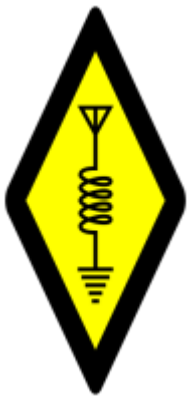
Funky HAM

Name	Funky HAM
Description	The main goal of this project is to promote open-source for amateur radio and to teach the youth about the radio technologies and experiment with them. (Also to have aninternal group for some Funky HAM radio experiments.)
Status	Planning
Contact	peter
Participants	
Repository	

What is HAM radio

"Amateur radio, also known as ham radio, is the use of radio frequency spectrum for purposes of non-commercial exchange of messages, wireless experimentation, self-training, private recreation, radiosport, contesting, and emergency communication. The term "amateur" is used to specify "a duly authorised person interested in radioelectric practice with a purely personal aim and without pecuniary interest;" (either direct monetary or other similar reward) and to differentiate it from commercial broadcasting, public safety (such as police and fire), or professional two-way radio services (such as maritime, aviation, taxis, etc.)." Wikipedia 20.09.2021 - 13:10



HAM Radio is regulated in Luxembourg by the "Institut Luxembourgeois de Régulation (ILR)" They also offer the exams to obtain a license. The courses however to train for the exams are organized by 2 Associations:

- Radioamateurs du Luxembourg (RL)
- Luxembourg Amateur Radio Union (LARU)

History of HAM radio

Video

Fixed

"An amateur radio station established in a permanent structure with equipment that is not intended for portable operation is referred to as a fixed station. This is the most common form of amateur radio station, and can be found in homes, schools, and some public buildings. A typical fixed station is equipped with a transceiver and one or more antennas. For voice communications, the station will be equipped with a microphone; for communications using Morse code, a telegraph key is common; and for communications over digital modes such as RTTY and PSK31, a station will be equipped with a specialized interface to connect the transceiver to a computer sound card. While not a requirement for radiocommunications, most fixed amateur radio stations are equipped with one or more computers, which serve tasks ranging from logging of contacts with other stations to various levels of station hardware control. Fixed stations might also be equipped with amplifiers, antenna rotators, SWR meters, antenna tuners, and other station accessories.

Fixed stations are generally powered from the AC mains electrical supply available in the building. Some equipment in fixed stations may run off low voltage DC instead of AC, and require a separate power supply. Some fixed stations are equipped with auxiliary sources of power, such as electrical generators or batteries for use in emergencies." → Wikipedia 21.09.2021 - 09:12

Mobile

"An amateur radio station installed in a vehicle is referred to as a mobile station. A typical mobile station is equipped with a transceiver, one or more antennas, and a microphone. The transceiver may be specially designed for installation in vehicles. It may be much smaller than transceivers designed for fixed station use, to facilitate installation under a seat or in a trunk, and it may feature a detachable control head that can be mounted in a separate location from the rest of the radio. Antennas designed for mobile stations must accommodate the unique physical constraints of the vehicle and travel lanes which it occupies, allowing for clearance under overpasses and bridges, and safe passage by vehicles in adjacent lanes. Most antennas used in mobile stations are omnidirectional. Few mobile stations are equipped to communicate with Morse code or digital modes. Most mobile stations are designed to be operated by the vehicle operator while driving.

Most transceivers installed in vehicles are designed to run on 12-16 VDC, and are generally powered by the starting battery in the vehicle. Because of the power demands placed on the vehicle battery,

most mobile stations either do not include external amplifiers or include amplifiers with power outputs that are more modest than those commonly found in fixed stations." → Wikipedia 21.09.2021 - 09:15

Portable

"An amateur radio station set up in a temporary location is referred to as a portable station. A portable station might be established to provide emergency communications in a disaster area, to provide public service communications during a large organized event such as a charity bicycle ride, to provide communications during an expedition, or for the recreational enjoyment of operating outdoors. Portable stations include the same basic equipment as fixed and mobile stations, although transportation of the transceiver, antennas, power supplies or batteries and necessary accessories often influences the particular selection. Equipment that does not weigh very much, or that can be broken down for shipment or transportation in luggage is especially popular with amateur radio operators travelling on DX-peditions." → Wikipedia 21.09.2021 - 09:17

Handheld

"A walkie-talkie, more formally known as a handheld transceiver (HT), is a hand-held, portable, two-way radio transceiver. Its development during the Second World War has been variously credited to Donald Hings, radio engineer Alfred J. Gross, Henryk Magnuski and engineering teams at Motorola. First used for infantry, similar designs were created for field artillery and tank units, and after the war, walkie-talkies spread to public safety and eventually commercial and jobsite work.

Typical walkie-talkies resemble a telephone handset, with a speaker built into one end and a microphone in the other (in some devices the speaker also is used as the microphone) and an antenna mounted on the top of the unit. They are held up to the face to talk. A walkie-talkie is a half-duplex communication device. Multiple walkie-talkies use a single radio channel, and only one radio on the channel can transmit at a time, although any number can listen. The transceiver is normally in receive mode; when the user wants to talk they must press a "push-to-talk" (PTT) button that turns off the receiver and turns on the transmitter. Smaller versions of this device are also very popular among young children." → Wikipedia 20.09.2021 - 14:18

"Walkie-talkies (also known as HTs or "handheld transceivers") are widely used among amateur radio operators. While converted commercial gear by companies such as Motorola are not uncommon, many companies such as Yaesu, Icom, and Kenwood design models specifically for amateur use. While superficially similar to commercial and personal units (including such things as CTCSS and DCS squelch functions, used primarily to activate amateur radio repeaters), amateur gear usually has a number of features that are not common to other gear, including:

- Wide-band receivers, often including radio scanner functionality, for listening to non-amateur radio bands.
- Multiple bands; while some operate only on specific bands such as 2 meters or 70 cm, others support several UHF and VHF amateur allocations available to the user.

