# Ethics and Operating Procedures for the Radio Amateur



*by ON4UN and ON4WW*

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Right from the early days of Amateur Radio it was clear that binding rules and regulations were not sufficient to keep the hobby on the right track...

## The Radio Amateur's Code

The Radio Amateur is

CONSIDERATE... He never knowingly operates in such a way as to lessen the pleasure of others.

LOYAL... He offers loyalty, encouragement and support to other amateurs, local clubs, the IARU Radio Society in his country, through which Amateur Radio in his country is represented nationally and internationally.

PROGRESSIVE... He keeps his station up to date. It is well-built and efficient. His *operating practice* is above reproach.

FRIENDLY... He operates slowly and patiently when requested; offers friendly advice and counsel to the beginner; kind assistance, cooperation and consideration for the interests of others. These are the marks of the amateur spirit.

BALANCED... Radio is a hobby, never interfering with duties owed to family, job, school or community.

PATRIOTIC... His station and skills are always ready for service to country and community.

*-- adapted from the original Amateur's Code, written by Paul M. Segal, W9EEA, in 1928.*

# I. INTRODUCTION

## I.1. WELCOME

Why this document?

- Evolution in amateur radio over the past 50 years: less *technique* → more *operating.*
- However:
  - So far little if any detailed training in *operating matters.*
  - Very little exam material on this subject (for testing newcomers).
  - Little has yet been published.
- What we hear on the bands is often far from perfect

Hence:

- A complete training aid aimed at newcomers of all licence classes (starter, novice, full licence).
- A reference work to be used by old timers to yet improve their behavior on the ham bands.

What it is not:

- A series of restricting rules aimed at making the hobby less enjoyable.

What is IS:

- A help to all hams and candidate hams to make life of all of us on the bands easier and more enjoyable.

## I. 2. CODE OF CONDUCT FOR THE RADIO AMATEUR

- Basic Principles:
  - Social feeling, feeling of brotherhood, brotherly spirit: we are in large numbers. Always be considerate. Treat other hams as colleagues or friends.
  - Tolerance: understand why not everybody is of your opinion.
  - Politeness: rude manners and abusive words only tell us for the people using them.
  - Comprehension: understand not everyone is as smart or as professional as you. Have a positive attitude in this matter.
- The danger of conflicts:
  - Only one single playing field, the ether, for hundreds of thousands of players.
- How to avoid conflicts:
  - Most frequent cause of conflicts: ignorance.
  - Only one remedy: take away the ignorance → explain, inform, train, help.

*This is the unique purpose of this document*

- Self Discipline:
  - Ethics and operational aspects are not a concern of the *telecom authorities* in most countries.
  - This means that self discipline must be at the basis of our conduct on the bands. In matters of ethics and operating procedures, hams are self policing, which obviously does not mean that we have our own police services!
- So what's in the Code of Conduct for the Radio Amateur?

- *Ethical Rules: what is 'good', what is 'bad', based on moral values and principles*
- *Practical Rules: rules based on good sense, traditions, conventions, habits and uses*

# II. GENERAL OPERATING

## II.1. HAM LANGUAGE

- Amongst hams we never use expressions like "mister", "miss" or "misses". Hams always address one another with their first name.
- In spoken as well as written language (including e-mails) we always greet one another using the expression "73". Do not use *sincerely* and similar expressions.
- "73" means *best regards*. Hence, do not say or write *73s (seventy threes)*, *best 73* or *many 73s* etc. Just "73" is correct.
- If you used to be a CB operator, erase the CB language from your memory, and learn the amateur radio idioms which will help you integrate into the ham radio community.
- On the air, use the Q-code correctly.
- Use the Q-code *sparsely* during phone contacts.
- Some other *short expressions* stem from CW and have become commonplace also in phone, such as 73, 88, OM (*old man*), YL (*young lady*), etc.
- Use the international spelling alphabet correctly. Avoid fantasies.
- English is the number one international ham language on the air.
- For contacts in CW (Morse Code) you do not need to understand or speak the language of your correspondent.
- Ham radio is an ideal tool to learn and practice new languages.

QRM: interference
QRN: interference from atmospherics (static crashes)
a QRP: a child
going QRT: leave the air, stop transmitting
being QRV: being ready, being available
QRX: just a moment, stand by
QRZ: who called me?
QSB: fading
QSL (card): the card which confirms a contact
QSL: I confirm
a QSO: a contact
QSY: change frequency
QTH: the place where your station is located (city, village)

## A few basic principles

### II.2. LISTENING

- Becoming a good radio amateur starts by listening a lot.
- Be careful, not all you hear on the bands are *good examples*. Old-timers also commit errors!
- If you are active on the bands, be a good example on the air.

### II.3. USE YOUR CALL (CALLSIGN) CORRECTLY

- Never start a transmission by calling your correspondent with his first name or nickname.
- Identify yourself using your complete callsign, not just the suffix! Identify frequently.

### II.4. ALWAYS BE A GENTLEMAN

- Never use faul language, stay polite, courteous and gentle, under all circumstances.

