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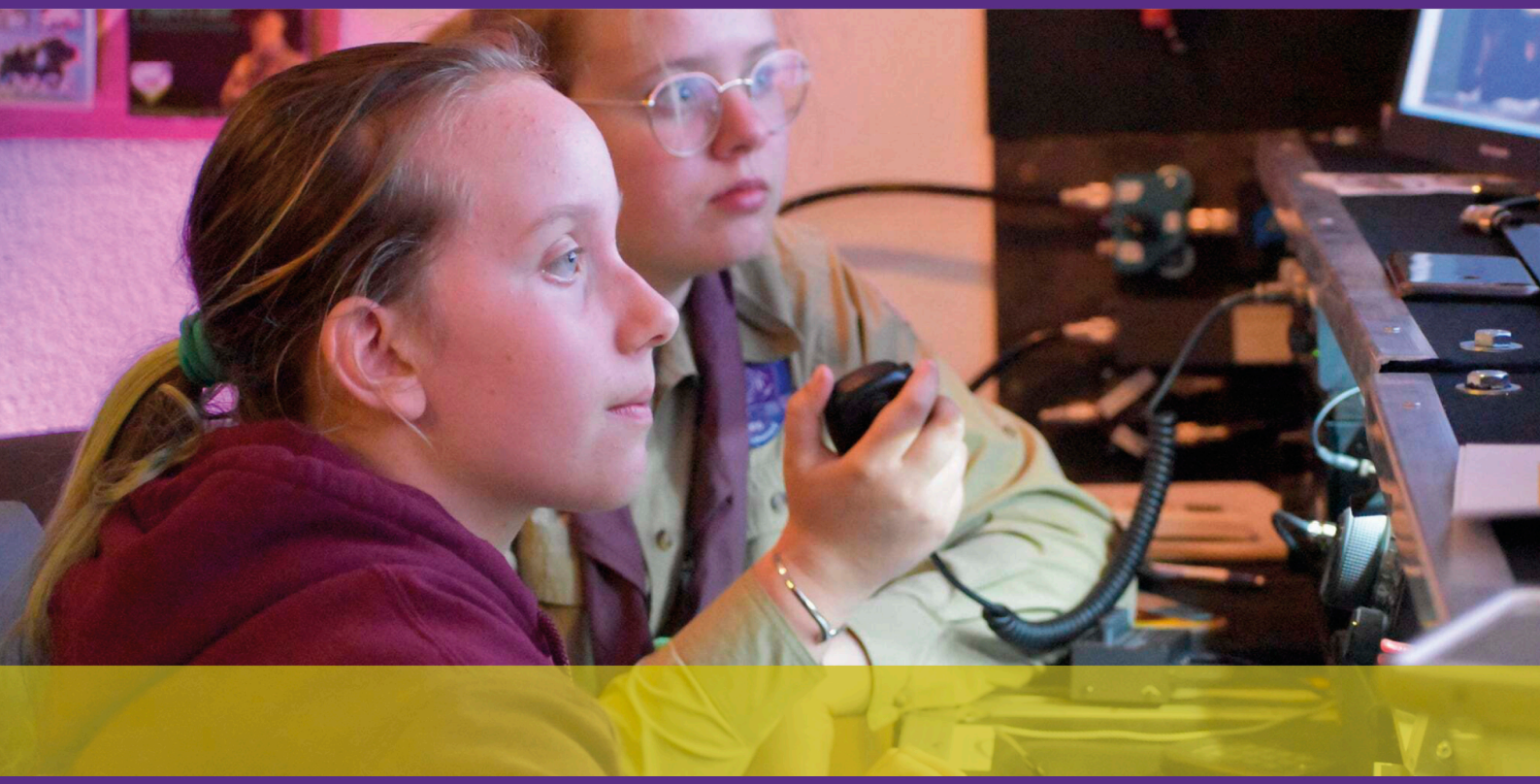

JOTA-JOTI HAM RADIO HANDBOOK

jota joti

14 - 16 OCTOBER / OCTOBRE 2022

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Creating a Better World

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JOTA-JOTI

Jamboree On The Air -

Jamboree On the Internet

14 - 16 OCTOBER 2022

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What is "Ham Radio"?

Ham Radio, sometimes also called Amateur Radio, is a technology that allows two people - called ham radio operators - to communicate directly through the air.

Most of the time, when people talk about "radio," they mean broadcast radio: A station sends out a program like music or news, and countless people listen to that same station using a receiver, it is often also just called "radio."

In ham radio, everybody can be the sender and the receiver - just like a phone call, the two sides take turns talking. While many other technologies allow this, for example, the internet or the public phone network, ham radio is unique. It does not require any network or central function to operate - the two stations exchange signals directly through the air.

There is a wide range of ham radio devices. They range from toy radios for kids, which in most countries can be used by anyone, all the way to large stations that require special licenses and that can send their signals halfway around the world and even up to the International Space Station.

Ham Radio is a fascinating world, full of technology and its own language. All newcomers are very welcome, and all experienced ham radio operators love nothing more than introducing someone new to this exciting world. JOTA-JOTI is the perfect event to explore Ham Radio!

What is JOTA-JOTI?

A Jamboree is a large gathering of Scouts, either global or national, and traces its roots back to the early days of Scouting in the last century. The first World Scout Jamboree was held in 1920, and it still takes place every four years, next time in 2023 in Korea.

As ham radio became popular among Scouts, the idea of holding a Jamboree remotely, using ham radio: the "Jamboree on the Air" was born and first held in 1957. Later, when the internet became increasingly popular, the "Jamboree on the Internet" was created in 1995. Today, the two events have merged into a single experience called JOTA-JOTI.

JOTA-JOTI always takes place on the third weekend of October, with over 2 million Scouts participating.

In this manual, we teach and guide you as a Scout or Scout leader about participating in JOTA-JOTI using amateur radio technology: How it works, Radio operator practice, technical background, activities and ideas, rules and regulations, specific radio language, handy tools, and links.

Important: Radio regulations differ from country to country. This manual is not a replacement for local rules. We recommend that all Scouts work with a local radio amateur who has all the required licenses.

The activity of radio amateurs is like driving a car; it must obey a code whose objective is to allow people to travel on the airwaves without hindrance because everyone knows the rules and follows them.

After passing an exam, one is granted the right to use an amateur radio station and talk over the air, possibly over long distances.

However, you will be able to speak on the microphone yourself under the conditions described below:

- *the station is under the effective control and in the presence of a licensed amateur radio operator;*
- *you can say your first name and a few words using the international alphabet*
- *you know how to use the CQ calling procedures and the Q (amateur radio) and J (Jamboree) code*
- *you have prepared one or two sentences or a question to ask your listener. You can use this example from our colleagues in New South Wales: https://nswjotajoti.org/pdf's/JOTA-Qesuestons-1.pdf*

JOTA-JOTI is not a competition. There are no points or time limits or prices.
JOTA-JOTI is a fantastic event during the 3rd weekend of October. We are making and exploring old and new friendships on a weekend of experiences, connections, and communications with Scouts worldwide.

Amateur Radio Code of Conduct

The basic principles that should govern our code of conduct on the ham bands are:

- Social Feeling, Feeling of Brotherhood/Sisterhood, Brotherly/sisterly spirit;
- Tolerance;
- Politeness;
- Understanding.

Source: https://www.jotajoti.info/amateur-radio-code-conduct

Radio Amateur Code of Conduct Basic Principles:

- Considerate;
- Loyal;
- Progressive;
- Friendly;
- Balanced;
- Patriotic.

Source: Ethics and operation procedures for the Radio Amateurs (Edition 3, 2010)

Be safe

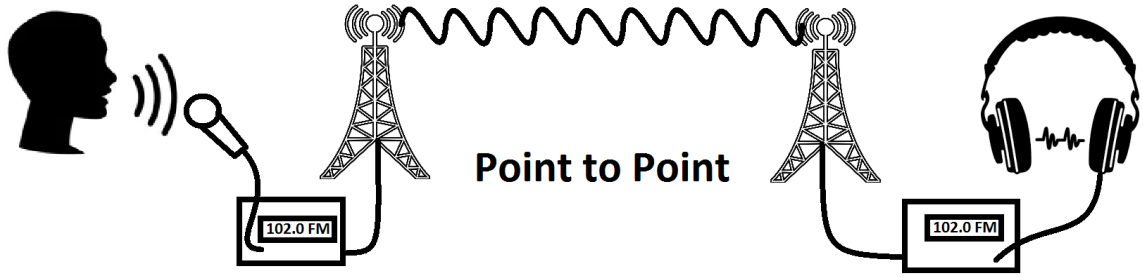
With all of its opportunities and enriching content, using the Internet and Amateur Radio also comes with many risks, including threats to personal data, wellbeing or safety.

We strongly encourage all participants to take our Be Safe Online e-learning course to learn more about online safety and to be fully prepared for JOTA-JOTI and other online activities.
https://www.scout.org/elearning_beingsafeonline

More information can be found at
https://www.jotajoti.info/be-safe

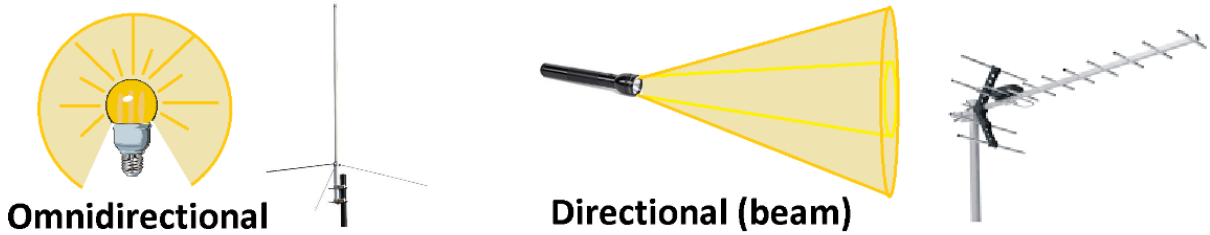
What is Radio, and how does it work?

Radio is the technology of signaling and communicating using radio waves. A radio wave is made by a transmitter and will be received by a receiver. A radio transmitter is an electronic device that converts communication like spoken words via an antenna into electromagnetic signals. In between the Transmitter and the Receiver, there could be distortion that could affect understanding in communication. All kinds of different types of transmission on various frequencies are possible. You will be familiar with broadcast radio, e.g., to listen to your favorite music in the car. The critical point is that the transmitter and the receiver have to be on the same frequency. For decoding the message, they should be in the same mode to understand the communication (for example, two different countries using one language to understand each other). They could make an appointment about how and when they planned to have a conversation by following the international regulations for Amateur Radio.



In general, the higher the transmission frequency (>50MHz), the shorter the possible receiving distance. The lower the frequency (<50MHz,) the more efficiently the transmission could travel worldwide. It is just like audio signals. If there is a music festival with a rock band in a park, the low frequency (bass) sound could be heard at a much greater distance than the higher tones.

Most common frequencies as used in radio waves by Ham Radio.
There are 2 groups: High Frequency (HF <50Mhz) or Very High Frequency, Ultra High Frequency (VHF-UHF >50Mhz). Radio waves could be compared to (visual) light. Light is also a 'frequency' but it is much higher in frequency and visible to the human eye. An antenna can be directed, like a light source (light bulb or torch). So, depending on the type of antenna, radio signals can be directed in all directions or sent as a beam in one direction, just like light.