- Since amateur allocations usually are not channelized, the user can dial in any frequency desired in the authorized band (whereas commercial HTs usually only allow the user to tune the radio into a number of already programmed channels). This is known as VFO mode.
- Multiple modulation schemes: a few amateur HTs may allow modulation modes other than FM, including AM, SSB, and CW, and digital modes such as radioteletype or PSK31. Some may have TNCs built in to support packet radio data transmission without additional hardware.
- Digital voice modes are available on some amateur HTs. For example, a newer addition to the Amateur Radio service is Digital Smart Technology for Amateur Radio or D-STAR. Handheld radios with this technology have several advanced features, including narrower bandwidth, simultaneous voice and messaging, GPS position reporting, and callsign routed radio calls over a wide-ranging international network.

As mentioned, commercial walkie-talkies can sometimes be reprogrammed to operate on amateur frequencies. Amateur radio operators may do this for cost reasons or due to a perception that commercial gear is more solidly constructed or better designed than purpose-built amateur gear." → Wikipedia 20.09.2021 - 14:18

Beginner radios

These radios need some programming via a computer, please check the manuals on how they are programmed and if you need a special cable for this. Some of these devices also allow to manually enter frequencies and settings without prior programming. All of these devices require the operator to have an amateur license to transmit.

Price	Name	Type	URL
~30€	Baofeng UV-5R+	Analog	baofengradio.com
~220€	Anytone AT-D878UV II Plus	Analog & Digital	wimo.com
~500€	Yaesu FT5DR	Analog & Digital	yaesu.com
~500€	Icom ID-31E PLUS	Analog & Digital	icomuk.co.uk

SDR

"Software-defined radio (SDR) is a radio communication system where components that have been traditionally implemented in hardware (e.g. mixers, filters, amplifiers, modulators/demodulators, detectors, etc.) are instead implemented by means of software on a personal computer or embedded system.[1] While the concept of SDR is not new, the rapidly evolving capabilities of digital electronics render practical many processes which were once only theoretically possible.

A basic SDR system may consist of a personal computer equipped with a sound card, or other analog-to-digital converter, preceded by some form of RF front end. Significant amounts of signal processing are handed over to the general-purpose processor, rather than being done in special-purpose hardware (electronic circuits). Such a design produces a radio which can receive and transmit widely different radio protocols (sometimes referred to as waveforms) based solely on the software used.

Software radios have significant utility for the military and cell phone services, both of which must serve a wide variety of changing radio protocols in real time. In the long term, software-defined radios are expected by proponents like the Wireless Innovation Forum to become the dominant technology in radio communications. SDRs, along with software defined antennas are the enablers of the cognitive radio.[2]

A software-defined radio can be flexible enough to avoid the "limited spectrum" assumptions of designers of previous kinds of radios, in one or more ways including:

- Spread spectrum and ultrawideband techniques allow several transmitters to transmit in the same place on the same frequency with very little interference, typically combined with one or more error detection and correction techniques to fix all the errors caused by that interference.
- Software defined antennas adaptively "lock onto" a directional signal, so that receivers can better reject interference from other directions, allowing it to detect fainter transmissions.
- Cognitive radio techniques: each radio measures the spectrum in use and communicates that information to other cooperating radios, so that transmitters can avoid mutual interference by selecting unused frequencies. Alternatively, each radio connects to a geolocation database to obtain information about the spectrum occupancy in its location and, flexibly, adjusts its operating frequency and/or transmit power not to cause interference to other wireless services.
- Dynamic transmitter power adjustment, based on information communicated from the receivers, lowering transmit power to the minimum necessary, reducing the near–far problem and reducing interference to others, and extending battery life in portable equipment.
- Wireless mesh network where every added radio increases total capacity and reduces the power required at any one node.[4] Each node transmits using only enough power needed for the message to hop to the nearest node in that direction, reducing the near–far problem and reducing interference to others." → Wikipedia 20.09.2021 - 16:00

RTL-SDR

"RTL-SDR is a very cheap ~$25 USB dongle that can be used as a computer based radio scanner for receiving live radio signals in your area (no internet required). Depending on the particular model it could receive frequencies from 500 kHz up to 1.75 GHz. Most software for the RTL-SDR is also community developed, and provided free of charge.

The origins of RTL-SDR stem from mass produced DVB-T TV tuner dongles that were based on the RTL2832U chipset. With the combined efforts of Antti Palosaari, Eric Fry and Osmocom (in particular Steve Markgraf) it was found that the raw I/Q data on the RTL2832U chipset could be accessed directly, which allowed the DVB-T TV tuner to be converted into a wideband software defined radio via a custom software driver developed by Steve Markgraf." → rtl-sdr.com 20.09.2021 - 16:02

License-free devices

PMR446

"PMR446 (Private Mobile Radio, 446 MHz) is a licence exempt service in the UHF radio frequency band and is available for business and personal use in most countries throughout the European Union.[1]

PMR446 is typically used for small-site, same-building and line of sight outdoor activities. Equipment used ranges from consumer-grade to professional quality walkie-talkies (similar to those used for FRS/GMRS in the United States and Canada). Depending on surrounding terrain range can vary from a few hundred metres (in a city) to a few kilometres (flat countryside) to many kilometres from high ground.

Historically, analogue FM is used but a digital voice mode has been available in radios conforming to

digital private mobile radio (dPMR446) and digital mobile radio (DMR Tier 1) standards designed by ETSI.