George Bernard Shaw wrote:

*There is no accomplishment so easy to acquire as politeness and none more profitable*

## II.5. ON THE REPEATERS

- Repeaters serve in the first place to extend the operating range of portable and mobile stations on VHF/UHF.
- Use simplex wherever possible. Using repeaters to make contacts between two fixed stations should be an exception.
- If you want to talk via the repeater while it is already in use, wait for a pause between transmissions to announce your call.
- Only use the term 'break' or even better 'break break break' in an emergency or life-threatening situation. Better is to say 'break break break with emergency traffic'.
- Stations using the repeater should pause until its carrier drops out or a beep appears, to avoid inadvertent *doubling* (simultaneous transmission) and to allow time for new stations to identify. Pausing usually also allows the timer to reset, avoiding a *time-out.*
- Do not monopolize the repeater. Repeaters are there not only for you and your friends. Be conscious that others may want to use the repeater as well; be obliging.
- Keep your contacts through a repeater short and *to the point*.
- Repeaters should not serve to inform the XYL that you are on your way home and that lunch can be served... Contacts through amateur radio concern primarily the technique of radio communications.
- Don't break into a contact unless you have something significant to add. Interrupting is no more polite on the air than it is in person.
- Interrupting a conversation without identification is not correct and in principle illegal interference.
- If you frequently use a particular repeater consider supporting those that keep that repeater on the air.

## II.6. HOW DO YOU MAKE A QSO?

A QSO is a contact by radio between two or more hams.

- How do you start a QSO?
  - By making a *general call* (calling CQ).
  - Or by answering someone's CQ.
  - Etc. More details follow.

- Which call comes first?
  - Correct is: 'W1ZZZ from G3ZZZ '(you are G3ZZZ, and W1ZZZ is the person you address).
  - First give the call of the person you address, followed by your own call.

- How often should you identify?
  - When you first come on the air, and when you leave th air, and in between every 5 (in some countries 10) minutes.
  - Good operatings says you should identify at each QSO.

- A 'pause 'or a 'blank '
  - When your correspondent switches the transmission over to you, it is a good habit to wait a second before starting your transmission, in order to check whether someone may want to join you, or use the frequency.

- Long versus short transmissions
  - Make short transmissions, this makes it much easier for your correspondent if he wants to comment on something you said.

## II.7. WHAT DO YOU TALK ABOUT ON THE AMATEUR BANDS?

- In principle: about the technique of radio communications
  - ... *in the broad sense of the term.*

- Some subjects which are a no no in amateur radio conversations on the air are:
  - Religion.
  - Politics.
  - Business (you can talk about your profession, but you cannot advertise for your business).
  - Derogatory remarks directed at any group (ethnic, religious, racial, sexual etc.).
  - Bathroom humor : if you wouldn't tell the joke to your ten year old child, don't tell it on the radio.
  - Any subject that has no relation whatsoever with the ham radio hobby.

## II.8.1. How do you call CQ in phone?

- If you need to *tune* your transmitter → on a *dummy load* → if need to do it on the antenna, only on a clear frequency!
- Decide which band to use. Depends on distance, propagation, time of day etc.
- Do you know where you can transmit in that band? Check the IARU Bandplan!
- Use the correct sideband: below 10 MHz: LSB, above 10 MHz: USB.
- In LSB your signal is transmitted up to 3 kHz below the nominal frequency, in USB, 3 kHz above.
- Always start by listening for a while.
- Then ask if the frequency is in use: 'Is this frequency in use?'
- If you have already listened for a while on an apparently clear frequency, why do you in addition have to ask if the frequency is in use?
- Because one station, part of a QSO, who is located in the skip zone vs. your location, could be transmitting on the frequency. This means that you cannot hear him (and he won t hear you) because he is too far for propagation via ground wave and too close for propagation via ionospheric reflection. On the higher HF bands this usually means stations located a few hundred kilometres from you.
- If you ask if the frequency is in use, his correspondent may hear you and confirm. If you start transmitting without asking, chances are you will be causing QRM to at least one of the stations on frequency.
- If it is in use, someone will probably answer 'yes' or also 'yes, thank you for asking.'
- If nobody replies, ask a second time if the frequency is in use.
- If still no answer: call CQ...
- 'CQ from G3ZZZ, G3ZZZ calling CQ, george three zulu zulu zulu calling CQ and listening.' You can also end by saying '... calling CQ and standing by.'
- Speak clearly and distinctly and pronounce all words correctly.
- Give your call 2 to maximum 4 times during a CQ.

- Use the international spelling alphabet (for spelling out your callsign) at least once during your CQ.
- It's better to use several consecutive short CQs rather than one long CQ.
- Never end your CQ with 'QRZ ?' QRZ has only 1 meaning: 'who did call me?'.. Quite out of the question here.
- Never end your CQ with 'over', you are not yet in contact with anyone, so there is nobody yet you can turn it 'over' to.
- If you call CQ and want to listen on another (than your transmit) frequency, always end your CQ by indicating where you will listen, e.g. '..and listening 5 to 10 up' or '..and listening on 14295', etc.
- If you specify a *separate* listening frequency, always check first if it is not yet in use!