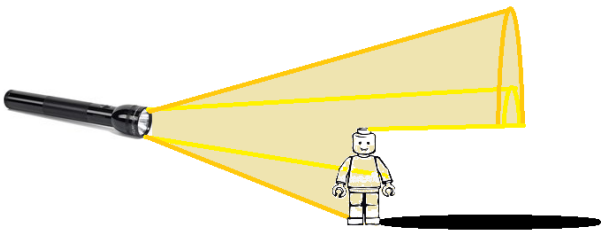


In "Appendix C" we spend some time to go deeper in detail about antennas

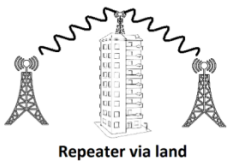
UHF VHF Radio Signals

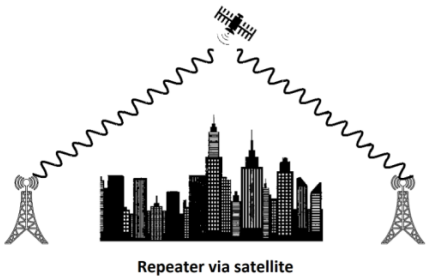
Radio transmitter

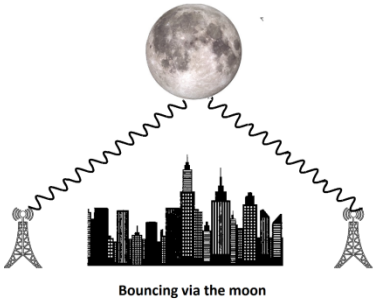
For higher frequencies from 30MHz to 300MHz (Very High-Frequency VHF), 300MHz-3GHz (UHF, Ultra High Frequency), an object could hinder clear reception of a signal. The object could "reflect" the radio signal, just like a light source. If you are using a lamp and something is standing in the middle of the beam, this will result in a "Shadow." There will be less or no light behind the object.



High-rise buildings, cities, or even the curvature of mother earth could be 'an issue' for UHF and VHF. Satellites, repeaters or high antenna towers can solve this issue by receiving and repeating the signal.







HF Radio signals

For lower frequencies in the HF spectrum (<30MHz), the magnetic protection shield around the earth can help reflect signals and make it possible to use these layers for really long distances. The way this protection shield helps or disrupts a radio signal is a combination of the earth's magnetic field and the magnetic transmission of the sun, and it changes like the weather: Every day or hour, conditions can differ.

The reason behind this is that when the sun produces a 'solar flare' (an electro-magnetic radiation), they disturb these shielding layers. We can see this solar activity with our own eyes as the Northern Lights or aurora borealis. So, the earth has a layer around the planet to protect us from incoming magnetic fields.

You can see the solar forecast on YouTube here:
https://www.youtube.com/channel/UCkXjdDQ-db0xz8f4PKgKsag

When HF radio signals are transmitted, the transmission goes from earth to these F-Layers. The system works in reverse. The protection (F) layer around the planet reflects the signals from inside and tries to keep the signal inside these layers. So, the earth is helping the HF signal travel around the world. If there is an "opening" in the F-layer reflecting the signal back to land somewhere around the world, it would be possible to receive this signal many kilometers away.

https://www.nsta.org/science-teacher/science-teacher-novemberdecember-2020/aurora-borealis

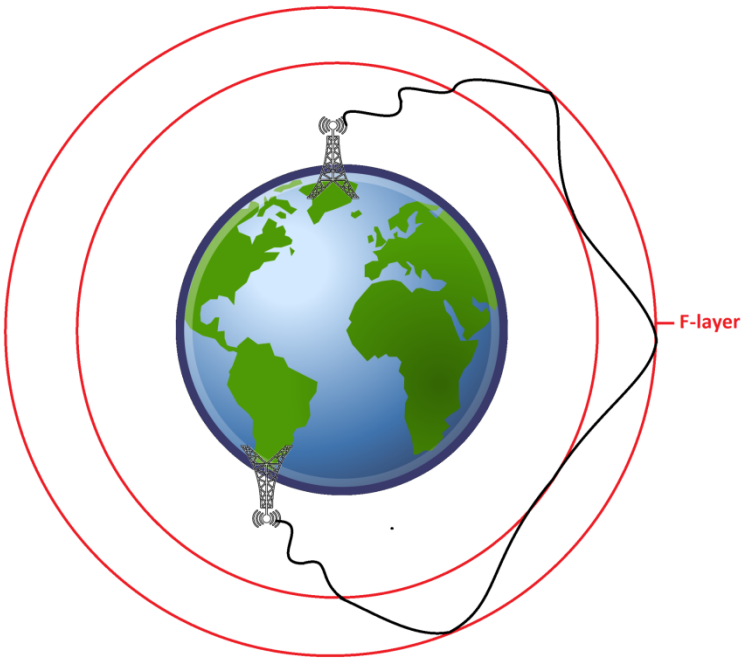


Diagram of how HF signals can travel around the world.

In JOTA-JOTI, a radio can be used to connect. In this guide, we are trying to provide some basic skills and conventions that are helpful for radio communication (during JOTA-JOTI). If you are speaking a different language, understanding could be an issue. So, with amateur radio communication, we have a global tool to talk to each other.

Operator practice & code of ethics

During JOTA-JOTI, we are talking to other stations. As mentioned earlier, to use a radio transmitter, you need to have a license or licensed amateur next to you to make the radio transmission. You cannot play music with an amateur radio license (that requires a different license). During the conversation, you can talk about the weather, techniques, school, your Scouting games, or talk about the JOTA-JOTI event. You cannot talk about religion or make political statements. It is an excellent way to make friends every day around the world, sharing knowledge and the love of technology to connect with one another other!

Basic principles of transmitters and receivers

(On / Off, Volume, Frequency, Mode, Squelch, PTT)

There are radios for mobile or stationary use. There are all kinds of transceivers, and just like a car, there are many different models ranging from minivans to sports cars. They are all 'cars,' and all require the same driver's license, but they all work a bit differently or have different buttons at different places and have specific functions for applications. But overall, they all have a steering wheel, wheels, tyres, engines, and headlights to bring you to the finish line.

The same is the case with amateur radios. There are many different types and brands. In this part, we want to show some basics of transceivers that can be used. The main difference between a transceiver and a receiver is that the transceiver can transmit (send out your message via the antenna) and receive signals. A receiver can only receive radio signals (as the name says).

Overview of a Radio

To turn the radio on (or off), find the 'on-off' button. Be sure before powering 'on', the power supply should be connected, and the correct antenna for a specific band connected to the radio. This power ON/OFF could be a power button or a knob (volume).

With the radio ON, before we make a connection or listen to radio signals, we need to talk about some of the functions of these devices.

On the radio's display, there could be a lot of information. Some of the essential elements are:

To 'Tune in' a frequency, you must select the same frequency as the receiving station or choose an empty frequency to start a conversation. This is usually done with the large main dial (large rotary knob).

Now you need to choose your operating mode. {MODE SELECT} This is like language. If you are talking in English and the other station is talking Russian, you can hear but not understand each other. Mode is a sort of language to transmit how the signal is being modified by the transceiver to the antenna. The transceiver is just like a big translation machine.

FM Mode (Frequency Modulation)
AM Mode (Amplitude Modulation)
SSB (USB - LSB) (Upper or Lower Sideband of an AM signal)
CW (Morse code)
Data modes (Packet or digital modes with a computer)

There are certain main (most used) Modes for specific frequencies. They are listed for each region and frequency. Worldwide this can be found in the Ham Radio 'band plan' of (together with the maximum power allowed for transmission).

You can select a band (e.g., 20m - 14.190 MHz) and the {USB MODE} turn on the volume and listen to the signals. (If nothing else, you will hear noise, maybe. There is no one there, tune in to another frequency).

For voice communications in the HF spectrum, broadcasting stations use AM while ham radio operators use SSB (LSB below 10 MHz, USB above 10 MHz). Above 30 MHz, broadcasting stations and ham radio mostly use FM (WFM for broadcasting, NFM for radio operators).

If you have selected a frequency and mode (matching with your antenna), you will be able to contact the other station by pushing the {PTT} button on your microphone (Push to Talk).

Do not be afraid of the microphone. It is ok to speak directly into it.

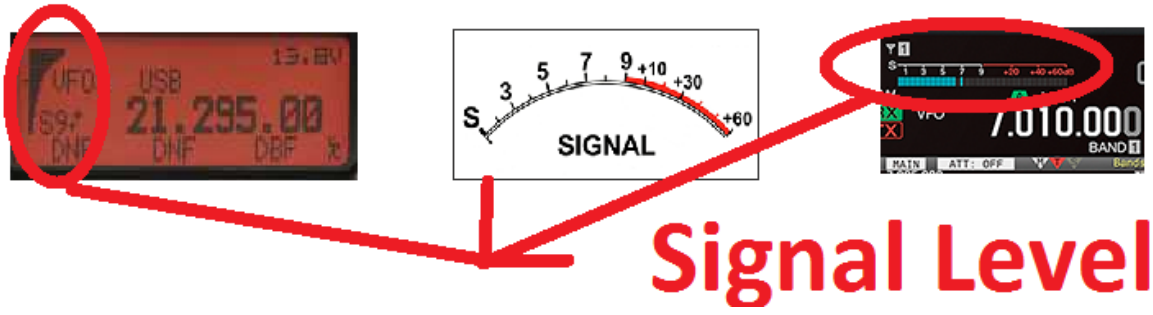
You have to talk close to the microphone (10cm away, but you can still see the micro in your hand); first PUSH the button; then TALK; otherwise, the other station will not be able to hear you because the transmitter in the radio {TX} will not have been activated yet). After you are finished talking, you must release the button to listen to the other station.

The SQUELCH function blocks the audio output if the signal is below a selectable level; in this way, the annoying noise in between communication is silenced, with the further advantage of saving battery. Be careful! If the squelch is too high, you may not hear weak radio signals.

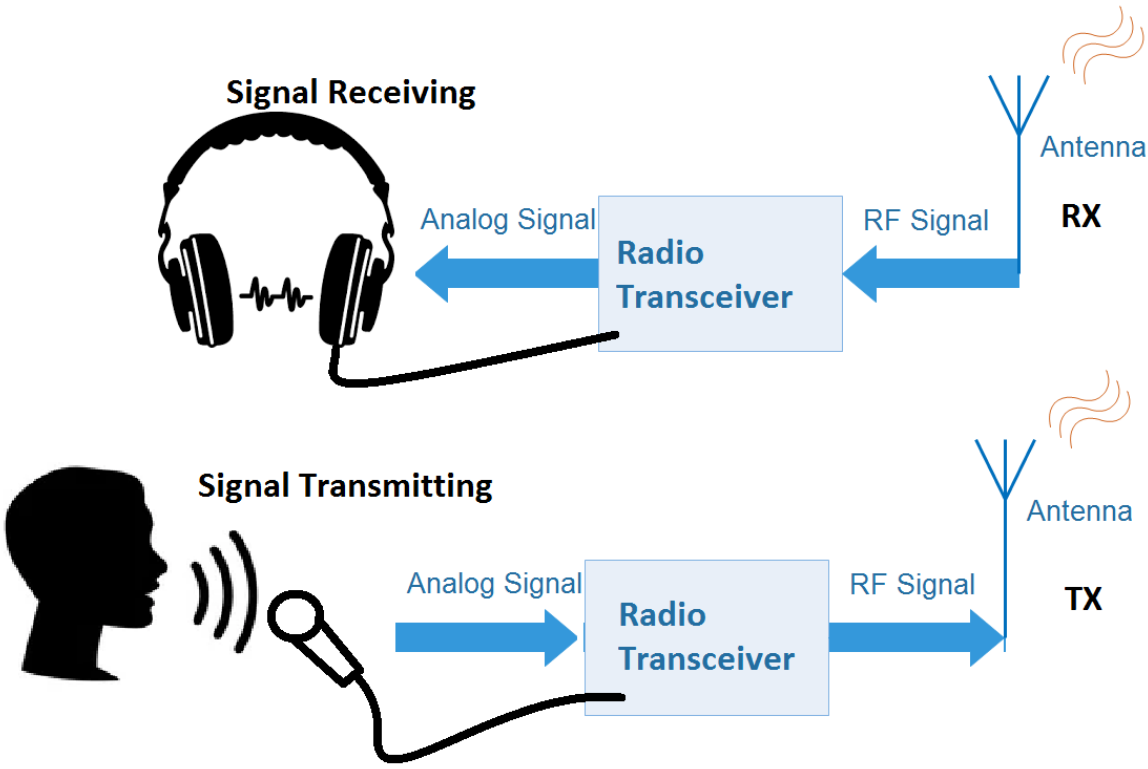
An example of the USA region Band Plan for Ham Radio frequencies