Originally 8 channels were available in analogue mode but this has now been increased to 16 channels. Typically PMR446 is used for both recreational and business use, additionally it has been utilized by amateur-radio operators and radio enthusiasts as a license-free experimental band." → Wikipedia 21.09.2021 - 07:48

CB

"Citizens band radio (also known as CB radio), used in many countries, is a land mobile radio system, a system allowing short-distance person-to-person bidirectional voice communication between individuals, using two way radios operating on 40 channels near 27 MHz (11 m) in the high frequency (a.k.a. shortwave) band. Citizens band is distinct from other personal radio service allocations such as FRS, GMRS, MURS, UHF CB and the Amateur Radio Service ("ham" radio). In many countries, CB operation does not require a license, and (unlike amateur radio) it may be used for business or personal communications. Like many other land mobile radio services, multiple radios in a local area share a single frequency channel, but only one can transmit at a time. The radio is normally in receive mode to receive transmissions of other radios on the channel; when users want to talk they press a "push to talk" button on their radio, which turns on their transmitter. Users on a channel must take turns talking. Transmitter power is limited to 4 watts in the US and the EU. CB radios have a range of about 3 miles (4.8 km) to 20 miles (32 km) depending on terrain, for line of sight communication; however, various radio propagation conditions may intermittently allow communication over much greater distances." → Wikipedia 20.09.2021 - 07:35

Interesting facts

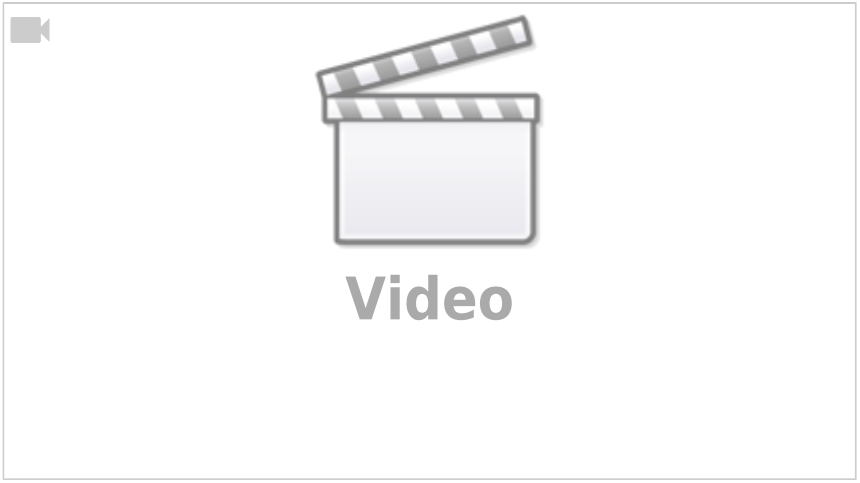
ISS

Via ARISS

The following call signs are available for use on the ISS:

- Russian: RS0ISS
- USA: NA1SS
- European: DP0ISS, OR4ISS, IR0ISS
- Packet Station Mailbox: RS0ISS-11, RS0ISS-1

It is even possible to do a QSA with the ISS. To do so you must send your QSA-request with a IRC (International Reply Coupon → Contact POST) to the regional address as mentioned at ARISS



Getting a license

"Conformément à la section 1.5.3 du Plan des fréquences, deux autorisations sont nécessaires au radioamateur afin de lui permettre d'exécuter son activité en toute légalité.

En premier lieu, l'opérateur qui se sert d'une station d'amateur, doit être titutlaire d'un certificat d'opérateur individuel. Ce certificat d'opérateur est délivré après avoir passé un examen radioamateur.

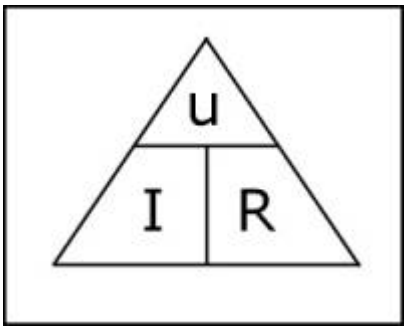
En deuxième lieu, l'utilisation d'une station radioamateur est également soumise à l'obtention d'une licence conformément aux dispositions du Règlement des radiocommunications.

Le titulaire d'un certificat d'opérateur HAREC ou NOVICE peut soliciter une licence radioamateur auprès de l'Institut." → rl.lu

Mathematics

Ohm's law

"Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points. Introducing the constant of proportionality, the resistance,[1] one arrives at the usual mathematical equation that describes this relationship:[2]



$$I={\frac {U}{R}}$$ $$R={\frac {U}{I}}$$ $$U={R\cdot{I}}$$

where I is the current through the conductor in units of amperes, U is the voltage measured across the conductor in units of volts, and R is the resistance of the conductor in units of ohms. More specifically, Ohm's law states that the R in this relation is constant, independent of the current.[3] If the resistance is not constant, the previous equation cannot be called Ohm's law, but it can still be used as a definition of static/DC resistance.[4] Ohm's law is an empirical relation which accurately

describes the conductivity of the vast majority of electrically conductive materials over many orders of magnitude of current. However some materials do not obey Ohm's law; these are called non-ohmic.

The law was named after the German physicist Georg Ohm, who, in a treatise published in 1827, described measurements of applied voltage and current through simple electrical circuits containing various lengths of wire. Ohm explained his experimental results by a slightly more complex equation than the modern form above (see § History below)." → Wikipedia 21.09.2021 - 11:25

Power

"Electric power is the rate, per unit time, at which electrical energy is transferred by an electric circuit. The SI unit of power is the watt, one joule per second.

Electric power is usually produced by electric generators, but can also be supplied by sources such as electric batteries. It is usually supplied to businesses and homes (as domestic mains electricity) by the electric power industry through an electric power grid.

Electric power can be delivered over long distances by transmission lines and used for applications such as motion, light or heat with high efficiency.[1]" → Wikipedia 21.09.2021 - 11:35 $${\displaystyle P={\text{work done per unit time}}={\frac {W}{t}}={\frac {W}{Q}}{\frac {Q}{t}}=VI\,}$$

Resistive circuits

In the case of resistive (Ohmic, or linear) loads, Joule's law can be combined with Ohm's law (V = I·R) to produce alternative expressions for the amount of power that is dissipated:

$$P=IV=I^{2}R={\frac {V^{2}}{R}}$$

where R is the electrical resistance.