## II.8.2. What means 'CQ DX'?

- If you want to contact *long distance* stations, call 'CQ DX'
- What is DX?
- On HF: stations outside your own continent, or of a country with very limited amateur radio activity (e.g. Mount Athos, Order of Malta etc. in Europe).
- On VHF-UHF: stations located at more than approx. 300 km.
- During a CQ you can insist that you only want to work DX stations, as follows: 'CQ DX, outside Europe, this is...'
- Always be obliging; maybe the local station calling you after your CQ DX is a newcomer, and maybe you are a *new country* for him. Why not just give him a quick QSO?

## II.8.3. Calling a specific station

- Let us assume that you want to call DL1ZZZ with whom you have a *sked* (*schedule, rendez-vous*). Here's how you do this: 'DL1ZZZ, DL1ZZZ this is G3ZZZ calling on sked and listening for you'
- If, despite your directive call someone else calls you, remain polite. Give him a quick report and say 'sorry, I have a sked with DL1ZZZ...'

## II.8.4. Making a phone QSO (1)

- W1ZZZ answers your CQ: 'G3ZZZ from W1ZZZ, whiskey one zulu zulu zulu is calling you and listening' or 'G3ZZZ from W1ZZZ, whiskey one zulu zulu zulu over.' Someone who answers your CQ can obviously end his transmission with 'over' as he wants to turn it *over* to you, who called CQ.
- If you call a station that has called CQ (or QRZ), call that station by giving his call not more than once. In most cases it's better not to give it at all; the operator knows his own call. In a contest you never give the callsign of the station you are calling.
- 'W1ZZZ from G3ZZZ (be careful, keep the right sequence!), thanks for the call, I am receiving you very well, readability 5 and strength 8 (usually the indication on the S-meter on your receiver). My QTH is London and my name is John (not *my personal name*, there are no such things as *personal* or *impersonal* names). How do you copy me? W1ZZZ from G3ZZZ. Over.'

| READABILITY | | SIGNAL STRENGTH | |
|---|---|---|---|
| R1 | Unreadable | S1 | Faint signals, barely perceptible |
| R2 | Barely readable | S2 | Very weak signals |
| R3 | Readable with difficulty | S3 | Weak Signals |
| R4 | Readable with no difficulty | S4 | Fair signals |
| R5 | Perfectly readable | S5 | Fairly good signals |
| | | S6 | Good signals |
| | | S7 | Fairly strong signals |
| | | S8 | Strong signals |
| | | S9 | Very strong signals |

- Using the word 'over' at the end of your *over* is recommended but not really a must. A QSO consists of a number of transmissions or *overs*. 'over' stands for 'over to you.'
- If signals are not very strong and if the readability is not perfect, you can spell out your name etc. Example: 'My name is John, spelled juliett, oscar, hotel, november...' 'Do NOT say 'juliett juliett, oscar oscar, hotel hotel, november november.' This is not the way you spell the name John.

## II.8.4. Making a phone QSO (2)

- In most *rubber stamp* QSOs data regarding equipment and antennas will be exchanged, sometimes complemented with weather data (can influence propagation).
- It is the station that called CQ which takes the leading role in the contact. In principle it is this station which determines the subjects of the conversation. It is possible that he just wants to exchange a report. As a calling station, do not impose anything.
- What starts as a short rubber stamp-like contact can evolve into serious and lengthy technical conversations and even into real friendships. Amateur Radio can be a real bridge builder between communities, cultures and civilizations!
- If you wish to QSL (exchange cards), mention it: 'Please QSL. I will send my card to you via the QSL bureau and would appreciate your card as well.' A QSL is a postcard sized report confirming a QSO you made.
- QSL cards may be mailed direct to the other station or sent via a QSL bureau. Just about all Radio Societies, members of IARU, exchange QSL cards for their members. Some stations only QSL via a QSL manager who handles the mail for him/her. Details of those can be found on various websites.
- To wrap up a QSO: '..W1ZZZ, this is G3ZZZ signing with you and listening for any other calls,' or if you intend to go off the air '..and closing down the station.'
- You may add the word 'out' at the end of your last transmission, indicating you are closing down, but it is seldom done. Do NOT say 'over and out,' because 'over' means you switch over to your correspondent, and in this case there is no longer a correspondent!

Typical SSB QSO for the beginner:

Is this frequency in use? This is W1ZZZ

Is this frequency in use? This is W1ZZZ

CQ CQ CQ from W1ZZZ whiskey one zulu zulu zulu calling CQ and listening

W1ZZZ from ON6YYY oscar november six yankee yankee yankee calling and standing by

ON6YYY from W1ZZZ, good evening, thanks for your call, you are 59. My name is Robert, I spell Romeo Oscar Bravo Echo Romeo Tango and my QTH is Boston. How copy? ON6YYY from W1ZZZ. Over.