160 1.800		DX Window 1.830	1.850	1.860	1.880	1.900	1.920	1.940	1.960	1.980	2.000
80 3.500	3.525	3.550	3.675	3.725	3.750	3.775	3.800	3.850	3.900	3.950	4.000
40 7.000	7.025	7.050	7.100	7.125	7.150	7.175	7.200	7.225	7.250	7.275	7.300
30 10.100	10.110	10.120	10.130	10.140	10.150						
20 14.000	14.025	14.050	14.075	14.100	14.125	14.150	14.175	14.200	14.250	14.300	14.350
17 18.068	18.075	18.085	18.095	18.105	18.110	18.300	18.400	18.500	18.168		
15 21.000	21.025	21.050	21.100	21.150	21.200	21.225	21.250	21.300	21.350	21.400	21.450
12 24.890	24.910	24.920	24.930	24.940	24.950	24.960	24.970	24.980	24.990		
10 28.000	28.100	28.200	28.300	28.400	28.500	28.700	28.900	29.100	29.300	29.500	29.700
6 50.00	50.10	DX Window 50.11	50.50	51.00	51.50	52.00	52.50	53.00	53.50	54.00	
2 144.00	144.10	144.30	144.50	145.00	145.50	145.80	146.00	146.50	147.00	147.50	148.00
Extra CW	CW	Novice CW	Novice CW & Data	Extra SSB	SSB	FM	Satellite	CW, Data & Phone			

Finally - To provide the other radio station a receiving report, on the radio you will find a 'VU meter' or 'level meter' in the display to give the received signal strength in 'RST'. (More about these reporting numbers is shown on the next page of this manual)



Because every station has a different radio and antenna and a unique distance, every signal is different. Radio operators are interested in how strongly the signals are being received.



Transmitting and receiving a signal separately from each other is called a Simplex connection. A connection like a telephone (listening and talking at the same time) is called Duplex.

With many radios nowadays you can use a wide variety of 'Filters' to make the reception or transmitting signal much easier to understand. Common filters are {CWfilter} -Bandwidth filter, {DNR} -digital noise filter and {Notch filter} -to clear unwanted audio signals like interfering tones or heavy background noise signals.

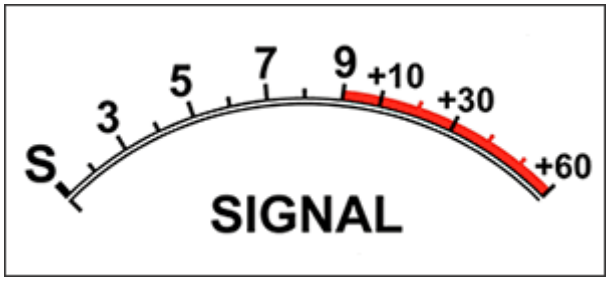
Signal Report RST

This information is used to indicate to correspondents the quality of the signals received. In their jargon, radio amateurs call it a 'Report'.

(RS for phone/ spoken words, RST for {Mode} cw)
For example, FIVE and NINE+ indicates: (R) Perfectly readable, (S) Extremely strong signals

Readability

R1 - Unreadable.
R2 - Barely readable, occasional words distinguishable.
R3 - Readable with considerable difficulty.
R4 - Readable with practically no difficulty.
R5 - Perfectly readable.



Signal strength

S1 - Faint, signals barely readable
S2 - Very weak signals
S3 - Weak signals
S4 - Fair signals
S5 - Fairly good signals
S6 - Good signals
S7 - Moderately strong signals
S8 - Strong signals
S9 - Extremely strong signals

Tone
T: for dial tone, is only used for Morse code and digital communications. Values go from 1 (very irregular) to 9 (crystal clear) and provide information on the quality of the sound heard.

T1 - Extremely rough hissing note
T2 - Very rough ac note, not musical
T3 - Rough, low-pitched ac note, mod. music
T4 - Rather rough ac note, mod. musical
T5 - Musically modulated note
T6 - Modulated note, slight trace of whistle
T7 - Near dc note, smooth ripple
T8 - Good dc note, just a trace of ripple
T9 - Purest dc note

Now you have some basic knowledge of the techniques behind radio equipment for operating during JOTA-JOTI! Next, we will look at what we could tell the other station and how we talk to each other over our radio connection.

Of course, during JOTA-JOTI, a Scout leader or the Ham radio operator could help you make the connection to another radio station happen. Making connections with the magic of amateur radio is pretty cool!

Operator Practice

How to 'set up' a radio connection?

For a radio connection, we need the following

- An amateur radio transmitter;
- an antenna;
- a licence and or licensed ham radio operator to help you out.

Every radio station has its own 'call sign'. This is just like the number plate of a car. The first letters (called the prefix) show the country or the region, followed by a number. The following letters are random or could be chosen by the radio amateur station.

For example, let's look at call sign LX9S: LX stands for Luxembourg, 9 is locally regulated as a club station, and S has been chosen for Scout. So, in this example, LX9S is the European station during JOTA-JOTI. The radio operator needs to announce the station's name (call sign) at least every 5 minutes if it is active (ON AIR).

The NATO/ICAO alphabet is useful to make the voice spelling of a word or of a sequence of letters and numbers; it turns out useful in case of bad reception: weak signals or strong noise/interfering communications

LETTER	HOW TO SAY
A	ALFA
B	BRAVO
C	CHARLIE
D	DELTA
E	ECHO
F	FOXTROT
G	GOLF

H	**HOTEL**
I	**INDIA**
J	**JULIET**
K	**KILO**
L	**LIMA**
M	**MIKE**
N	**NOVEMBER**
O	**OSCAR**
P	**PAPA**
Q	**QUEBEC**
R	**ROMEO**
S	**SIERRA**
T	**TANGO**
U	**UNIFORM**
V	**VICTOR**
W	**WHISKEY**
X	**X-RAY**
Y	**YANKEE**
Z	**ZULU**

***Setting up a connection by radio*: What to say.**

One of the rules is always to state your caller's code and then the code of the station you are using (you from me) at the start and end of your program.

This is a general call for JOTA-JOTI for the Scout example station LX9S in Luxembourg, EU.

CQ Jamboree CQ Jamboree this is "LIMA X-RAY NINE SIERRA" calling and listening for any call. LX9S is calling CQ and standing by

Once an amateur station reacts-> What to say during a conversation (QSO)? -> you can have a normal conversation ;)

LX9S this is PI4RS how do you copy?

PI4RS this is LX9S returning (afternoon, night,) to you.
My name is Toni, like *TANGO OSCAR NOVEMBER INDIA*
My QTH (location) is *LUXEMBOURG*, like *LIMA UNIFORM X-RAY ECHO MIKE BRAVO OSCAR UNIFORM ROMEO GOLF*
Your signal report (RST) is 5 and 9, Microphone back to you, PI4RS from LX9S

The station is returning the microphone ->

Thanks, you for ……bla bla……Mic back to you LX9S from PI4RS

After the reaction; this station has returned the microphone to you:

Very fine copy dear JOHN. We are a scout station and enjoy the JOTA-JOTI Weekend. The weather here is … and my age is … years. Thank you for this conversation micro back to you for the final. PI4RS from LX9S

The microphone is going back from you again to the other station.

LX9S this is PI4RS Thank you for the information, hope you are enjoying the JOTA weekend. For now, 73's (*Greetings*) back to you LX9S from PI4RS

Ok Fine John, Thank you for the conversation. Our QSL Card is 100% via the Bureau. Thank you for the Nice Contact and 73's to you and your family, PI4RS from LX9S. 73's

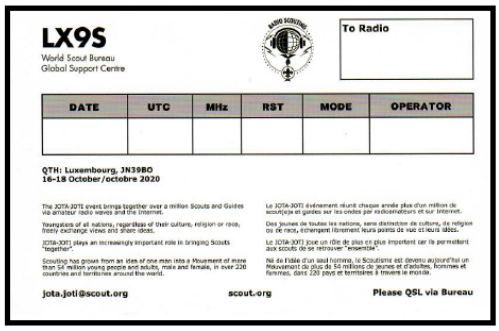
=Now, you can register the conversation in the logbook and write a "QSL" card to the station to confirm the connection you just made. And you can start all over to request any call.

CQ Jamboree CQ Jamboree this is…

*You will find a blank sheet and logbook, in **Appendix A** at the end of this guide.*

Sending QSL cards for confirmation

After a connection with an amateur station has been made, you can send a confirmation card directly (by mail) to the QSL Bureau. All cards sent to the bureau are sorted by country and district handed over to the central organization. These cards will be handed over from person to person to save the bureau postage!



Example: QSL cards sent for Scouting-related activities and a sample QSL Card

The QSL card is to confirm that you have 'worked' the other station. A lot of radio amateurs collect these paper QSL Cards. Some of these cards are unique and designed only for an event or a special call sign. It is just like a postcard from summer camp to confirm you are there, having fun. The QSL cards are also available digitally with E-QSL or LOTW. This is a much quicker way to send your card + Confirmation.

The (paper or electronic) QSL Card should contain the information collected and shared. Such as:

-> Receiver info	*Call sign you are sending to*
-> Date	*Date of the QSO*
-> Time	*Time of the QSO*
-> Frequency	*for example 14.190Mhz or 20M*
-> Signal Report (RST)	*599*
-> Mode	*Mode of transmission (such as FM, AM, SSB)*
-> Your (operator)name	*Personal name(s)*

-> Note; If there is some space left on the card you can write a short comment or personal message such as "Thank you it was my first QSO ever!".

Amateur Radio Games on JOTA-JOTI

Fox Hunt or RDF

Fox hunts are an excellent JOTA-JOTI activity though not part of the main radio activity; they are a good way of keeping younger members occupied while not on the radio. Commercial "Foxes" are available, and scouts could even build receivers or the fox as part of another activity.

Fox hunting is a game where a transmission signal has been hidden. The game is to search and spot the transmitter. This could be done as a 'walking' foxhunt in, for example, a park or forest during JOTA-JOTI or could be done with a larger transmission signal (a static hidden transceiver or a moving (high altitude) weather balloon) over a wider area where you need a car to reach the foxhunt hiding or landing spot.

Radio activity ideas:

The JOTA-JOTI platform offers a variety of ideas that can be used for complementary activities to make the JOTA-JOTI local event more varied and exciting and help Scout leaders teach radio techniques and good communications practice.

These ideas are for both experienced radio operators and Scouts, and leaders who would like to learn more about radio communications. Most activities do not require a ham radio license. The list of available activities is shown below; you will find their description at the JOTA-JOTI amateur radio hub.

Links to all these activities can be found at https://www.jotajoti.info/jota

Basic activities

- How to build a Morse key
- How to use a radio (CB - PMR)
- How to manage a radio communication
- How to use Zello
- Game: prisoners
- Game: battleship
- Game: maps and paths
- Game: red moose

Intermediate activities

- How to build a dipole antenna for Citizens Band (CB)
- Game: radio listening - stations from all over the world
- Game: spy story!
- Game: monument hunt
- Game: triangulation
- Game: number stations
- Game: subtone telephone game

Advanced activities

- How to build a crystal radio
- How to build a Morse transceiver
- SSTV images from space
- Call (QSO) the International Space Station via Amateur Radio
- Game: radio listening - digital modes
- Game: radio listening - naval messages
- Game: fox hunting

No young people at the station?
If you do not have young people at your station, you can still answer JOTA-JOTI stations but advise the operator that you currently do not have any youth members, but you are happy to talk to their youth members.

