record/Tactical
UHF BGIXS	240-320 MHz	HD T/R	DPSK	2400/4800	KG-84A	Record/Tactical
UHF LINK 11	225-400 MHz	HD T/R	FM	2250	KG-40	Tactical
UHF TADIXS A	240-320 MHz	R	DPSK	2400	KG-84A	Tactical
UHF TADIXS B	240-320 MHz	R	QPSK	9600	KGR-96	Tactical
UHF SATCOM BUOY	290-320 MHz	T	DPSK	2400/4800	KG-84A	Record
UHF SATCOM SECVOX	240-320 MHz	HD T/R	DPSK	2400	KYV-5	Voice
UHF VINSON	225-400 MHz	HD T/R	AM or FM	N/A	KY-58	Voice
UHF CLEAR VOICE	225-400 MHz	HD T/R	AM	N/A	N/A	Voice
UHF SECURE TTY	225-400 MHz	HD T/R	AFTS AM/FSK	75-2400	KG-84A	Record/Tactical
UHF AFSATCOM	225-400 MHz	HD T/R	FSK	75	Off-Line	Record
EHF SECURE TTY	20.2-21.2 GHz R 43.5-45.5 GHz T	FD T/R	FSK/DPSK FSK	75-2400	KG-84A	Record/Tactical
EHF SPECIAL COMMUNICATIONS	20.2-21.2 GHz R 43.5-45.5 GHz T	FD T/R	FSK/DPSK FSK	75	Off-Line	Record
EHF SECVOX	20.2-21.2 GHz R 43.5-45.5 GHz T	FD T/R FD T/R	FSK/DPSK FSK	2400	KYV-5	Voice

R - Receive Only
T - Transmit Only
HD - Half Duplex
FD - Full Duplex
T/R - Transmit/Receive

bps - bits per second
MSK - Minimum Shift Keying
FSK - Frequency Shift Keying
CW - Continuous Wave
ISB - Independent Sideband
SSB - Single Sideband

DPSK - Differential Phase Shift Keying
FM - Frequency Modulation
AM - Amplitude Modulation
AFTS - Audio Frequency Tone Shift
N/A - Not Applicable
QPSK - Quadrature Phase Shift Keying

International Morse Code

1. The length of a dot is one unit.
2. A dash is three units.
3. The space between parts of the same letter is one unit.
4. The space between letters is three units.
5. The space between words is seven units.

A ● —
B — ● ● ●
C — ● — ●
D — ● ●
E ●
F ● ● — ●
G — — ●
H ● ● ● ●
I ● ●
J ● — — —
K — ● —
L ● — ● ●
M — —
N — ●
O — — —
P ● — — ●
Q — — ● —
R ● — ●
S ● ● ●
T —

U ● ● —
V ● ● ● —
W ● — —
X — ● ● —
Y — ● — —
Z — — ● ●

1 ● — — —
2 ● ● — —
3 ● ● ● — —
4 ● ● ● ● —
5 ● ● ● ● ●
6 — ● ● ● ●
7 — — ● ● ●
8 — — — ● ●
9 — — — — ●
0 — — — — —



Amateur radio club ETGD
PI4THT

Faculty for Electrical Engineering,
Mathematics and Computer Science

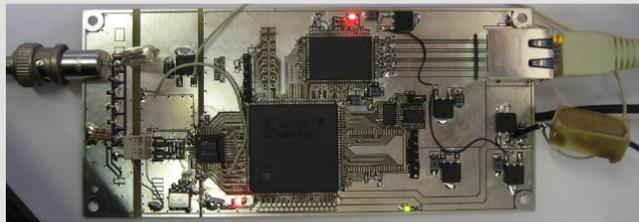


University of Twente
Enschede - The Netherlands

Wide-band WebSDR

On this page you can listen to and control a short-wave receiver located at the amateur radio club [ETGD](#) at the [University of Twente](#). In contrast to other web-controlled receivers, this receiver can be tuned by multiple users simultaneously, thanks to the use of Software-Defined Radio.

This site, which in 2008 was the very first WebSDR site ever, was finally reactivated in July 2012 after [an interruption of more than 1.5 years](#); read also the [old news since then](#).



The system is currently composed of a "Mini-Whip" antenna, a homebuilt SDR board (as pictured; see [here for background](#)) which samples the entire shortwave spectrum and sends all of this via a gigabit ethernet link to a PC, where a special version of the WebSDR server software processes it. The Mini-Whip is based on a design from PA0RDT (google finds it); see [some pictures](#). The active receiving element is about 5 by 10 cm large. Such an antenna only works well with a [good grounding](#); ours is on top of a 20m high building, the upper part of which is all metal.