W1ZZZ from ON6YYY, good evening Robert, I copy you very well, 57, readability 5 and strength 7. My name is John, Juliette Oscar Hotel November, and my QTH is near Ghent . Back to you Robert. W1ZZZ from ON6YYY. Over.

ON6YYY from W1ZZZ, thanks for the report John. My working conditions are a 100 Watt transceiver with a dipole 10 meter high. I would like to exchange QSL cards with you, and will send you my card via the bureau. Many thanks for this contact, 73 and see you soon again, I hope. ON6YYY from W1ZZZ.

W1ZZZ from ON6YYY, all copied 100%, on this side I am using 10 Watt with an inverted-V antenna with the apex at 8 meters. I will also send you my QSL card via the bureau, Robert. 73 and hope to meet you again soon. W1ZZZ this is ON6YYY clear with you.

73 John and see you soon from W1ZZZ now clear (..and listening for any stations calling)

## II.8.5. Fast back and forth switching

- If you are involved in a quick back and forth conversation, involving short transmissions, you do not need to identify at each *over*.
- You can also turn it over to your correspondent by simply saying 'over', meaning you turned the microphone over to him/her to start his transmission.
- Even faster is to just stop talking and pause. If the pause exceeds 1 or 2 seconds your correspondent will simply start transmitting.
- Legally one must identify at least once every 5 minutes or 10 minutes (different from country to country) and when you come on the air and when you leave the air.
- It is good practice however to at least identify at the end of each QSO.

## II.8.6. How to make QSOs in a phone contest (1)

- Contest: is the name for a radio communication competition between radio amateurs.
- What is contesting? It is the competitive side of ham radio.
- Why contesting?
  - During a contest a radio amateur can measure the competitive performance of his station and antennas, as well as his performance as an operator.
  - 'The proof of the pudding is in the eating.'
- How to become a good contester?
  - Through lots of practice and participation in contests.
- Are there many contests?
  - There are contests every weekend, totaling well over 200 contests every year.
  - About 20 have the status of important international contests (ham radio's equivalent to Formula 1 racing).
  - No contests on the WARC bands (10, 18 and 24 MHz).
- The contest calendar: available on all radio amateur sites.
- What do you do in a contest?
  - Make as many QSO's as you can.
  - Work as many *multipliers* as you can.
  - In a given time frame (e.g. 4, 8, 12, 24, 36 or 48 hours).
- What makes a contest QSO?
  - The exchange of calls, and most often a report and a so-called contest exchange (often a serial number).
- Contest operating is all about speed, efficiency and accuracy. One is expected to say only and exactly what's strictly required. No time for formalities.

## II.8.6. How to make QSOs in a phone contest (2)

- If you are new to contesting, it is advisable to first visit a contester during a contest. You can also make your first steps in contesting by participating e.g. in a field day with your local radio club.
- For your first contest, start by listening to see how the routine contesters go about it. Identify the right procedures to make fast contacts. Be aware that not all that you will hear are good examples. A few examples of common errors are discussed further on.
- An example of a fully efficient contest CQ is: 'G3ZZZ george three zulu zulu zulu contest'
- Always give your call twice, once phonetically, unless you're in a big pileup, in which case you give your call just once and forget about spelling it out every time.
- Why is the word *contest* the last word in your contest CQ? Because by doing so, someone who happens to tune across your frequency at the end of the CQ, knows there is someone calling CQ contest on that frequency. Even the word *CQ* is left out as it is ballast and contains no added information.
- The caller (G3XXX) should call you by merely giving his call once: 'george three x-ray x-ray x-ray'
- If you don't reply to him, he will after 1 second, probably call again (1 time his call).
- If you copy him, reply as follows: 'G3XXX 59001' or even faster 'G3XXX 591' (if the rules permit the short number format). Do not add anything else, it would only be ballast.
- If you copied only a partial call (e.g. ON4X..):
  - Go back to him as follows: 'ON4X 59001'
  - Do not send 'QRZ ON4X' or anything like that.
  - Being a good operator, ON4XXX will return to you with 'ON4XXX x-ray x-ray x-ray, you are 59012'
- Never say 'ON4XXX please copy 59001', nor 'ON4XXX copy 59001' which is equally bad. The 'please copy' or 'copy' contains no additional information.