Commonly used HF frequencies for Scouting events:

Bands	SSB (phone)	CW (morse)
80 m	3.690 & 3.940	3.570 MHz
40 m	7.090 & 7.190 MHz	7.030 MHz
20 m	14.290 MHz	14.060 MHz
17 m	18.140 MHz	18.080 MHz
15 m	21.360 MHz	21.140 MHz
12 m	24.960 MHz	24.910 MHz
10 m	28.390 MHz	28.180 MHz
6 m	50.160 MHz	50.160 MHz

Language in Ham Radio

Here is a short list to help you understand what Ham radio amateurs are saying:

Abbreviations

- **CQ**: general call (addressed to all stations)
- **CW:** Carrier wave used for Morse code
- **DX:** distant contact (different continents)
- **R or Rgr:** Roger - Ok
- **RST:** Readable Signal Tone - To identify in numbers the quality of the signal as received
- **RX:** Receive
- **SDR:** Software Defined Radio - A receiver for (radio) signals in a Personal Computer
- **TNX or TKS:** Thanks - this ham radio abbreviation is widely used for Morse / CW transmissions
- **TX:** Transmit
- **UTC:** Universal Time Coordinated is the primary time standard

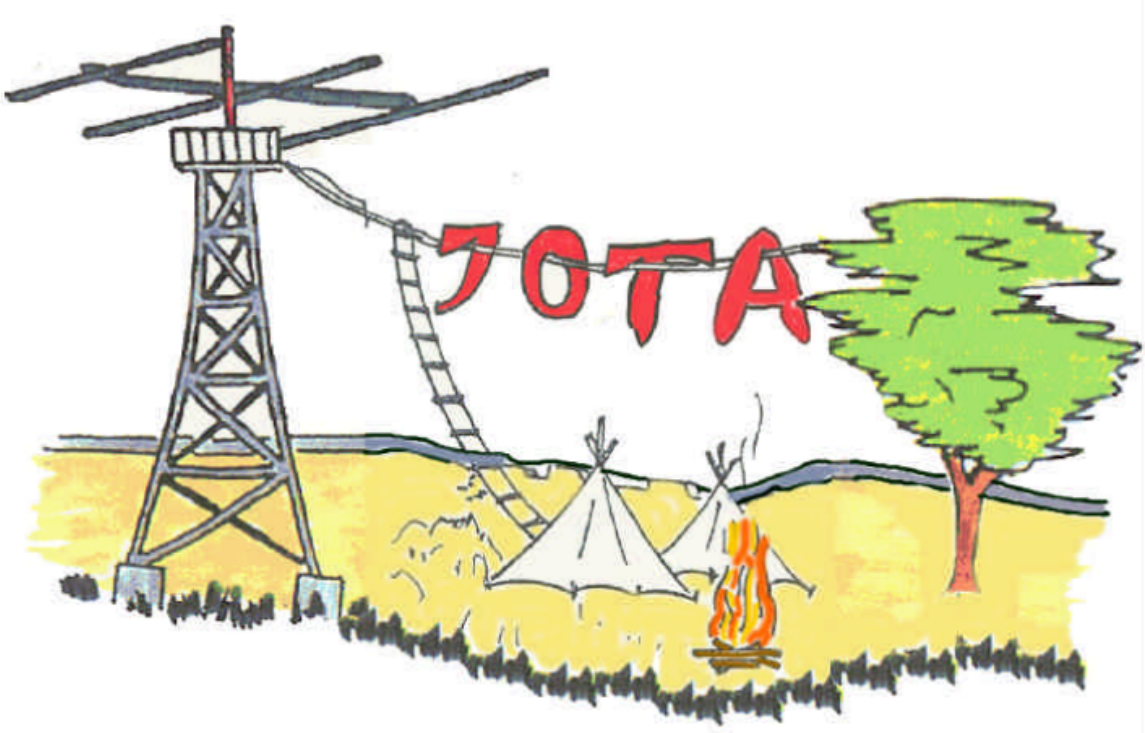
Words

- **Buro:** QSL by Buro - a well-established system for sending amateur radio QSL cards in bulk from amateur to amateur. It does take more time than mail, but the QSL bureau provides a much more cost-effective way of sending cards.
- **Call (or call sign):** Registration number of a ham radio amateur or amateur organization
- **Contest:** an event in which people compete for supremacy in ham radio.
- **JOTA-JOTI:** Jamboree on the Air -, Jamboree on the Internet - World largest Scouting event every 3rd weekend of October.
- **Pile-up**: accumulation of calls to a single station
- **QSL card:** A postcard-sized card used to confirm contact or a report of a station that has been heard. These cards are often exchanged between radio hams or CB enthusiasts. They are also frequently sent out by short-wave broadcast stations to confirm a reception report.
- **S Meter:** A Signal meter on a receiver or transceiver indicates the signal strength of incoming signals. It is normally marked in "S" units from 1 to 9.
- **Shack:** A radio room originally a ship's radio room, but now often used to describe a radio ham's station
- **Squelch:** A control on a receiver or transceiver used to mute or turn off the audio when no signal is present. This prevents large noise levels from being present on the output when there is nothing to be heard.
- **Vertical:** A vertical antenna
- **VSWR** (or SWR): Voltage standing wave ratio. A measure of the power returned from the antenna when the antenna and feeder are not correctly matched.
- **Yagi:** A type of beam antenna. (Most television antennas are Yagis).
- **YOTA:** Youngsters on the Air - an organization (non-Scouting) of ham radio amateurs encouraging young people to enjoy making radio contacts.

Numbers

- **59**: Given a lot as a standard answer for signal reporting “RST” (and still asking what is your call sign)
- **73:** "I send you my best regards."

Other Links / Technical information

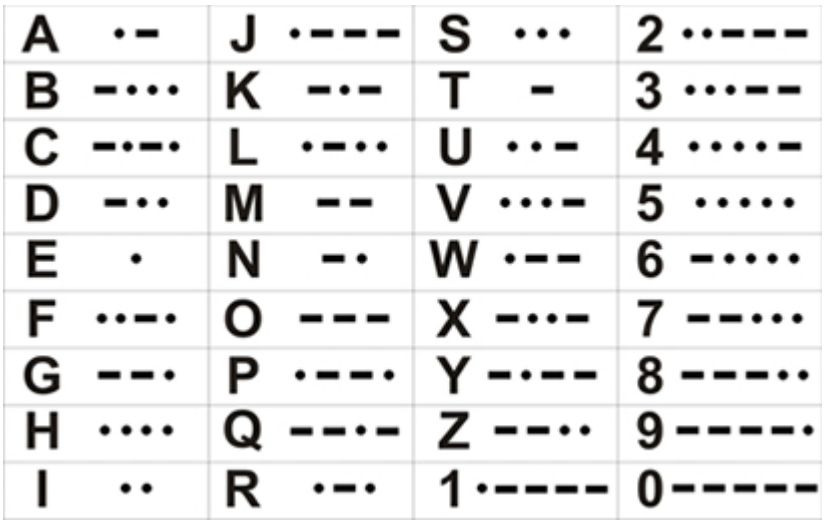


JOTA Originals Website

A lot of historical information about the history of JOTA dating back to 1957 can be found on https://www.jota-originals.ml/

"Feel free to download them and mention this web page in your JOTA-JOTI communications to others."

Morse Code



A	•–	J	•–––	S	•••	2	••–––
B	–•••	K	–•–	T	–	3	•••––
C	–•–•	L	•–••	U	••–	4	••••–
D	–••	M	––	V	•••–	5	•••••
E	•	N	–•	W	•––	6	–••••
F	••–•	O	–––	X	–••–	7	––•••
G	––•	P	•––•	Y	–•––	8	–––••
H	••••	Q	––•–	Z	––••	9	––––•
I	••	R	•–•	1	•––––	0	–––––

Morse Code is a system of representing letters, numbers and punctuation marks through a coded signal sent intermittently through Long and Short SOUNDS. It was developed by Samuel Morse in 1835, creator of the electric telegraph, a device that uses electric currents to control electromagnets that act in the emission and reception of signals. A message encoded in Morse can be transmitted in several ways in short and long pulses (or tones). When visualizing a point, say or think "Di". Likewise, when visualizing a stroke, don't say or think "dash", but think or say aloud "daá".

Before worrying about streaming, it's more important to start dealing with morse code just by listening.

Morse Specials Codes

Abbreviation	**Mnemonic**	**code**		**comment**
	SOS	...---...	▪ ▪ ▪ ▬ ▬ ▬ ▪ ▪ ▪	International Emergency
K (k)		-.-	▬ ▪ ▬	Contact, request to send
	HH	....	▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪	issue in decoding on the receiver side (8 points)
=	BT	-...-	▬ ▪ ▪ ▪ ▬	Separation (stop), new paragraph

+	AR	**.-.-.**		In message/ transmission (“over to you.”) I’m waiting for a response from you
?	IMI	**..--..**		Not understood, please repeat!
	VA, SK	**...-.-**		End of contact, I am not expecting an answer from you

J Code

Scouting has its own "short code" language. We are a worldwide organization with a considerable variety of languages. To talk to each other or give some basic information about yourself, you can use the J code.

The J-code is a simple tool that enables a very basic conversation in those cases where there is no common language between the participants. The J-code is a set of abbreviations similar to the Q-Code used by radio amateurs. It is not a code intended to hide the contents of the transmissions, quite the opposite, it is intended to enable communication. As such, it can be used over amateur radio and in Internet chat contacts.

Personal	
JWN	My name is .....
JFC	I come from .... (Country)
JHO	I am ..... years old.
JWA	My address is .....
JEM	Our e-mail address is .....
JWL	The language I speak is ... 1 English 2 French 3 Spanish 4 Portuguese 5 Russian 6 German 7 Dutch 8 Italian

Scouting	
JCS	I am a Cub Scout
JSC	I am a Scout
JGI	I am a Guide
JRS	I am a Rover Scout
JRG	I am a Ranger Guide
JLS	I am a Scout Leader
JWG	I belong to the Group ....
JHJ	Happy JOTA / JOTI
JSW	Best Scouting wishes to you

General	
JAC	We are camping
JWB	The weather here is ... 1 overcast 2 rainy 3 very heavy rain 4 snowy 5 fine

In order to ask a question just add the letter "X" to the end of the particular code, e.g.:
JWN = My name is ..... JWNX = What is your name?
JHO = I am ..... years old. JHOX = How old are you?

Imagine the following exchange between a Russian Scout in Vladivostok and his friend-to-be in Caracas, Venezuela. All words can be spelled in the international spelling alphabet:

Doswe danja, JWN Dimitri
Hola Dimitri, JWN Paco
JHJ Paco, JFC Russia, QTH Vladivostok. JWL 5
OK Dimitri, QTH Caracas y JHO 12. JHOX
JHO 14 Paco. JSC, JAC, JWB 4
Muy bien, JSC y JWB 1. JSW Dimitri.
JSW Paco.

Looks like code to you? Well, that's exactly what it is, the J-Code. Dimitri and his friend Paco would otherwise not be able to have this basic contact. Can you? Give it a try.

Q code

Q-Codes (also called Q-Signals) are three letter combinations that begin with the letter Q that CW operators use in place of common phrases. Originally intended for use only by radiotelegraph operators, Q-codes have become a permanent part of the hobby's jargon, and many hams use them on phone as well as in face-to-face conversations.

Examples:

QRL = I am busy (or I am busy with ____). Please do not interfere.

QRU = I have no messages for you.

QRV = I am ready

QTH = My position is _____

QTU = My station is open from ____ to ____ hours.

QUA = Here is news of _____ (call sign).

QRA = The name of my station is ____.

QRM = I am being interfered with / Your transmission is being interfered with ____.

QRO = Increase transmitter power.

QRP = Decrease transmitter power.

QRQ = Send faster.

QRS = Send more slowly.

QRT = Stop sending.

QRX = I will call you again at _____ hours (on _____ kHz (or MHz)).

QRZ = You are being called by _____ (on _____ kHz (or MHz)).