Other services available on this system:



WSPR reception



Chirp signal reception



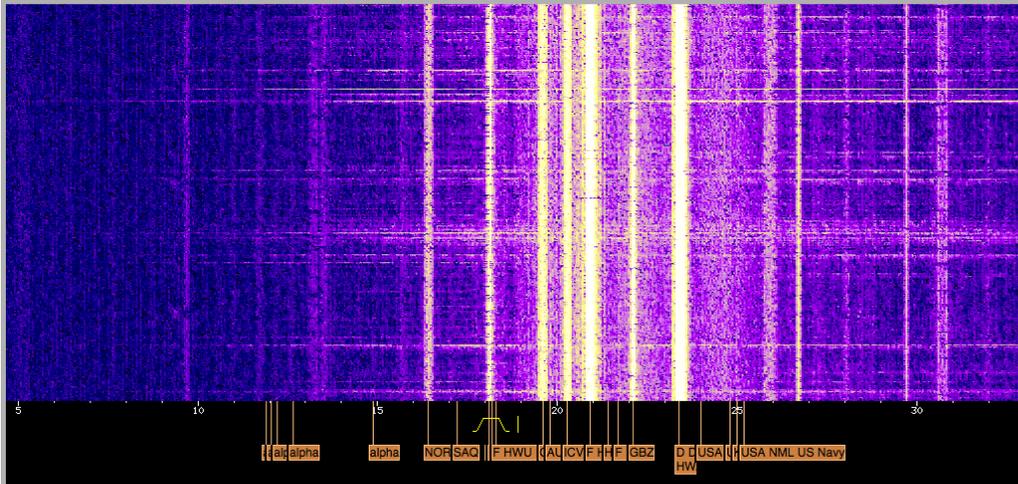
Entire day waterfall display

Questions and remarks about this WebSDR can be sent to the developer and maintainer: pa3fwm@websdr.org (but please check the [FAQ](#) first).

Please log in by typing your name or callsign here (it will be saved for later visits in a cookie):

View: waterfall blind

Allow keyboard:



18.16 kHz A/B A=B

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CW LSB USB AM FM AMsync

Volume: mute

Filter: 0.40 kHz narrower wider

squelch autonotch noise reduction

Audio recording

Waterfall zoom

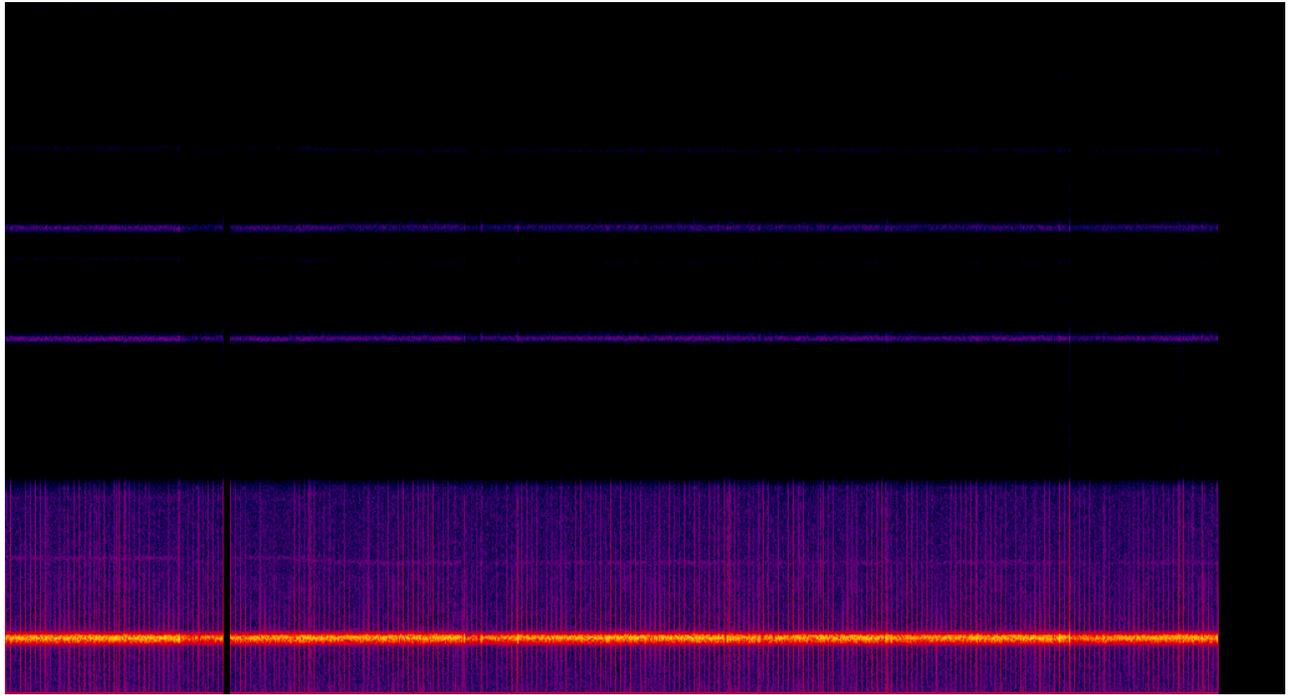
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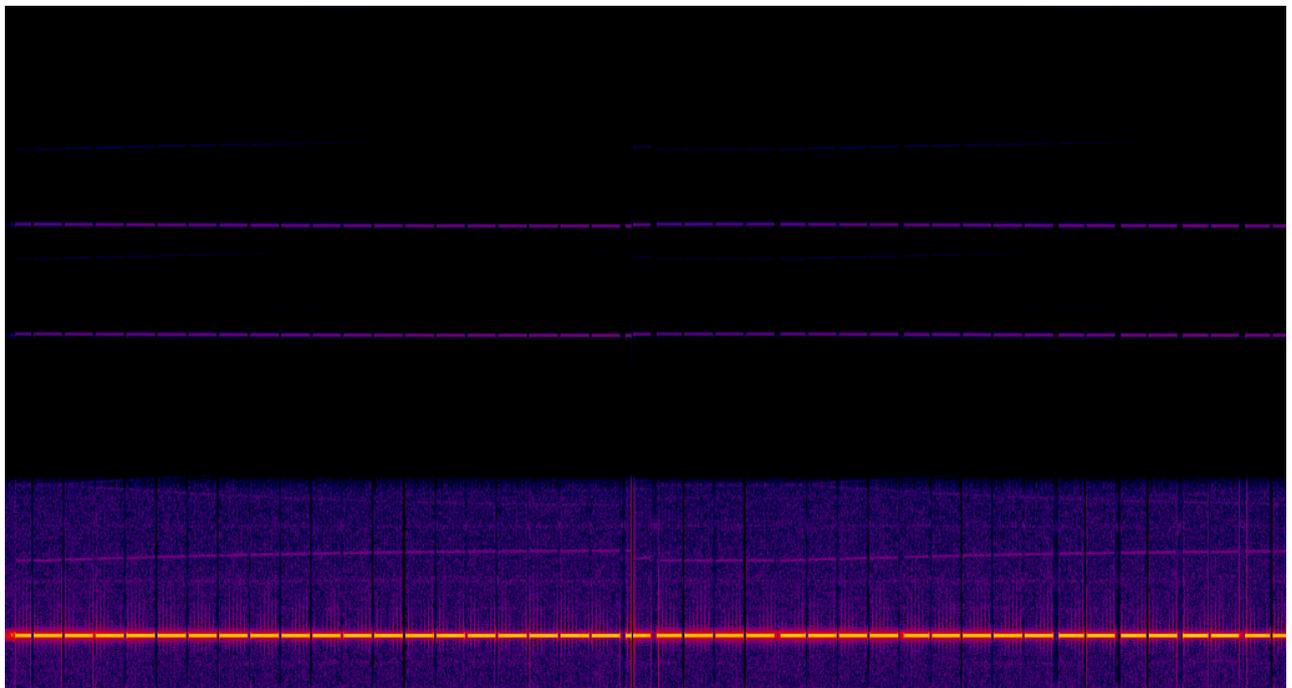
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51 53 55 57 59 +2.8dB +4.4dB +6.0dB

-59.2 dBm; peak -59.2 dBm



19.8 kHz



60 kHz

The Dolphin Code

The unofficial code used between **diesel** submarines and surface ships engaged in exercises.

1. Your last surfacing procedure was:
 - A. First class.
 - B. Surprisingly good.
 - C. Understandably awful.
 - D. Indescribable.
2. I presume you got your ticket in a raffle.
3. For the last serial you could have used any fishing vessel.
4. My battery is:
 - A. 100%, I will simulate a Nuclear Submarine if you wish.
 - B. 75%, I will simulate a Nuclear Submarine for a short time if you wish.
 - C. 50%, I will not simulate a Nuclear Submarine, regardless of your wish.
 - D. 25%, I wish to simulate a Conventional Submarine, and will hot-pipe if you wish.
 - E. DEAD, I hot-pipe now, regardless of your wish.
5. I was unaware that medical standards had been revised. You must be blind as a bat.
6. During the last action you displayed noticeably suicidal tendencies.
7. Once again you have demonstrated a commendable ability to practise basics.
8. The last serial was so bad that we watched a double feature.