## II.8.6. How to make QSOs in a phone contest (3)

- Being an experienced contester, ON4XXX will come back as follows: "59012".
- If he had not copied your report he would have said "report again" or "please again".
- Last step of the contest QSO: "thanks G3ZZZ contest". Three parts in this exchange: *thanks* = end of QSO, *G3ZZZ* = identification, *contest* = new CQ contest.
- Never end your QSO with "QSL QRZ". Why?
  - "QSL QRZ" does not tell anything about your identity (call). And you want all passers-by that stumble across your frequency at the end of your QSO, to know who you are and that you are calling CQ-contest.
  - Therefore, always end with "thanks G3ZZZ contest" (or "QSL G3ZZZ contest") or if you are very much in a hurry "G3ZZZ contest" (this may however lead to confusion and sounds less friendly).
  - "QSL" means: *I confirm*
  - Don't say "QRZ" because QRZ means "who called me", unless there were more stations calling you in the first place when you picked out ON4XXX.
- It all boils down to being fast, efficient, accurate and correct.
- Most contest operators use a contest logging program on PC.
- Search and pounce QSO's: looking around the band for multipliers and stations not yet worked, and call them. How do you do that?
  - Make sure you are exactly zero beat with the station you want to work (watch the RIT!).
  - Just give your call once. Don't call as follows: "DL1ZZZ from G3ZZZ"; DL1ZZZ certainly knows his call, and knows you are calling him because you call on his frequency!
  - If he does not return to you within 1 second, call again (1 time) etc.

Example of a contest QSO on phone:

whiskey one zulu zulu zulu contest (CQ contest by W1ZZZ)

oscar november six zulu zulu zulu (ON6ZZZ answers)

ON6ZZZ five nine zero zero one (W1ZZZ gives a report to ON6ZZZ)

five nine zero zero three (ON6ZZZ gives his report to W1ZZZ)

thanks W1ZZZ contest (W1ZZZ finishes the contact, identifies and calls CQ contest)

- During some of the larger international contests (CQWW, WPX, ARRL DX, CQ-160m contest – all of these in phone as well as in CW-), contest operators not always fully live by the IARU Band Plan. This happens almost exclusively on 160m and 40m, because of the restricted space on those bands.
- It is nice however to see that during these contests many thousand of hams intensively occupy our bands, which is very positive in view of our required band occupation (use them or lose them).
- The temporary nuisances caused by this exceptional situation, should best be approached with a positive attitude.

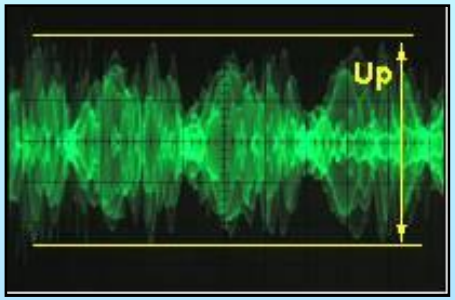
## II.8.7. The correct use of QRZ

- QRZ ? means "who called me? ".
  - The most classical use of QRZ ? is after a CQ, when you were unable to copy the call(s) of the station(s) that called you.
- QRZ ? does not mean "who's there? ".
  - If you want to know the call of a station which has not identified for some time, don't say QRZ ? but ask "your call please ? or "please identify ".
- QRZ ? does not mean "is there anyone on this frequency? ".
  - If you want to check if a frequency is in use just say "is this frequency in use? ".
- QRZ ? does not mean "please call me ".
  - We more and more frequently hear CQ calls ending with QRZ ? This makes no sense. How can someone already have been calling if you just finished a CQ?
- Even more funny is to say QRZ is this frequency in use? ? or QRZ the frequency? ".
- QRZ ? in a pileup:

| Incorrect: | Incorrect: | Correct: |
|---|---|---|
| CQ ZK1DX | CQ ZK1DX | CQ ZK1DX |
| ... | ... | ... |
| ON4YYY you're 59 | ON4YYY you're 59 | ON4YYY you're 59 |
| QSL ~~QRZ~~ ZK1DX | QSL ~~QRZ~~ | QSL ZK1DX |

## II.8.8. Check your transmission quality

- Have you properly adjusted your transmitter?
- Is the microphone gain not set too high?
- Is the speech processing level not too high? The background noise level should be at least 25 dB down from your voice peak level. This means that when you don t speak, the output level of the transmitter must be at least approximately 300 times lower than the peak power when you speak.
- Ask a local ham to check your transmission for *splatter*.
- It is best to check the quality of the transmitted signal by using an oscilloscope which continuously monitors the transmitted waveform.




Transmitting a ćlean ’signal

is a question of ethics.

If you splatter, you are causing interference

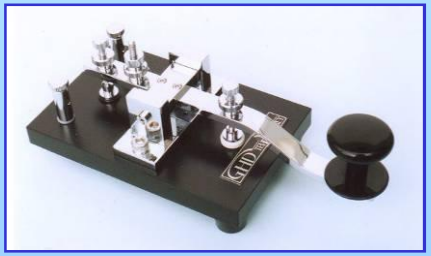
to other users of our bands.