QSL = I am acknowledging receipt.

QSY = Change to transmission on another frequency [or on _____ kHz (or MHz)].

Link to the complete list of Q codes: https://hamradioprep.com/ham-radio-q-codes/

Addressing your location - The QTH locator
To address the location of the radio installation, we use a 'locator grid'. This is a series of letters and numbers around the globe like the grid on a map to provide your location or area.

Maidenhead Locator System (formerly QRA Map)

European Locator Map - Version 1
https://en.wikipedia.org/wiki/Maidenhead_Locator_System

the MAP Locator:
https://www.voacap.com/qth.html or https://k7fry.com/grid/

JOTA-JOTI Dx Cluster

How do I find a JOTA-JOTI station on the amateur radio bands quickly?
Well, help is available through the JOTA-JOTI Dx Cluster (a database for radio amateurs) used during JOTA-JOTI to see exactly on which frequency a Scout station somewhere in the world is transmitting.

How does this work?
If one amateur radio station hears a Scout station on the air, it can enter the date, time, frequency, and call sign in the database. The information is immediately visible worldwide. You can also enter your transmitting frequency. Other Scout stations can use the info to tune to the published frequency and make contact.

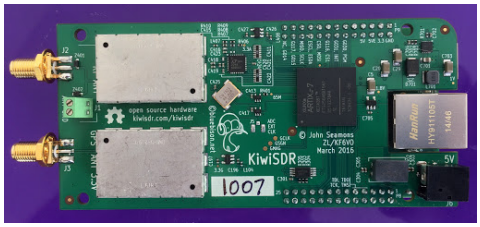
What do you need for this?
* A computer, a packet radio terminal program, Ham net or Internet connection
* Electricity or battery pack
*An enthusiastic Scout to survey the cluster (the JOTA-JOTI contact manager)

Webpage to use:
To see:
https://www.dxwatch.com/
To add some info (Share a spot):
http://www.dxsummit.fi/#/

The map:
https://www.dxmaps.com/spots/mapg.php?Lan=E

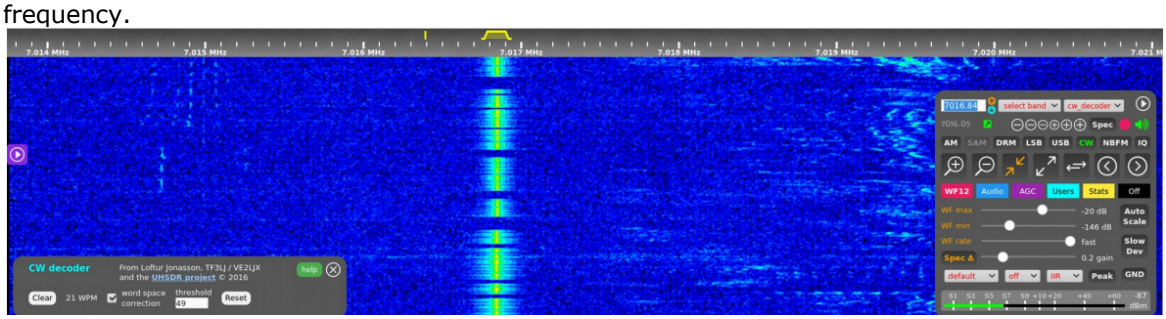
SDR and WEBSDR
Software-defined radio (SDR) is a radio made from software instead of hardware.

SDR receivers are mostly low-cost and readily available. It could be a USB Dongle (RTLSDR). There are two main (components) chips as used. For HF RT820 (band with 0 - 50mHz) and E4000 or RTL2832U for UHF-VHF (30 - 2 GHz)



Besides some hardware such as a USB dongle as a receiver, a PC with software will be needed to "decode" the received signals. Available software: HDSDR, Airspy, or KIWI SDR

KiwiSDR web SDR: this is what you see—the signal in a "waterfall display," mode, and the frequency.



With SDR, you can make the receiver online available to others (only with a PC). In the links below, you will find WebSDR receivers and receiving websites. You can listen to JOTA-JOTI stations via the internet.

Try these links:
http://kiwisdr.com/public/

http://rx.linkfanel.net/

http://www.Websdr.org

Direct link to a receiver in the Netherlands: http://websdr.ewi.utwente.nl:8901/

QO-100

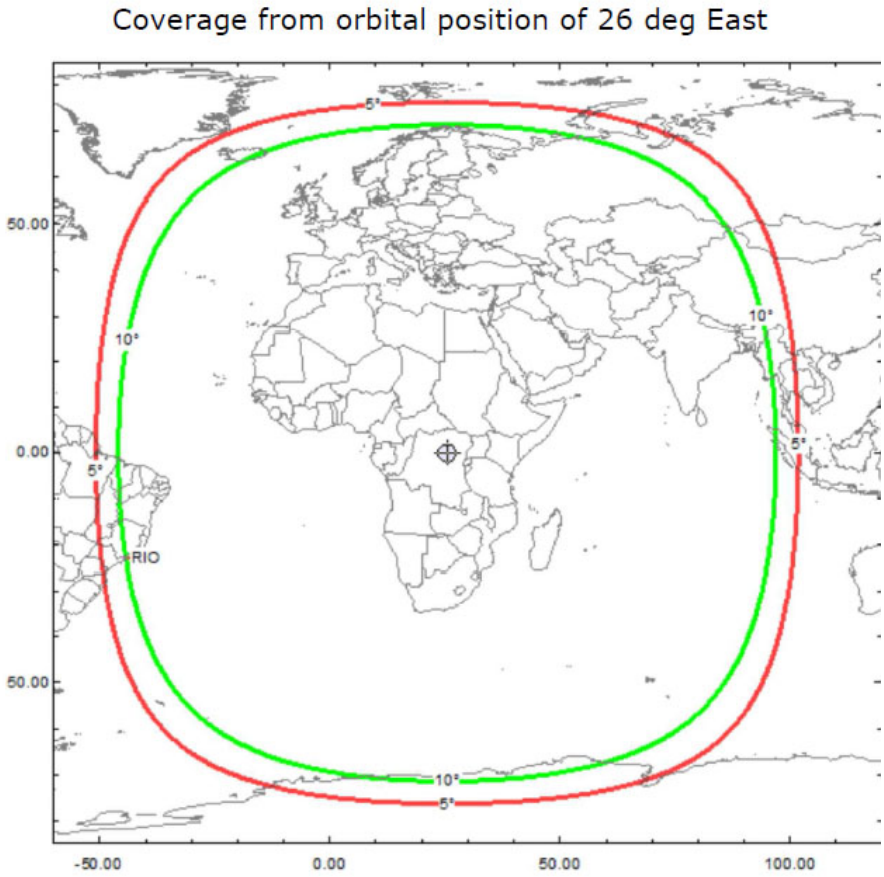
Qatar OSCAR-100 is a first geostation amateur radio transponder, a joint project between the Qatar Satellite Company (Es'hailSat), the Qatar Amateur Radio Society (QARS), and AMSAT Deutschland (AMSAT-DL), which provided the technical lead.

OSCAR-100 is hosted on Es'hail-2, a Broadcast Transponder Satellite owned by the Es'hailSat Qatar Satellite Company; the satellite is now in geostationary orbit at 25.9° E.

You can also listen to Oscar 100 satellite via web SDR.

INFO Link: https://eshail.batc.org.uk/nb/

SSB Frequency **10.489.890 RX, TX 2400.390**



DMR

Digital mobile radio (DMR) is a limited open digital mobile radio standard defined in the European Telecommunications Standards Institute (ETSI) Standard TS 102 361 parts 1–4[1] and used in commercial products around the world. DMR, along with P25 phase II and NXDN, are the main competitor technologies in achieving 6.25 kHz equivalent bandwidth using the proprietary AMBE+2 vocoder. DMR and P25 II use two-slot TDMA in a 12.5 kHz channel, while NXDN uses discrete 6.25 kHz channels using frequency division, and TETRA uses a four-slot TDMA in a 25 kHz channel.

DMR was designed with three tiers. DMR tiers I and II (conventional) were first published in 2005, and DMR III (trunked version) was published in 2012, with manufacturers producing products within a few years of each publication.

The primary goal of the standard is to specify a digital system with low complexity, low cost, and interoperability across brands, so radio communications purchasers are not locked into a proprietary solution. In practice, given the current limited scope of the DMR standard, many vendors have introduced proprietary features that make their product offerings non-interoperable with other brands.

Brandmeister

The 907 Talk Group ->will be used to let Scouts make contacts worldwide, under appropriate supervision, following individual country's guidelines.

Please request an ID here in advance (it takes a little time to get a valid number)
https://www.radioid.net/

Open 24 hours a day, 7 days a week, 365 days a year)

List of the different lounges reserved for JOTA on the Brandmeister network

TG 907 - JOTA Call, when contact is established, you will have to go to one of the chat rooms below:

TG 9071 - JOTA Room 1	TG 9072 - JOTA Room 2
TG 9073 - JOTA Room 3	TG 9074 - JOTA Room 4
TG 9075 - JOTA Room 5	TG 9076 - JOTA Room 6
TG 9077 - JOTA Room 7	TG 9078 - JOTA Room 8

TG 90737 - JOTA French
TG 90710 - JOTA German Deutsch (jeden 4. Donnerstag im Monat, 20:30 Uhr Berlin)

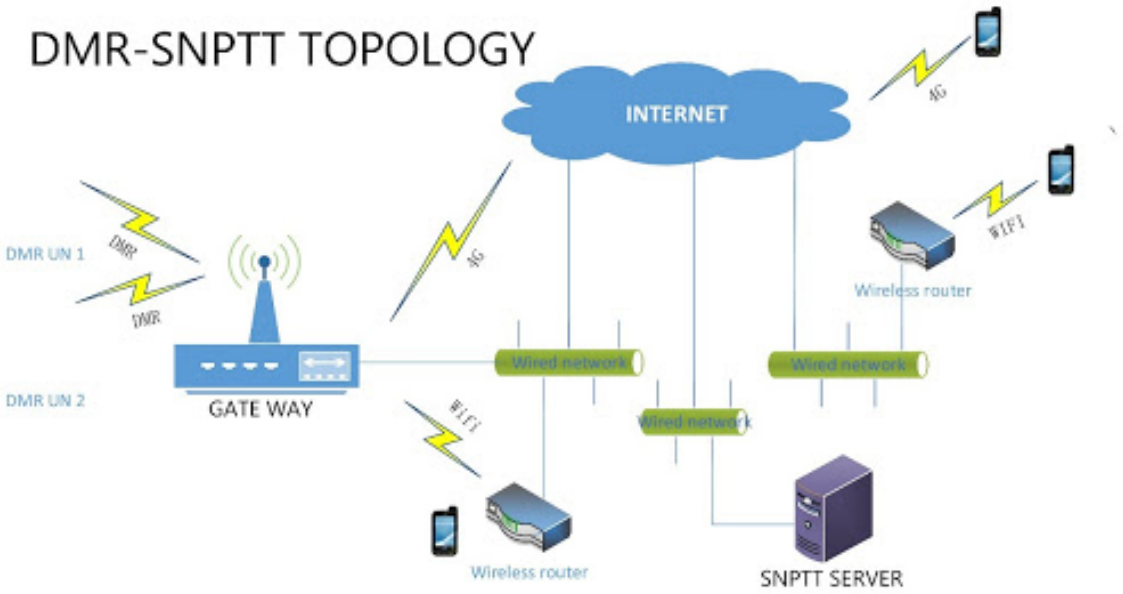
TG 235907 - JOTA United Kingdom,	in English
TG 272907 - JOTA Ireland,	In English
TG 250907 - JOTA Russia,	на Русском
TG 268907 - JOTA Portugal,	em Português
TG 222907 - JOTA Italy,	in Italiano
TG 204907 - JOTA The Netherlands,	in het Nederlands
TG 50297 - JOTA Malaysia,	di Malaysia
TG 50298 - JOTA Malaysia,	di Malaysia
TG 748907 - JOTA Uruguay,	en Español
TG 748918 - JOTA Uruguay,	en Español
TG 33457 - JOTA Mexico,	en Español
TG 724907 - JOTA Brazil	em Português
TG 263907 - JOTA Germany,	auf Deutsch

TG 918 - YOTA Call (Only for young radio amateurs) when contact is established, you will have to move to another TG chat room to release TG 918

FreeDMR Network Hotspot or Local Repeater TG907 & TG9071-9078

D-STAR

D-STAR (Digital Smart Technologies for Amateur Radio)



http://www.dstarinfo.com

D-STAR is a digital mode that allows users to be connected through repeaters and personal hotspots.