Electric conductance

"The siemens (symbol: S) is the derived unit of electric conductance, electric susceptance, and electric admittance in the International System of Units (SI). Conductance, susceptance, and admittance are the reciprocals of resistance, reactance, and impedance respectively; hence one siemens is redundantly equal to the reciprocal of one ohm (Ω−1) and is also referred to as the mho. The 14th General Conference on Weights and Measures approved the addition of the siemens as a derived unit in 1971.[1]" → Wikipedia 29.09.2021 - 10:15

$$S = {I\over A} = {[{A\over mm^2}]}$$

Electric charge

$$1C = 1As$$ $$Q = I*t$$

Period duration

"A time period (denoted by 'T'') is the time taken for one complete cycle of vibration to pass a given point.[1] As the frequency of a wave increases, the time period of the wave decreases. The unit for time period is 'seconds'." → Wikipedia 29.09.2021 - 10:22

$$T = {1\over f}$$

Antennae lengths

Dipole

Electronics

Resistors

Capacitors

Coils

Diodes

Transistors and amplifiers

Nato-alphabet and morse

CHARACTER	MORSE CODE	TELEPHONY	PHONIC (PRONUNCIATION)
A	• —	Alfa	(AL-FAH)
B	— • • •	Bravo	(BRAH-VOH)
C	— • — •	Charlie	(CHAR-LEE) or (SHAR-LEE)
D	— • •	Delta	(DELL-TAH)
E	•	Echo	(ECK-OH)
F	• • — •	Foxtrot	(FOKS-TROT)
G	— — •	Golf	(GOLF)
H	• • • •	Hotel	(HOH-TEL)
I	• •	India	(IN-DEE-AH)
J	• — — —	Juliett	(JEW-LEE-ETT)
K	— • —	Kilo	(KEY-LOH)
L	• — • •	Lima	(LEE-MAH)
M	— —	Mike	(MIKE)
N	— •	November	(NO-VEM-BER)
O	— — —	Oscar	(OSS-CAH)
P	• — — •	Papa	(PAH-PAH)
Q	— — • —	Quebec	(KEH-BECK)
R	• — •	Romeo	(ROW-ME-OH)
S	• • •	Sierra	(SEE-AIR-RAH)
T	—	Tango	(TANG-GO)
U	• • —	Uniform	(YOU-NEE-FORM) or (OO-NEE-FORM)
V	• • • —	Victor	(VIK-TAH)
W	• — —	Whiskey	(WISS-KEY)
X	— • • —	Xray	(ECKS-RAY)
Y	— • — —	Yankee	(YANG-KEY)
Z	— — • •	Zulu	(ZOO-LOO)
1	• — — — —	One	(WUN)
2	• • — — —	Two	(TOO)
3	• • • — —	Three	(TREE)
4	• • • • —	Four	(FOW-ER)
5	• • • • •	Five	(FIFE)
6	— • • • •	Six	(SIX)
7	— — • • •	Seven	(SEV-EN)
8	— — — • •	Eight	(AIT)
9	— — — — •	Nine	(NIN-ER)
0	— — — — —	Zero	(ZEE-RO)

Callsigns

The Luxembourg Prefixes begin with LX followed by 1 Digit (Number 0-9) and 1 to 4 letters.

LX 0 aaaa	**Repeaters, Digipeaters or official RL call-signs**
LX 1-3 aaaa	**Full privilege license (HAREC)**
LX 4-5 aaaa	**Special call-signs (can be time-limited)**
LX 6 aaaa	**NOVICE License call-signs (since 2007)**
LX 7-8 aaaa	**Special call-signs (can be time-limited)**
LX 9 aaaa	**Local Club call-Signs (can be time-limited)**

LX - nnnn	**Listener call-signs (only composed of LX followed by a number)**

Foreign Amateurs wishing to operate in or from Luxembourg

If you are in possession of a HAREC or NOVICE license you can transmit in Luxembourg for a period of 3 months without any notification to the authorities.

You have the following possibilities to use your callsign (i.e. your call being ON1ABC):

- LX / ON1ABC /p for portable stations
- LX / ON1ABC /m for mobile stations
- LX0RL Operator ON1ABC (if you are using a Luxembourg amateur radio station at his/her home)

In case you are holder of a CEPT Novice License you have to use the prefix LX6 (i.e. LX6 / DO3ABC)

→ RL 20.09.2021 - 21:30

Personal

C3I Members

peter	**Not yet assigned**

Notable callsigns

LX1KQ	**Mich FRIEDERICH**	**President of "Radioamateurs du Luxembourg"**
LX3X	**Patrick Rendulic**	**President of "Luxembourg Amateur Radio Union"**
EF6	**HRH King Felipe VI of Spain**	**King of Spain**