## II.9. THE ART OF TELEGRAPHY (CW, MORSE CODE)

- Morse code is a code for transmitting text. The code is made up by sequences of short and long audio tones. A short tone burst is called a DIT, the longer one a *DAH*. The *DAHs* are 3 times as long as the *DITs*. These are frequently but incorrectly called *DOTS* and *DASHES*, which make us think of something visual rather than sounds.
- Hams normally use the word *CW* for telegraphy. The term *CW* stems from *Continuous Wave* although CW is far from being a *continuous wave.*
- CW makes extensive use of Q codes, abbreviations and prosigns. These are all shortcuts to make communicating faster and more efficient.
- The -6dB bandwidth of a properly shaped CW signal is approximately 4 times the sending speed in WPM (Words Per Minute). Example: CW at 25 WPM takes 100 Hz (at -6dB). The spectrum required to transmit one SSB (voice) signal (2.7 kHz) can hold more than a dozen CW signals!
- The intrinsic narrow bandwidth of CW results in a much better Signal-to-Noise ratio under marginal conditions as compared to wide band signals such as SSB (a wider bandwidth contains more noise power than a narrower bandwidth). This is why DX contacts under marginal conditions (e.g. working stations in other continents on 160m and working EME) are most frequently done in CW.
- What's the minimum receiving speed you need to master to be able to regularly make QSOs in Morse code?
  - 5 WPM can get you a starter's certificate, but you will not be able to make many contacts except on the special *QRS* (*QRS* means: reduce your sending speed) frequencies. These *QRS* frequencies can be found in the IARU Band Plan.
  - 12 WPM is a minimum, but most experienced CW operators make their QSOs at 20 to 30 WPM and even higher speeds.
- There is no secret recipe to master the Art of CW: training, training, training, just as in any *sport*.
- CW is a unique language, a language which is mastered in all countries of the world!

## II.9.1. The computer as your assistant?

- You will not learn CW by using a computer program that helps you to decode CW.
- It is acceptable though to send CW from a computer (pre-programmed short messages). This is commonly done in contests by the logging program.
- As a newcomer you may want to use a CW decoding program to assist you in order to be able to verify that a text was correctly decoded. However, if you really want to learn the code, you will need to decode the same CW text yourself using your ears and brain.
- CW decoding programs perform very poorly under anything but perfect conditions; our ears and brains are far superior. This is mainly because Morse code was not developed to be automatically sent nor received, as is the case with many modern digital codes (RTTY, PSK etc.).
- A large majority of CW operators use an electronic keyer (with a paddle) instead of a hand key to generate Morse code. It is much easier to send *good* Morse code using an electronic keyer than with a hand key.




## II.9.2. Calling CQ (1)

What should you do first?

- Decide which band you will use. Distance, propagation, time of day. Check MUF charts.
- Where is the CW activity? On most bands this is at the bottom end of the band. See IARU Band Plan.
- Look for a clear frequency. Listen for a while on an apparently clear frequency.
- If the frequency seems clear, ask if the frequency is in use. Send 'QRL?' at least twice, with a few seconds in between. Sending '?' only is not the proper procedure. The question mark just says 'I asked a question'; the problem is that you did not ask anything.
- 'QRL?' (with the question mark) means 'is this frequency in use?'
- Do not send 'QRL? K' as we sometimes hear. It means 'is the frequency in use? Over to you.' To whom? Just 'QRL?' is correct.
- If in use, someone will answer 'R' (roger), 'Y' (yes), or 'R QSY,' or 'QRL,' 'C' (I confirm) etc.
- 'QRL' (without question mark) means: the frequency is in use.
- In this case you will have to look for another frequency to use.
- And if a clear frequency has been found?
- Call CQ. How?
- Send CQ at the speed at which you would like to be answered. Never send faster than you can copy.
- 'CQ CQ G3ZZZ G3ZZZ G3ZZZ AR.'
- 'AR' means 'end of message' or 'I am through with this transmission,' while 'K' means 'over to you.' This means you should always terminate your CQ with 'AR' and never with 'K,' because there is nobody there yet whom you can turn it over to.

## II.9.2. Calling CQ (2)

- The use of 'PSE' at the end of a CQ (e.g. 'CQ CQ de... PSE K') may seem to be very polite, but is not necessary. It has no added value. In addition, the use of the 'K' is incorrect. Simply use 'AR' at the end of your CQ.
- Send your call 2 to 4 times, certainly not more!
- Don't send an endless series of CQs, with your call just once at the end. Thinking that a long CQ will increase the chances of getting a response, is wrong. It actually has the opposite effect.
- It's much better to send a number of short CQs ('CQ CQ de F9ZZZ F9ZZZ AR') than one long spun CQ ('CQ CQ CQ ... -15 times- de F9ZZZ CQ CQ CQ ... -15 more times- de F9ZZZ AR').
- If you call CQ and want to work *split* (listening on another frequency than you transmit on), specify your listening frequency at each CQ. Example: end your CQ with 'UP 5/10...' or 'UP 5...' or 'QSX 1822...' (which means that you will listen on 1822 kHz, 'QSX' means 'I listen on...').

## II.9.3. Prosigns

- Prosigns (short for *professional signs*) are symbols formed by combining two characters into one *without the inter-character space*.
- 'AR', used to end a transmission, is a *prosign*.
- Other commonly used prosigns are: 'AS', 'CL', 'SK', 'HH'.
- 'BK' and 'KN' are not prosigns, as the two letters of these codes are sent with a space in between.