9. Your exercise instructions are simple. Simply awful.
10. I am unable to act as evasively as I wish.
11. I am unable to act as unevasively as you wish.
12. I am surfaced (surfacing) because:
 - A. I must make repairs.
 - B. I wish to bale out water.
 - C. Your chances of locating me are negligible otherwise.
 - D. I wish to barbecue the next meal.
13. I must temporarily withdraw from the exercise because of difficulties with:
 - A. Technical systems which are too difficult to explain.
 - B. Battery/motors/generators, I no go right.
 - C. Sonar, I no hear right.
 - D. Ingress of water, I no float right.
 - E. Fire/smoke, I no breathe right.
 - F. Personnel, I no lead right.
14. Please accept my apologies for failing to make the assigned rendezvous. My reason is as follows:
 - A. The navigator is a Newfoundlander.
 - B. I was doing something else at the time and didn't think you'd miss me.
 - C. I erroneously assumed that you would be where you said you would be.
 - D. My navigational equipment has not been updated since the Boer War.

Nuclear alert siren goes off across Barrow

BARROW town centre was tonight filled with the sound of an air raid siren as the shipyard tested its nuclear alert alarm.

BAE Systems in Barrow is required by nuclear regulator, the Office for Nuclear Regulation, to periodically test its nuclear siren.

The alarm is played from loudspeakers positioned around the Devonshire Dock Hall - the main facility where submarines are constructed.

Whilst the possibility of an incident occurring with the nuclear reactor of a submarine is very low, there are a number of precautions that need to be in place.

As well as the nuclear alert siren those living within a designated area close to the shipyard, including schools and businesses, are issued with iodine tablets to be taken in the case of a release of radioactive material into the atmosphere.

The tablets work by flooding the thyroid glands with iodine prior to the exposure to radioactive iodine. This prevents the glands from taking up the radioactive iodine and it will be quickly removed from the body.

The yard in Barrow is currently in the middle of its seven-boat Astute-class submarine programme and work has already started on the early construction phase of the Dreadnought boats.

The four Dreadnought submarines will replace the Vanguard-class boats which carry Trident - thermonuclear warheads which act as the country's nuclear deterrent.

HMS Vanguard, Victorious, Vigilant and Vengeance, built between 1986 and 1998,

At least one of the four boats has been on patrol beneath the waves since 1995.

The Vanguard-class submarines were built with a 25-year life expectancy, taking them into the 2020s.

A vote in the House of Commons on 18 July 2016 determined that the UK should proceed with construction of the next generation of submarines in Barrow.

MPs voted in favour of the replacement with 472 votes in favour to 117 against, extending the programme's life until at least the 2060s.

Dreadnought - expected to cost up to £31bn, with a contingency fund of £10bn, are expected to become operational from 2028, with the current fleet phased out by 2032.

Crispin Blunt, Chair of the Foreign Affairs Select Committee, estimated in July 2016 that the programme would cost £179bn in total over its lifetime.

What happens if Britain decides to launch a nuclear weapon from a Barrow submarine?

Members of the Royal Navy respond to a simulated fire in a Vanguard-class submarine control room

HOW will one of Barrow's Vanguard-class submarine crews respond if a nuclear weapon is fired at Britain?

Geographically, Britain is safer than a lot of countries, being an island on the edge of a block of allies.

If an intercontinental ballistic nuclear missile set off from Moscow or North Korea, it would take around 20 minutes to hit London.

En route, it would pass through the airspace of half a dozen Nato allies.

A text message is more likely, too, especially since the government has can easily contact every registered mobile phone the UK. What's more, it has the ability to restrict access to base transceiver stations (BTS), meaning mobile signal would only be available for the emergency services and energy companies.

Somewhere in the North Atlantic, one of Britain's nuclear, Vanguard-class submarines is always patrolling, and this would be its moment.

Only the Prime Minister can authorise the deployment of its missiles.

From Pindar, a code would be sent by the PM via the Northwood Headquarters 100ft under the Chiltern Hills, through which all communications with the Vanguard-class submarines pass, and out to sea.

At every stage, the message is confirmed by two people, as a precaution against miscommunication or foul play.

The sub commander would then open two safes, one inside the other, and the trigger is then pulled.

In the worst scenario, there may be no nation left for them to defend. In that case, the same commander would go through a series of checks to assess the state of the nation.

One of these includes listening out for Radio 4's Today programme for three days. Safe in the Worcestershire bunker, Radio 4 would be the only broadcaster left by this stage, utilising Wood Norton's super high-frequency satellite; if Today fails to air for three days straight, it is safe for them to assume Britain has fallen.

And then, the submarine's commander will read what's known as 'The Letter of Last Resort', containing the Prime Minister's final instructions.

Whenever a new PM is elected, the Cabinet Secretary immediately has them write four letters, one for each sub, with their recommendation for what to do if the chain of command has collapsed. Retaliate, don't retaliate, place the boat under the control of the Australian or US Navy, or leave the decision up to the commander – those are the options.

Nobody knows what previous leaders have recommended; the letters are destroyed at the end of each premiership.





SOUND-ART-HANNAH