Club

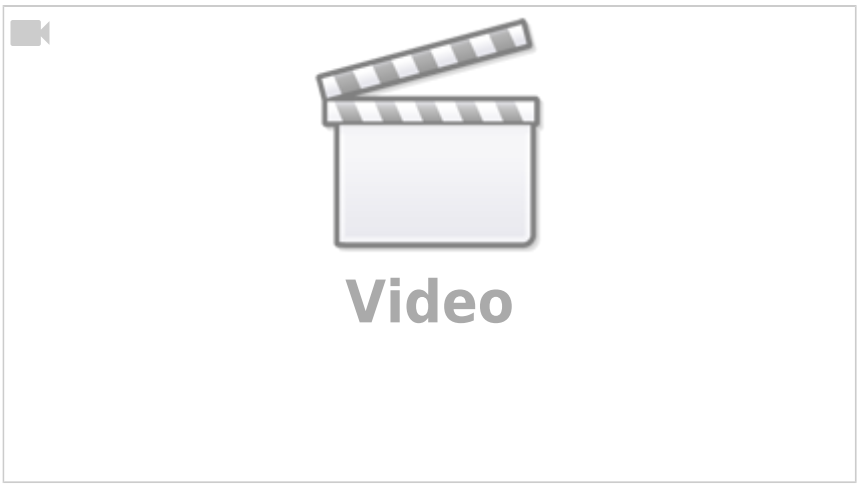
C3L	**Not yet assigned**

Notable callsigns

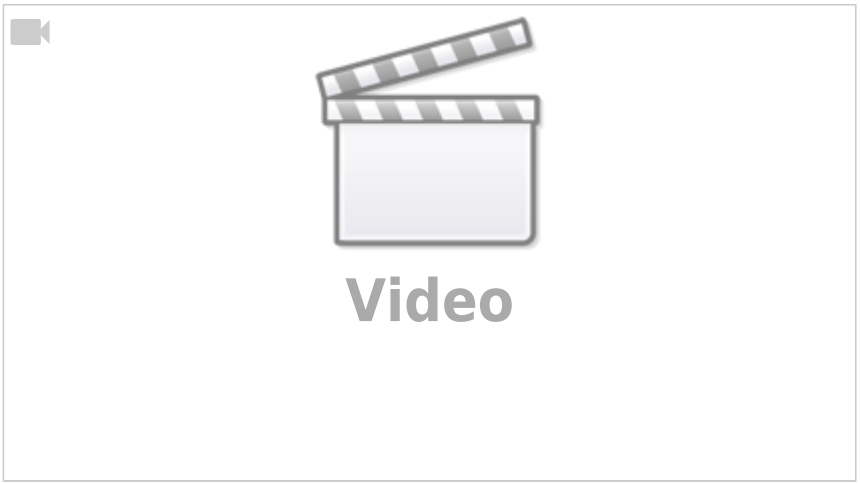
Luxembourg DX and Contest Club	**LX9DX**
International Police Association	**LX9IPA**
ASTRA-SES, Betzdorf	**LX9SES**
World Scout Bureau Global Support Centre	**LX9S**
RL Shack	**LX0RL**
LARU club station	**LX9LARU**