## II.9.4. Call 'CQ DX' in CW

- Just send 'CQ DX' instead of 'CQ'.
- If you want to work DX from a specific region, call e.g. 'CQ JA CQ JA I1ZZZ I1ZZZ JA AR' (a call for stations from Japan), or 'CQ NA CQ NA...' (a call for stations from North America) etc. You can also make your CQ DX call more explicit by adding that you do not want to contact European stations: 'CQ DX CQ DX I1ZZZ I1ZZZ DX NO EU AR', but this sounds a little aggressive.
- You can also specify a continent: NA = North America, SA = South America, AF = Africa, AS = Asia, EU = Europe, OC = Oceania.
- Even if a station from your own continent calls you, always remain courteous. Maybe he is a newcomer. Give him a quick contact and log him. You may actually be a new country for him!

## II.9.5. Calling a specific station (a directive call)

- Let us assume that you want to call DL0ZZZ, with whom you have a *sked* (*schedule*, *rendez-vous*). Here's how you do this: 'DL0ZZZ DL0ZZZ SKED DE ON4ZZZ KN'. Note the 'KN' at the end, which means you do not want other stations to call you.
- If, despite your directive call someone else calls you, give him a quick report and send 'SRI HVE SKED WID DL0ZZZ 73...'

## II.9.6. Carry on and wrap up the CW QSO (1)

- W1ZZZ answering your CQ: 'G3ZZZ DE W1ZZZ W1ZZZ AR' or 'G3ZZZ DE W1ZZZ W1ZZZ K 'or even 'W1ZZZ W1ZZZ K 'or 'W1ZZZ W1ZZZ AR'.
- 'AR 'is a prosign: the letters A and R are sent without any space between them. If one sends 'K 'instead of 'AR 'and if the letter 'K 'is sent somewhat close to the callsign, the letter 'K 'may be considered as being the last letter of the call. It happens all the time. With 'AR 'this is quite impossible as 'AR 'is not a letter. Often no closing code (neither AR nor K) is used, which reduces the risk of making errors.
- When replying to a CQ, do not send the call of the station you are calling more than once, better still is not to send it at all (you can trust the operator knows his own call...).
- Assume you want to reply to W1ZZZ who called you. You can do this as follows: 'W1ZZZ DE G3ZZZ GE (good evening) TKS (thanks) FER (for) UR (your) CALL UR RST 589 589 NAME BOB BOB QTH LEEDS LEEDS HW CPY (how copy) W1ZZZ DE G3ZZZ K'. This is the time to use 'K 'at the end of your transmission. 'K 'means *over to you*, and now the *you* is ON4XXX.
- Do not end this transmission with '..AR K', which means 'end of transmission + over to you '(pleonasm).
- Do not send 'PSE K': PSE = please, has no added value (everyone knows you're a polite operator!)
- On frequencies above 30 MHz the QTH-locator information is usually exchanged.
- Do not end your transmission with 'AR', which means 'end of transmission 'and you leave the door wide open for anyone to call you.
- You can end the QSO as follows: '..TKS FER QSO 73 ES CUL W1ZZZ DE G3ZZZ SK'
- 'SK 'is a prosign: *end of contact* (SK is short for *Stop Keying*)
- If you finish the contact and also close down your station send: '..W1ZZZ DE G3ZZZ SK CL '
- 'CL 'is a prosign that is short for *closing* or *closing down*.

## II.9.6. Carry on and wrap up the CW QSO (2)

- the RST report
  - T stands for Tone
  - An updated T-table dates from 1995 (source: W4NRL):

| | |
|---|---|
| **T 1** | 60 Hz (or 50 Hz) AC or less, very rough and broad |
| **T 2** | Very rough AC, very harsh |
| **T 3** | Rough AC note, rectified but not filtered |
| **T 4** | Rough note, some trace of filtering |
| **T 5** | Filtered rectified AC, but strongly ripple-modulated |
| **T 6** | Filtered tone, definite trace of ripple modulation |
| **T 7** | Near pure tone, trace of ripple modulation |
| **T 8** | Near perfect tone, slight trace of modulation |
| **T 9** | Perfect tone, no trace of ripple or modulation of any kind |

- A more modern version of the T-report:
  - T1: heavily modulated CW, signs of wild oscillation or extremely rough AC (means: get off the air with such a poor signal!).
  - T5: very noticeable AC component (often due to poor regulation of a power supply of the transmitter or amplifier).
  - T7 – T8: slightly or barely noticeable AC component.
  - T9: perfect tone, undistorted sine waveform.
- Most frequently occurring defects with CW signals:
  - Chirp: give a report like '597 CHIRP' or '597 BAD CHIRP'.
  - Key clicks: '597 CLICKS' or '597 BAD CLICKS'.
  - Formerly 579C and 599K were widely used but not so much these days (the letter 'K' can be confusing).