There are two D-star reflectors for which REF33A and XLX005J can be used.
REF033A has been assigned as a full-time D-STAR JOTA / Radio Scouting reflector. Once contact is made, stations should disconnect from REF033A and connect to either repeater or migrate to an unused reflector.

https://freestar.network

XLX005J is linked to the FreeDMR TG907, which is the dedicated Radio Scouting Talkgroup.
Connect to XLX005J through your D-STAR radio or your hotspot.
On your Hotspot, set the mode to D-STAR and select DCS005 or XLX005, and then select Node J.
To monitor XLX005J Visit http://xlx005.freedmr.uk/

C4FM / fusion

C4FM is a digital modulation technique used to transmit digital voice and data information over a radio channel. C4FM is the acronym for Continuous 4-level Frequency Modulation.

Accordingly, four frequencies are used for frequency-shift keying. These are in frequency ranges such as the ultra-short wave and the decimeter wave below 1 GHz. The modulation method is used, among other things, in APCO P25 (Radio Land Mobile Communications, Project 25), a higher-level transmission network for digital authority radio for police and rescue services in North America and worldwide in amateur radio. C4FM is specified for this application by the Telecommunications Industry Association (TIA), an association of government agencies in the United States, in the ANSI / TIA-102.CAAB-C standard.

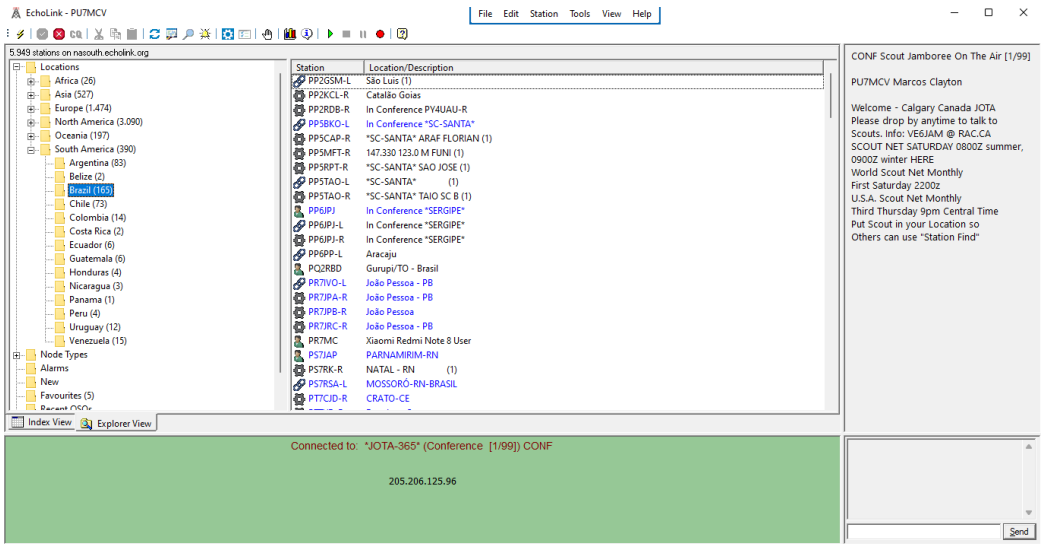
ID: IT-RADIOScoutING DTFM ID: 87202 Catania, Sicily, Italy
ID: N2TPA-ND 271432 N2TPA Digital Hudson, Florida, USA N:28 20' 36"W:082 42' 10"Supporting International Scouting and disaster response

UK:

- Fusion Hotspot or Local Repeater FCS004, Room 27 Available 24/7
- Fusion Wires-X Hotspot or Local Repeater JOTA-365-Scouts Available 24/7

EchoLink

EchoLink is a computer-based Amateur Radio system distributed free of charge.



If you have an internet connection available at your radio station, we recommend using the EchoLink system. Its main advantage allows you to make radio contacts over considerable distances, regardless of the radio propagation conditions, using even small handheld radios.

Echolink works via computers that are connected both to the internet and to an amateur radio station. By contacting one of these, your signals can go from the airwaves onto the internet and vice-versa. Suppose you are at a location that does not allow you to put up antennas or have easy access to the computer classroom in a school building. You will now have the chance to participate in JOTA-JOTI from the school's PCs simply by connecting to EchoLink. There is a primary conference node on Echolink where Scout stations meet: JOTA-365.

Your radio amateur has to register with EchoLink beforehand. This takes a few days, so don't wait until the last moment to prepare your EchoLink station.

Register with www.Echolink.org before 1 October if you intend to use it for JOTA-JOTI.

Scheduled Radio Meetings: (ECHOLINK)

UK Scout Net

Saturday
09:00 UK Local
HF SSB LSB 3.690/7.190 +/- .QRM
Band Agreed via EchoLink Net First

UK Scout Net

Saturday
09:00 UK Local
EchoLink
EchoLink App/Software
JOTA-365

World Scout Net

1st Saturday of Month
22:00UTC
EchoLink
EchoLink App/Software
JOTA-365

USA Radio Scouting Net Monthly

2nd Thursday of month 9 pm Central
EchoLink
EchoLink App/Software
JOTA-365

USA Radio Scouting NET Monthly

2nd Sunday of month 7 pm Mountain
EchoLink
EchoLink App/Software
JOTA-365

German

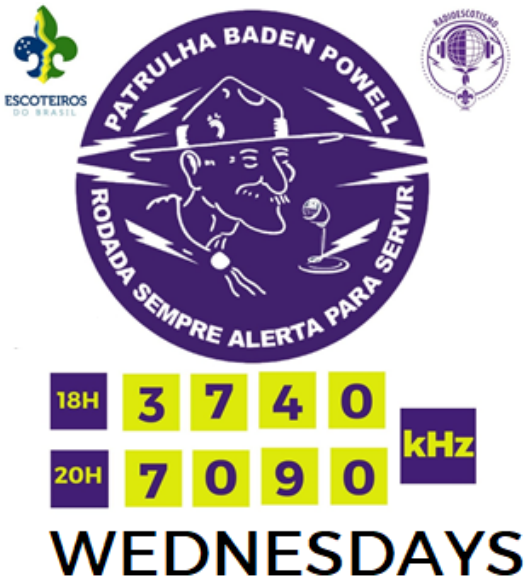
every 4th Thursday at 20:30 local time Germany)
EchoLink
EchoLink App/Software
JOTA-365
The spoken language is German.

Brazilian Radio Scouting NET

Every Sunday 10am Local time
EchoLink
EchoLink App/Software
JOTA-P

Brazilian Alertino Radio Scouting NET

Every Thursday 8pm Local time
EchoLink
EchoLink App/Software
SCOUT-SP



SSTV

Slow-scan television is a picture transmission method to transmit and receive static pictures via radio.

A (SDR)receiver/ transceiver is needed + software such as MMSSTV or (mobile) Droidsstv to decode the SSTV signals. Most used Mode = Scottie 2 or Martin 2

SSTV Frequencies:

80 m: 3,730 (LSB)
40 m: 7,033-7,040 (LSB)
20 m: 14,230 (USB) **(commonly used)**
17 m: 18,160 (USB)
15 m: 21,340 (USB)
10 m: 28,680 (USB)
6 m: 50,300 (USB)
2 m: 144,500 - 144,525 (FM)
70 cm: 433,700 - 433,925

SSTV simplex repeater network 2m (EU) 144.88750

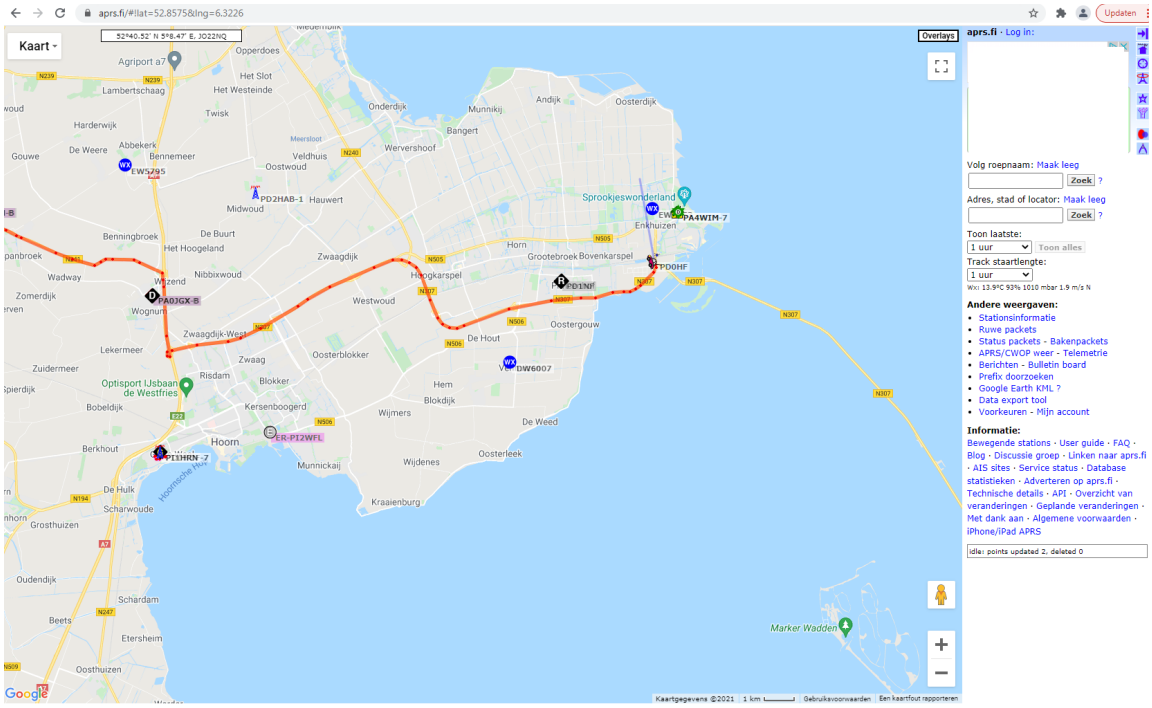
ARISS regularly sends SSTV images from space from the ISS. https://www.ariss.org/

Automated Packet Reporting System (APRS)

APRS is a method of tracking a radio station. It could be done using a mobile device with GPS. A fixed receiving/antenna system collects the location data and puts it on the internet. This is an amateur radio application like AIS for boats or ACARS for airplanes (used for the professional market).