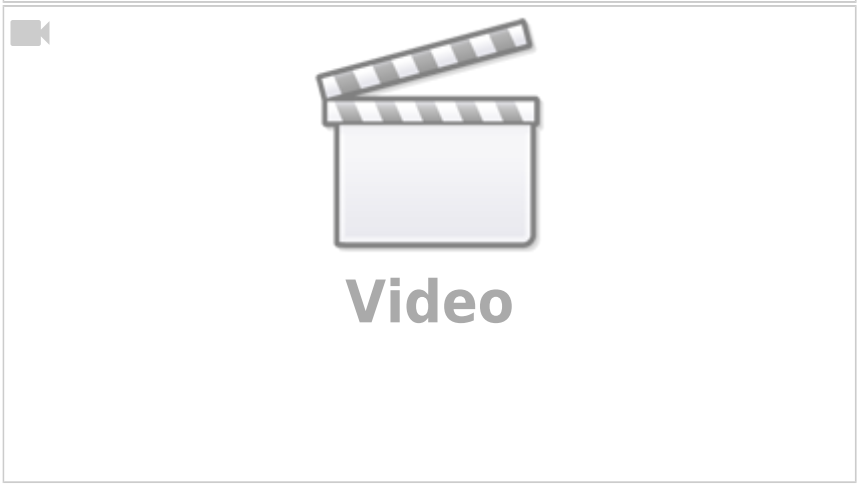
How do Antennae work

Dipole

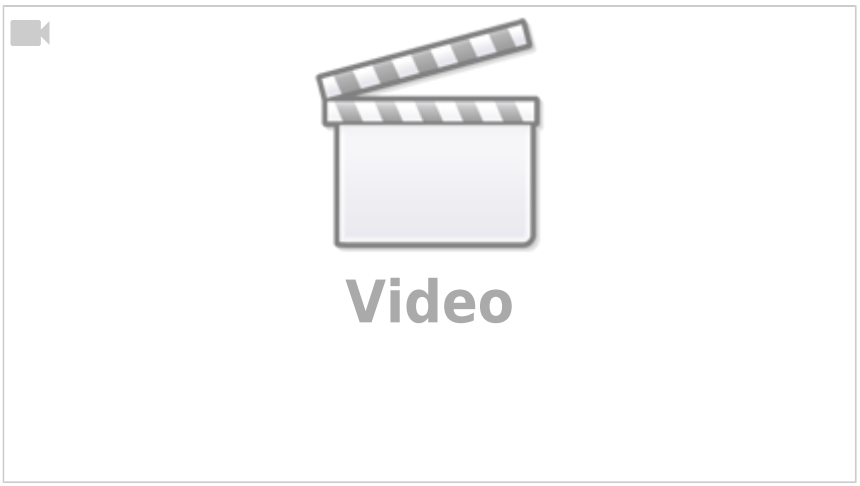


Yagi-Uda

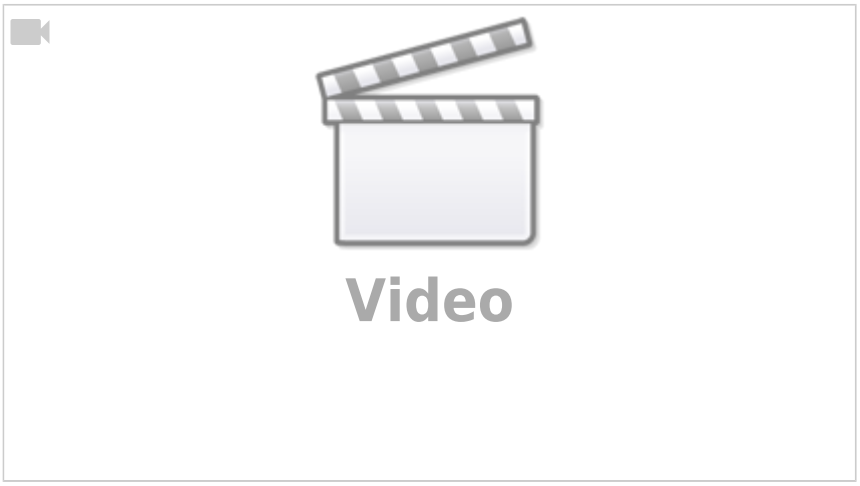




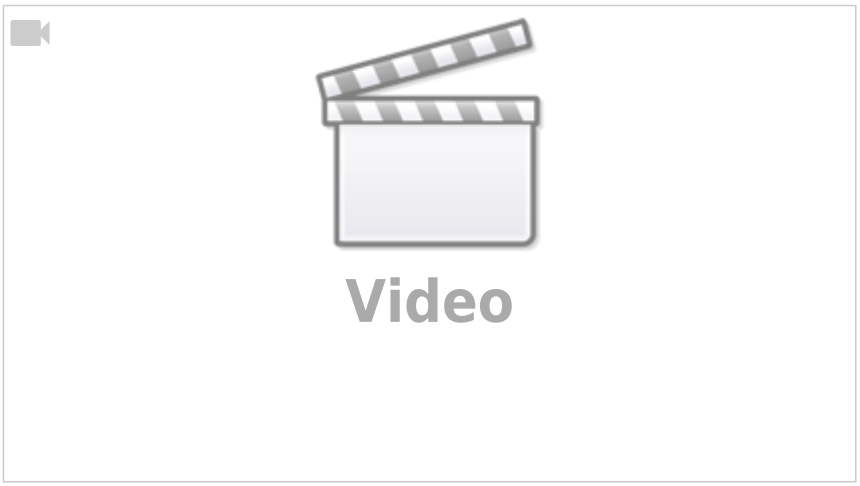
Magnetic loop



Dish



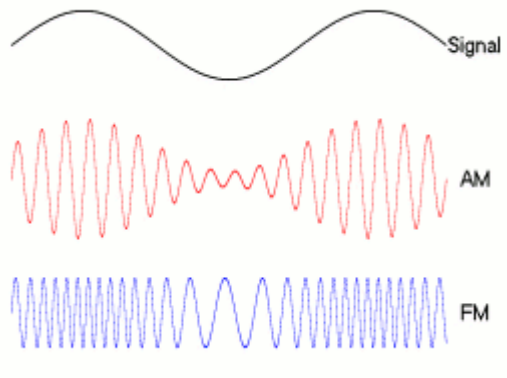
Monopole



FM and AM

FM

"Frequency modulation (FM) is the encoding of information in a carrier wave by varying the instantaneous frequency of the wave. The technology is used in telecommunications, radio broadcasting, signal processing, and computing.



In analog frequency modulation, such as radio broadcasting, of an audio signal representing voice or music, the instantaneous frequency deviation, i.e. the difference between the frequency of the carrier and its center frequency, has a functional relation to the modulating signal amplitude.

Digital data can be encoded and transmitted with a type of frequency modulation known as frequency-shift keying (FSK), in which the instantaneous frequency of the carrier is shifted among a set of frequencies. The frequencies may represent digits, such as '0' and '1'. FSK is widely used in computer modems, such as fax modems, telephone caller ID systems, garage door openers, and other low-frequency transmissions.[1] Radioteletype also uses FSK.[2]

Frequency modulation is widely used for FM radio broadcasting. It is also used in telemetry, radar, seismic prospecting, and monitoring newborns for seizures via EEG,[3] two-way radio systems, sound synthesis, magnetic tape-recording systems and some video-transmission systems. In radio transmission, an advantage of frequency modulation is that it has a larger signal-to-noise ratio and therefore rejects radio frequency interference better than an equal power amplitude modulation (AM) signal. For this reason, most music is broadcast over FM radio.

Frequency modulation and phase modulation are the two complementary principal methods of angle modulation; phase modulation is often used as an intermediate step to achieve frequency modulation. These methods contrast with amplitude modulation, in which the amplitude of the carrier wave varies, while the frequency and phase remain constant." → Wikipedia 21.09.2021 - 07:50

AM

"AM broadcasting is radio broadcasting using amplitude modulation (AM) transmissions. It was the first method developed for making audio radio transmissions, and is still used worldwide, primarily for medium wave (also known as "AM band") transmissions, but also on the longwave and shortwave radio bands.

The earliest experimental AM transmissions began in the early 1900s. However, widespread AM broadcasting was not established until the 1920s, following the development of vacuum tube receivers and transmitters. AM radio remained the dominant method of broadcasting for the next 30 years, a period called the "Golden Age of Radio", until television broadcasting became widespread in the 1950s and received most of the programming previously carried by radio. Subsequently, AM radio's audiences have also greatly shrunk due to competition from FM (frequency modulation) radio, Digital Audio Broadcasting (DAB), satellite radio, HD (digital) radio and Internet streaming.

AM transmissions are much more susceptible to interference than FM or digital signals, and often

have lower audio fidelity. Thus, AM broadcasters tend to specialise in spoken-word formats, such as talk radio, all news and sports, with music formats primarily for FM and digital stations." → Wikipedia 21.09.2021 - 07:52

CW

"In telecommunications, a carrier wave, carrier signal, or just carrier, is a waveform (usually sinusoidal) that is modulated (modified) with an information-bearing signal for the purpose of conveying information.[1] This carrier wave usually has a much higher frequency than the input signal does. The purpose of the carrier is usually either to transmit the information through space as an electromagnetic wave (as in radio communication), or to allow several carriers at different frequencies to share a common physical transmission medium by frequency division multiplexing (as in a cable television system). The term originated in radio communication, where the carrier wave creates the waves which carry the information (modulation) through the air from the transmitter to the receiver. The term is also used for an unmodulated emission in the absence of any modulating signal.[2]" → Wikipedia 21.09.2021 - 11:14

Digital

"Digital radio is the use of digital technology to transmit or receive across the radio spectrum. Digital transmission by radio waves includes digital broadcasting, and especially digital audio radio services." → Wikipedia 21.09.2021 - 11:16

D-Star

"D-STAR (Digital Smart Technologies for Amateur Radio) is a digital voice and data protocol specification for amateur radio. The system was developed in the late 1990s by the Japan Amateur Radio League and uses minimum-shift keying in its packet-based standard. There are other digital modes that have been adapted for use by amateurs, but D-STAR was the first that was designed specifically for amateur radio." → Wikipedia 21.09.2021 - 11:11

FT8

"Joe Taylor, K1JT, announced on June 29, 2017 the availability of a new mode in the WSJT-X software, FT8.[14] FT8 stands for "Franke-Taylor design, 8-FSK modulation" and was created by Joe Taylor, K1JT and Steve Franke, K9AN. It is described as being designed for "multi-hop Es where signals may be weak and fading, openings may be short, and you want fast completion of reliable, confirmable QSO's".

According to Taylor, the important characteristics of FT8 are —

T/R sequence length: 15 s Message length: 75 bits + 12-bit CRC FEC code: (174,87) LDPC Modulation: 8-FSK, keying rate = tone spacing = 6.25 Hz Waveform: Continuous phase, constant envelope Occupied bandwidth: 50 Hz Synchronization: three 7x7 Costas arrays (start, middle, end of transmission) Transmission duration: 79*1920/12000 = 12.64 s Decoding threshold: -20 dB (perhaps

-24 dB with a priori decoding, TBD) Operational behavior: similar to HF usage of JT9, JT65 Multi-decoder: finds and decodes all FT8 signals in passband Auto-sequencing after manual start of QSO Compared to the so-called "slow modes" (JT9, JT65, QRA64), FT8 is a few decibels less sensitive, but allows completion of QSOs four times faster. Bandwidth is greater than JT9, but about one-quarter of JT65A and less than one-half of QRA64. Compared with the "fast modes" (JT9E-H), FT8 is significantly more sensitive, has much narrower bandwidth, uses the vertical waterfall, and offers multi-decoding over the full displayed passband. Features not yet implemented include signal subtraction, two-pass decoding, and use of a priori (already known) information as it accumulates during a QSO."[15]" → Wikipedia 21.09.2021 - 11:13

M17

"M17 is an RF protocol that is:

Completely open: open specification, open source code, open source hardware, open algorithms. Anyone must be able to build an M17 radio and interoperate with other M17 radios without having to pay anyone else for the right to do so. Optimized for amateur radio use. Simple to understand and implement. Capable of doing the things hams expect their digital protocols to do: Voice (eg: DMR, D-Star, etc) Point to point data (eg: Packet, D-Star, etc) Broadcast telemetry (eg: APRS, etc) Extensible, so more capabilities can be added over time." → M17 Specification

Satellite

"Satellite radio is defined by the International Telecommunication Union (ITU)'s ITU Radio Regulations (RR) as a broadcasting-satellite service.[1] The satellite's signals are broadcast nationwide, across a much wider geographical area than terrestrial radio stations, and the service is primarily intended for the occupants of motor vehicles.[2][3] It is available by subscription, mostly commercial free, and offers subscribers more stations and a wider variety of programming options than terrestrial radio.[4]

Satellite radio technology was inducted into the Space Foundation Space Technology Hall of Fame in 2002.[5] Satellite radio uses the 2.3 GHz S band in North America for nationwide digital radio broadcasting.[6] In other parts of the world, satellite radio uses the 1.4 GHz L band allocated for DAB.[7]" → Wikipedia 21.09.2021 - 11:18

QO-100

"On November 15, 2018, Es’hail-2/P4A was launched on a Falcon 9 launch vehicle from the Cape Canaveral Air Force Station Space Launch Complex 40 in Florida. Es’hail-2/P4A was developed jointly by QARS (Qatar Amateur Radio Society) and Es’hailSat (the Qatar Satellite Company), with AMSAT-DL as the technical lead, and is the first geostationary amateur radio payload. The satellite has reached its final position at 25.9 °E, and the narrow and wideband transponders were successfully tested on December 23rd. The transponders are expected to be opened for general use in February 2019.

At the request of AMSAT Deutschland e.V., QARS, and Es’hailSat, AMSAT hereby designates Es’hail-2/P4A as Qatar-OSCAR 100 (QO-100). May the 100th OSCAR satellite be the guide star to future amateur radio satellites and payloads to geostationary orbit and beyond." → AMSAT

ATV

"Amateur television (ATV) is the transmission of broadcast quality video and audio over the wide range of frequencies of radio waves allocated for radio amateur (Ham) use.[1] ATV is used for non-commercial experimentation, pleasure, and public service events. Ham TV stations were on the air in many cities before commercial television stations came on the air.[2] Various transmission standards are used, these include the broadcast transmission standards of NTSC in North America and Japan, and PAL or SECAM elsewhere, utilizing the full refresh rates of those standards. ATV includes the study of building of such transmitters and receivers, and the study of radio propagation of signals travelling between transmitting and receiving stations." → Wikipedia 26.09.2021 06:29

2.4 Ghz and 5 Ghz

W-LAN

"A wireless LAN (WLAN) is a wireless computer network that links two or more devices using wireless communication to form a local area network (LAN) within a limited area such as a home, school, computer laboratory, campus, or office building. This gives users the ability to move around within the area and remain connected to the network. Through a gateway, a WLAN can also provide a connection to the wider Internet.