APRS can be used over JOTA-JOTI but has limited applications with direct JOTA-JOTI activities; you may use it to show your site location, as a TXT service, and so on. It would most likely be best used as part of another activity, not in the radio shack. You can also use the APRS.fi page to show APRS information

NSW JOTA-JOTI is currently looking for an APRS Digipeater, and Igate. See the APRS page for more info



A link to a website where you can spot APRS stations. www.aprs.fi

APRS VHF frequencies

144.390 MHz — North America, Colombia, Chile, Indonesia, Malaysia, Thailand
144.575 MHz — New Zealand
144.640 MHz — Taiwan
144.660 MHz — Japan
144.800 MHz — South Africa, Europe, Russia
144.930 MHz — Argentina, Uruguay
145.175 MHz — Australia
145.570 MHz — Brazil
145.825 MHz — International Space Station
432.500 MHz — Europe (UHF)

Mobile Apps:

EchoLink

https://apps.apple.com/us/app/echolink/id350688562

https://play.google.com/store/apps/details?id=org.echolink.android

QRZ Call sign search

https://apps.apple.com/us/app/callsign-search/id680180116

https://www.qrz.com

SSTV apps

https://play.google.com/store/apps/details?id=xdsopl.robot36

https://apps.apple.com/us/app/sstv-slow-scan-tv/id387910013

https://play.google.com/store/apps/details?id=om.sstvencoder

Satellite Finder:

https://play.google.com/store/apps/details?id=com.heavens_above.viewer

https://play.google.com/store/apps/details?id=com.noctuasoftware.stellarium_free

https://apps.apple.com/us/app/stellarium-mobile-star-map/id1458716890

Other related links:

Internet Radio Linking Project, IRLP
https://nswjotajoti.org/IRLPinfo.html , https://nswjotajoti.org/kml/setup-irlp.kml

APPENDIX A – CQ code communication example

One of the rules is always to state your caller's code and then the code of the station you are using ("you" from "me") at the start and end of your program.

CQ Jamboree CQ Jamboree this is (Your callsign) ……
Calling and listening for any call. (Your callsign)….**is calling CQ and standing for any call.**

Wait for a reaction from an amateur station to your call->

(Other callsign)…….

What to say during a conversation (QSO)?

(Other Callsign) **This is** (Your Callsign) **returning. Thank you for picking up my station call and a very good morning/afternoon/night to you. My name is** ……,
spelling like (NATO)……
My QTH (location) **is** ……, **spelling like** (NATO)……
Your signal is (RST 5 and 9) Microphone back to you, (other callsign) **from** (your callsign)

The station is returning the microphone ->
-> Thank you for……blah blah…….. Mic back to you.
After the reaction; the station has returned the microphone to you:

Very fine copy (other callsign)…….**this is** (your callsign)…….**We are a scout station and enjoy the JOTA-JOTI Weekend. The weather here is** …….**and my age is** ……**years old. Thanks, you for this conversation microphone back to you for the final** (other callsign)…… **this is** (your callsign)…….

Microphone is going back again to the other station.
-> For now, 73's (Greetings) back to you

Ok, thank you for the conversation. Our QSL Card is 100% via the Bureau. Thank you for the Nice Contact and 73's to you and your family, (other callsign)……
this is (your callsign)…… **73's**

-> 73's => END OF CONNECTION

Now, you can register the conversation in the logbook and write a "QSL" card to the station to confirm the connection you just made. And you can start all over to request for any call.

APPENDIX B Radio Logbook

Radio Logbook_____Page ___

STATION – NAME CALLSIGN	
OPERATOR:	

QSO	Date	Time	Callsign	Name	QRG	Rst	Comments
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
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34							
35							

APPENDIX C Antenna's for JOTA-JOTI

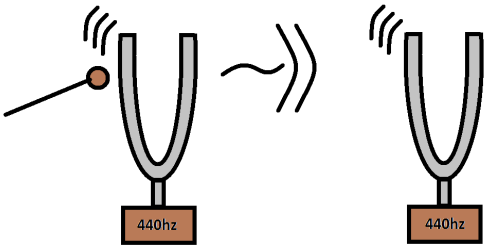
Introduction

An antenna is the connection between the radio transmitter (TX) or receiver (RX) and the electromagnetic radio wave. The electromagnetic waves are reacting to the metal of the antenna and are connected to the radio with a coaxial (shielded) cable. As spoke before there are many different antenna types. Such as Verticals, Beams, Dipoles, long wire antenna's

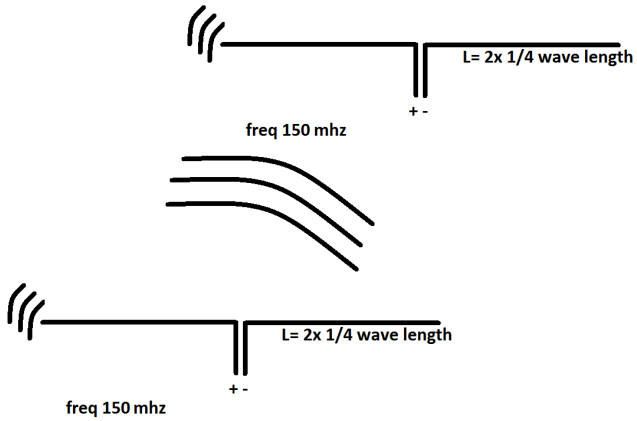
In this appendix we will speak about some quite simple antenna's which could be build and used during JOTA-JOTI.

Antenna Basics

A radio wave is the effect if a frequency and modulated signal such as speech, radiated or received with a metal construction called radio antenna. For the best performance in receiving and transmitting an antenna should be resonant to the frequency. In example we could think about sound waves. If a tuning fork has been placed on a table the sound will transport due to vibration thru the air. If we place a copy of the tuning fork beside the first one which produce the sound wave, the second will make the same sound too. This is called resonance. If we place another random format tuning fork this one will not resonate on the same frequency and would not pick up the same sound.



So, they should be matched. Antenna's work the same. If a transmitter antenna is sending out on a frequency, the antenna should be resonant to the transmitting frequency (for maximum performance). Signals to be received should be matched (resonant) to the transmitting frequency.



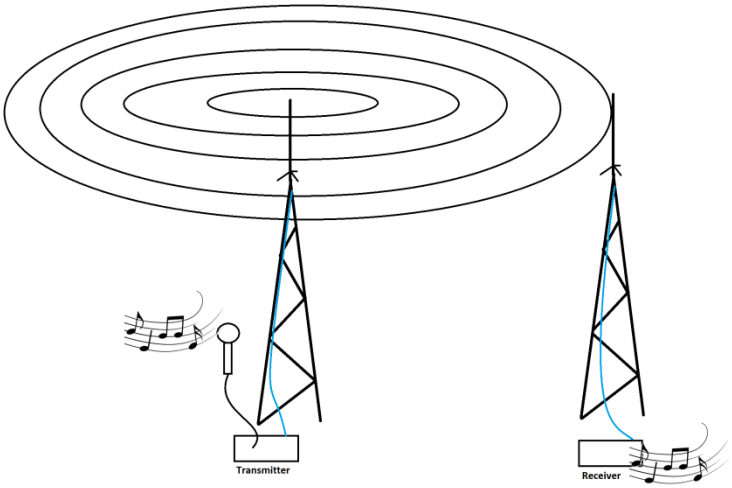
To understand what will happen, it will be easy to compare an electromagnetic radio wave with sound waves. They behave almost the same.

Before we jump into the making of antennas for JOTA-JOTI it will be necessary to understand what actually is happening.

The radio transmitter is converting speech into magnetic radio waves. Therefore, the speech of the audio has been converted and modulated in a wave form. This waveform as electrical current comes out of the transmitter (TX) to the antenna. The resonant antenna reacts on the electrical current and changes the signal from this electrical to an electromagnetic wave. The electromagnetic signal now transposes through the air. Depending on the type of antenna (and the strength of the wave) as described earlier, the signal will "propagate" through the air. The propagation of the signal can be easily imagined as if you throw a stone in water and we could see the ripple move forward.

So, you can imagine that is there is now something in the path of the ripple, it gives an effect of reflection and the path of the wave will change.

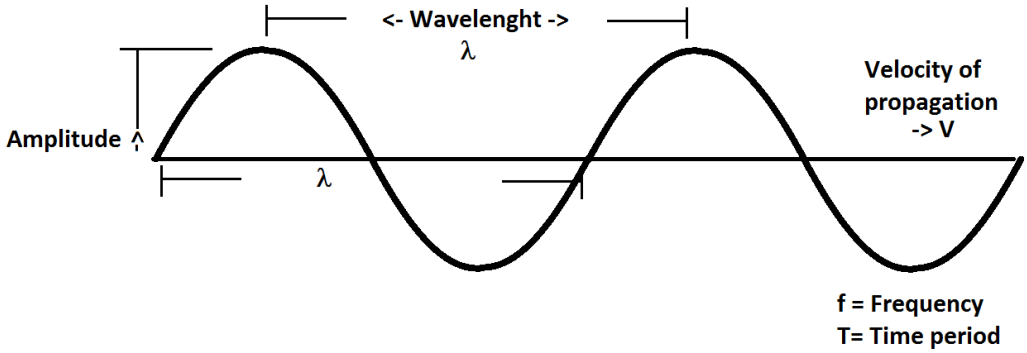
If you are in the path of this ripple (with your JOTA-JOTI antenna) you can receive the signal and the radio receiver shall decode it.



Calculate the (resonance) frequency into wave length

To match the antenna to the frequency as been transmitting you need to calculate the wave length of the signal. Electromagnetic Signals of waves are transporting thru the air with a speed of light = 300.000 meter per second. Wave length = Velocity (wave speed in m/s) : Frequency (vibrations per second in Hertz)

If a transmitter is transmitting at 150 MHz the wave length of one wave = 300.000 : 150.000 = 2-meter length.



The formula to calculate the Length of one wave in one Time period

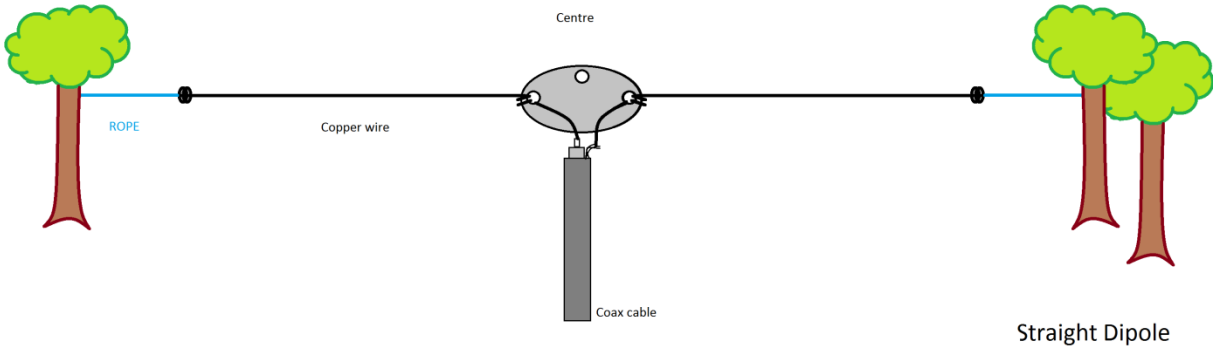
$$\lambda = V : f$$

Dipole antenna (single frequency)

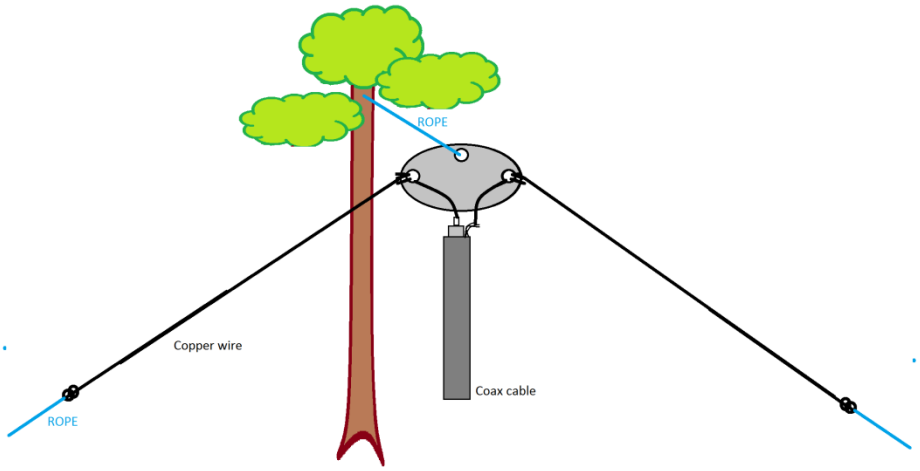
A dipole antenna is a simple antenna. The length of the two legs is 2x ¼ of a wave length.
For the example above for an antenna for 150 MHz we have seen the wave length is 2 meters. So, both lengths of the electrical (copper) wire are 0.5 meters.