Wireless LANs based on the IEEE 802.11 standards are the most widely used computer networks in the world. These are commonly called Wi-Fi, which is a trademark belonging to the Wi-Fi Alliance. They are used for common home and small office networks that link together laptop computers, printers, smartphones, Web TVs and gaming devices with a wireless router which links them to the internet. Hotspots provided by routers at restaurants, coffee shops, hotels, libraries, and airports allow consumers to access the internet with portable wireless devices." Wikipedia 21.09.2021 - 11:24

Bluetooth

"Bluetooth is a short-range wireless technology standard that is used for exchanging data between fixed and mobile devices over short distances using UHF radio waves in the ISM bands, from 2.402 GHz to 2.48 GHz, and building personal area networks (PANs).[4] It was originally conceived as a wireless alternative to RS-232 data cables. It is mainly used as an alternative to wire connections, to exchange files between nearby portable devices and connect cell phones and music players with wireless headphones. In the most widely used mode, transmission power is limited to 2.5 milliwatts, giving it a very short range of up to 10 meters (30 feet).

Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 35,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The IEEE standardized Bluetooth as IEEE 802.15.1, but no longer maintains the standard. The Bluetooth SIG oversees development of the specification, manages the qualification program, and protects the trademarks.[5] A manufacturer must meet Bluetooth SIG standards to market it as a Bluetooth device.[6] A network of patents apply to the technology, which are licensed to individual qualifying devices. As of 2009, Bluetooth integrated circuit chips ship approximately 920 million units annually." → Wikipedia 21.09.2021 - 11:22

How to use the HAM

Please ask a licensed amateur radio operator to show and guide you.

> It is **only** allowed to use the club-callsign when a currently licensed person is in **arms-reach** of the station. It is **illegal and punishable by law** to use a HAM radio without a current license. A HAM radio can be dangerous, for the users health or surrounding equipement, if not used correctly.
>
> On HAM frequencies it is not allowed to encrypt the transmission. It however is allowed to use a standard to modulate information on some bands.

> Listening to non-aviation, non-police and non-military bands **is always legal** and does **NOT** require a license. However please check if the device is compliant so it will not produce interference.

> In Luxembourg it is still **ILLEGAL** to listen to AM air-traffic. According to the authorities listening itself can already interfere with the signal. Keep in mind that it **is actively enforced** and a patrol car of the airport is checking for listening devices 24/7. The Chaosstuff is very close to an airport so the patrol cars are not far away.

Open source projects in the HAM-scene

M17

M17 is a new digital radio protocol in development as an alternative to those currently available, with freedom in mind. Freedom in the code, protocol, voice codecs, and hardware. The goal is to provide a better option for digital radios in the future.

The M17 Working Group is a team of several people from around the world. Headed up by Wojciech (SP5WWP) in Poland, there are several other Amateur Radio operators involved - putting their skills to work with the desire for a more free and open digital radio protocol that can be used world wide!

→ Jump to M17

OpenRTX

OpenRTX is a free and open source firmware for digital ham radios, top-down designed with modularity, flexibility and performance in mind.

Currently OpenRTX is being actively developed for the following radios:

- Tytera MD-380/390 UHF versions only
- Tytera MD-UV380/390
- Tytera TYT MD-9600
- Radioddity GD-77
- Baofeng DM-1801

CubicSDR

CubicSDR is a cross-platform Software-Defined Radio application which allows you to navigate the radio spectrum and demodulate any signals you might discover. It currently includes several common analog demodulation schemes such as AM and FM and will support digital modes in the future. Many digital decoding applications are available now that can use the analog outputs to process digital signals by “piping” the data from CubicSDR to another program using software like Soundflower, Jack Audio or VBCable.

CubicSDR supports the readily-available RTL-SDR which is an inexpensive SDR device that can be purchased online for about $10 and up. Search for “RTL2832U” and “820T” or “820T2” on sites such as eBay or Amazon to see what’s available. Additionally CubicSDR now includes support for SDRPlay, HackRF, BladeRF, AirSpy, NetSDR+, Red Pitaya, Audio Devices (some platform specific at the moment) or any other device with an available SoapySDR support module.

rpitx

rpitx is a general radio frequency transmitter for Raspberry Pi which doesn't require any other hardware unless filter to avoid interference. It can handle frequencies from 5 KHz up to 1500 MHz.

Rpitx is a software made for educational on RF system. It has not been tested for compliance with regulations governing transmission of radio signals. You are responsible for using your Raspberry Pi legally.

Regular Events

JOTA-JOTI

"JOTA-JOTI (Jamboree-on-the-Air-Jamboree-on-the-Internet) is the world’s largest digital Scout event taking place on the Internet and over the airwaves. Held every year in October, the event connects millions of young people around the world for a full weekend of online activities that promote friendship and global citizenship. JOTA-JOTI enables young people and volunteers to participate in fun and engaging group activities over the Internet and amateur radio focused on developing 21st century skills through Scouting.

JOTA-JOTI is one of World Scouting’s longest-running global events dating back more than 60 years to 1958. The digital educational event has seen steady annual growth in participation over the years and with a focus on the future aims to reach millions of more participants in the years to come." → JOTA-

JOTI Website

RL QST Emissioun

"D'QST Emissioun vum RL fënnt all läschte Freiden vum Mount um 20:00 Auer statt.

Eng Rediffusioun gëtt Sonndes nom leschte Freiden am Mount um 11:00 Auer gemaach.
D'Émissiounen ginn iwwer d'Relaisen LX0DMM, LX0HI an LX0LU iwwerdroen." → RL event page

DIY station with a RasPi

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