If we split up the feeding line (coax cable) of the transmitter or the receiver into 2x a ¼ wave length the antenna is resonant to the calculated frequency. At the end of the length of the wire you need some electrical isolation.

Technically this will work as Dipole antenna. But for (outdoor) use we need some mounting materials.



Straight Dipole
Both ends at high point



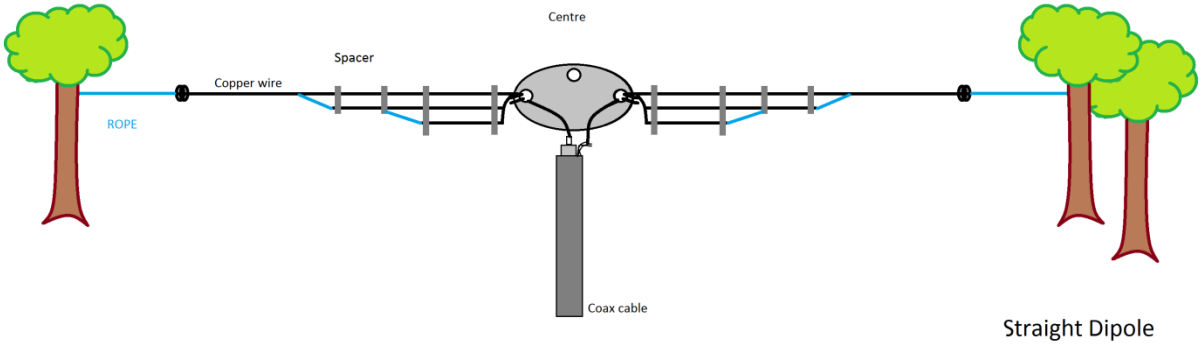
Inverted V
Only middle point high

Depending on the angle the impedance of this antenna is in between 30 ohm and 150 Ohm (should be as close to 50 Ohm because of the transceiver) Angles for an inverted Vee shape are in between 90 degrees and 120 degrees. A horizontal dipole is stretched over 180 degrees.

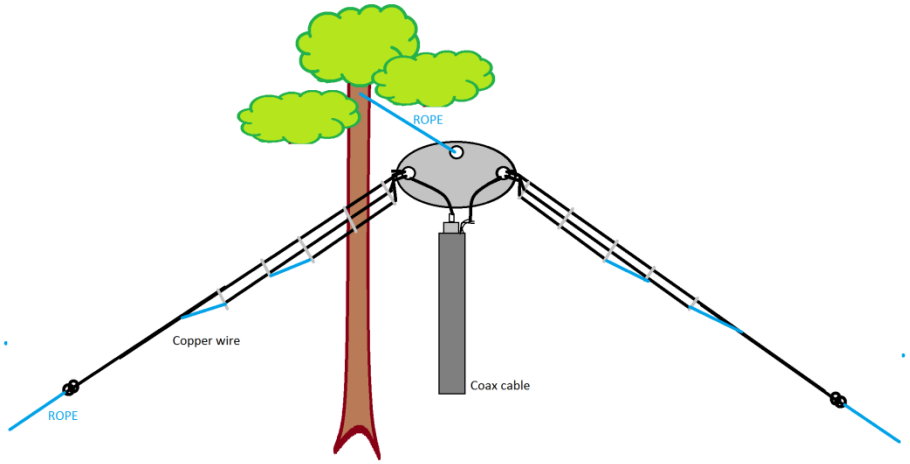
Fan Dipole (multiband dipole)

If we want to use an antenna for many different frequencies or different bands it will be possible to combine several dipoles with one feeding line to the transmitter or receiver.

Only one rule we need to think about, that the frequency as used has to be harmonic. So, for example for HF frequencies we could combine multiple dipoles for 40m – 20m – 10m (to one feeding line to the transmitter of receiver). In between the electrical (copper) wires we need isolation material, spacers (at least 10cm apart). This could be done by electrical isolation pipe. The length of the copper wires (legs) is the same as the single dipole, but every frequency has its own wire of ¼ wave length.



Straight Dipole
Both ends at high point



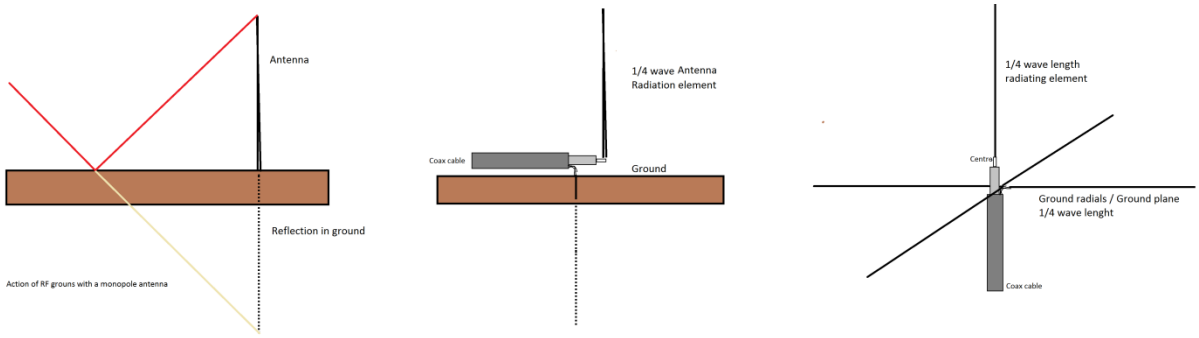
Inverted V
Only middle point high

Depending on the angle the impedance of this antenna is in between 30 ohm and 150 Ohm (should be as close to 50 Ohm because of the transceiver) Angles for an inverted Vee shape are in between 90 degrees and 120 degrees. A horizontal dipole is stretched over 180 degrees.

Vertical (1/4 wave) antenna

Quarter wave verticals are widely used in view of its simplicity and convenience. Basics of this type antenna are that the length of the "radials" of the antenna are a ¼ wave length. So, for the radiation is a ¼ length and also for the ground radials. As the name suggested the antenna is in vertical position.

The pattern of this type antenna is that signals could be transceiver and received around (omnidirectional) other than a horizontal dipole which has a different radiation pattern. At the ground plane (earth) this type antenna will reflect the signal.



In fact, the quarter wave dipole can be considered as a dipole in which one half is the radiating monopole, and the other half is a reflection seen in the ground. The antenna is what they called unbalanced, using a vertical radiation element and a ground plane.

Vertical antennas, especially for HF where separate ground or radial system is used will have a matching assembly in the base feed point to accommodate the mismatch as they are normally fed with 50Ω coaxial feeder. This matching arrangement normally consists of a tapped coil which gives the required impedance transformation. The impedance of this antenna is typically around 20 Ohm.

Hardware safety

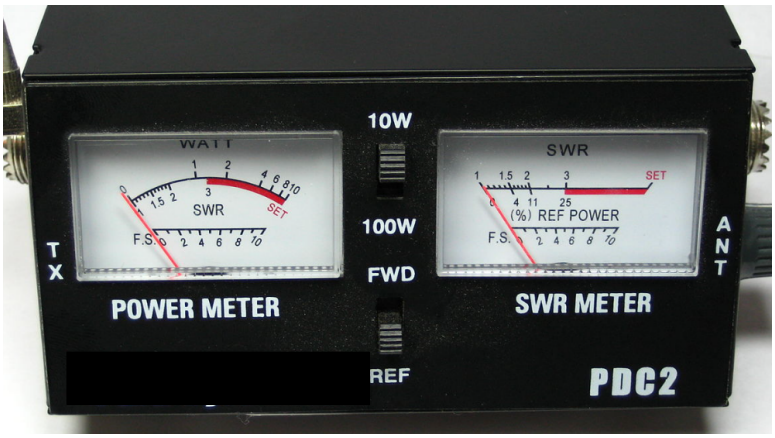
The radio signal is transferred from the antenna to the transceiver and vice versa through a coaxial cable. This cable is able to transfer the signal with minimal loss and without picking up external interferences along the way.

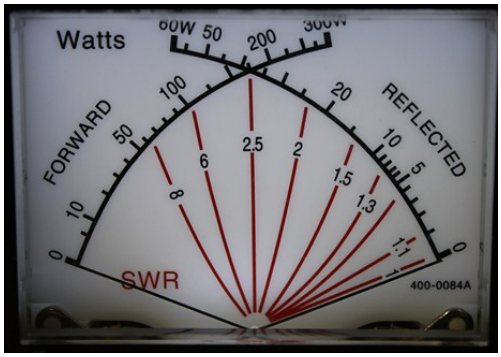
Never transmit if the coaxial cable is damage or disconnected at some point. The radio will suffer heavy, irreversible (and expensive) damage).

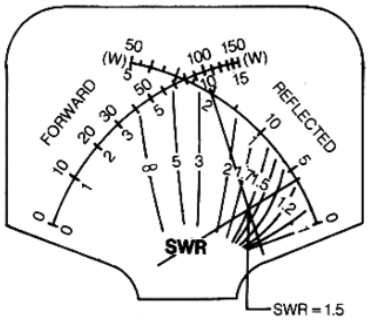
Always use coaxial cable with proper impedance. Most ham radio systems need 52 Ω cables, while TV ones usually have 75 Ω impedance. Choosing the wrong cable could lead to heavy damages.

Antennas usually cover one or few radio bands. Be sure that the antenna you have connected is designed to work in the frequencies you want to use.

For the safest and most efficient transmission, transceiver and antenna must be properly tuned. All the power from the transmitter must be radiated by the antenna, without coming back to the transceiver. In technical terms, this means to have a Standing Wave Ratio (SWR) at 1. The higher the SWR, the less efficient is the communication and the higher is the probability of damages to the equipment. A SWR meter must be connected in between transceiver and antenna. Always check it whenever the frequency is varied. If the SWR is too high, adjust the antenna. Some SWR meters are equipped with matching units (controllable with two knobs), that allow to correct the transmission line and take the SWR back to 1.







In the figure, a cross-needle SW meter display is shown. The SWR is read finding where the two needles intersect, with respect to the SWR lines.

Never touch the antenna when transmitting. Very high voltages can be reached.

Disconnect from the antenna if storms are approaching. Be also sure to connect the radio system to a good ground connection.

Practical Antenna tips and hazards

- Antenna towers should be steady and rock solid (also if they are only for a weekend)
- Antennas for low frequencies (HF) are setup at a minimum height of ¼ wave length for optimal performance.
- Antennas for VHF UHF are placed as high as possible. Because the signals are (mostly) traveling till the horizon.
- Antennas should be tested with an analyzer. Before use you need to check if the SWR is as closed as possible to 1:1 not more than 3:1 ratio.
- An antenna tuner (ATU) could be used to match antennas to the transceiver's frequency.
- Antenna (system) Impedance should be as close as possible to 50 Ohm
- Be aware of the Hazard of radiation of the antenna and do NOT touch the antenna elements during transmitting. AN electrical shock could Occur and could be really dangerous to people!

Other useful antennas for JOTA-JOTI

There are many antennas and types we could choose and use for JOTA-JOTI. In this appendix we try to keep it a little bit simple and a bit short. In this part we only suggest some other antennas which could be useful for activities during JOTA-JOTI. If you are interested how you could build your own, the internet is full of suggestions how to build or where to buy.

Suggestions for other (simple) antennas for use during JOTA-JOTI

- HB9CV antenna
- Vertical 5/8 wave antenna
- Vertical UHF VHF antenna
- Endfed antenna
- G5RV antenna
- ZS6BKW antenna
- Long wire antenna

More complex antennas for use during JOTA-JOTI

- Yagi
- Cross Yagi
- NVIS antenna
- Four square
- Delta Loop
- Magnetic loop antenna

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