- An overview of closing codes:

| CODE | MEANING | USE |
|---|---|---|
| AR | end of transmission | at end of CQ **and** at the end of your transmission when you call a station (1) |
| K | over to you | at the end of an *over* (2) **and** at the end of your transmission when you call a station (1) |
| KN | over to you only | at the end of an *over* |
| AR K | end of transmission + over to you | **do NOT use** |
| AR KN | end of transmission + over to you only | **do NOT use** |
| SK | end of contact (end of QSO) | at end of QSO |
| AR SK | end of transmission + end of contact | **do NOT use** |
| SK CL | end of QSO + closing down station | when closing down |

(1): when you reply to a station calling CQ or QRZ

(2): a *transmission* or an *over* is NOT the same as a QSO (contact). A QSO usually consists of a series of *overs*

Typical CW QSO for the beginner:

QRL?

QRL?

CQ CQ G4ZZZ G4ZZZ CQ CQ G4ZZZ G4ZZZ AR

G4ZZZ DE ON6YYY ON6YYY AR

ON6YYY DE G4ZZZ GE TKS FER CALL UR RST 579 579 MY NAME BOB BOB QTH HARLOW HARLOW HW CPY? ON6YYY DE G4ZZZ K

G4ZZZ DE ON6YYY FB BOB TKS FER RPRT UR RST 599 599 NAME JOHN JOHN QTH NR GENT GENT W1ZZZ DE ON6YYY K

ON6YYY DE G4ZZZ MNI TKS FER RPRT TX 100 W ANT DIPOLE AT 12M WILL QSL VIA BURO PSE UR QSL TKS QSO 73 ES GE JOHN ON6YYY DE G4ZZZ K

G4ZZZ DE ON6YYY ALL OK BOB, HERE TX 10 W ANT INV V AT 8M MY QSL OK VIA BURO 73 ES TKS QSO CUL BOB G4ZZZ DE ON6YYY SK

73 JOHN CUL DE G4ZZZ SK

## II.9.7. Using "BK"

- "BK" (*break*) is used for switching quickly back and forth between stations without exchanging callsigns at the end of the transmission.
- In a way it is the CW equivalent of "over" in phone.
- Example: W1ZZZ wants to know the name of G3ZZZ he's in QSO with and sends: "..UR NAME PSE BK." G3ZZZ answers immediately: "BK NAME JOHN JOHN BK."
- Note that in this case "PSE" is correctly used: you ask something.
- The break is announced with "BK," and the transmission by the correspondent starts with "BK."
- The latter "BK" however is not always sent.

## II.9.8. Still faster

- Often even the "BK" code is not used.
- One just stops sending and waits for the other station to start, just like in a normal eyeball conversation.
- In general this procedure is only applied by stations having semi- or full break-in capability.

## II.9.9. Using the prosign "$\overline{\text{AS}}$" (DIT DAH DIT DIT DIT)

- If, during a QSO, someone breaks in (transmits his call on top of the station you are working, or gives his call when you switch over), and you want to let him know that you first want to finish the QSO, send "AS," which means "hold on," "wait," "stand by."

## II.9.10. Using 'KN'

- 'K' means: *over to you.*
- 'KN' means: *over to you only*: you want to hear ONLY the station whose callsign you just sent (which means as much as *no breakers*).
- 'KN' is mainly used when chaos is imminent. A possible scenario:
  - Different stations are coming back to your CQ.
  - You copied part of a call and you send: 'ON4AB? DE G3ZZZ PSE UR CALL AGN (again) K.'
  - The station *ON4AB?* answers you, but in addition several other stations call simultaneously, making it impossible to copy his call.
  - The procedure is to call *ON4AB?* again and end your *over* with 'KN' instead of 'K,' this to emphasize you only want to hear *ON4AB?* come back to you. Example: 'ON4AB? DE G3ZZZ KN' or even 'ONLY ON4AB? DE G3ZZZ KN.'
  - If you are still short of authority on the frequency you may try 'ON4AB? DE G3ZZZ KN N N N' (keep some extra space between the letters N). Now you are really getting nervous...

## II.9.11. Answering a CQ

- You (ON4ZZZ) want to reply to the CQ of W1ZZZ.
- Do not send at a higher speed than the station you're calling.
- Do not send the call of the station you are calling more than once; most of the time the call is not sent, it is obvious who you are calling.
- You can use either 'K' or 'AR' to end your call: 'W1ZZZ DE G3ZZZ G3ZZZ K,' 'G3ZZZ G3ZZZ K,' 'W1ZZZ DE G3ZZZ G3ZZZ AR' or 'G3ZZZ G3ZZZ AR.'
- In many cases one sends only the callsign without any *closing code* (AR or K) at all. This is also common practice in contests.
- Do not end your call with either '...PSE AR' or '...PSE K.' Everybody knows you're a nice guy.

## II.9.12. Someone sends an error in your call

- W1ZZZ, returning for you (G3ZZZ) sends: 'G3ZZY DE W1ZZZ TKS FOR CALL UR RST 479 479 NAME JACK JACK QTH NR BOSTON BOSTON G3ZZY DE W1ZZZ K.'
- Go back to him as follows: 'W1ZZZ de G3ZZZ ZZZ G3ZZZ TKS FER RPRT...' By repeating part of your call a few times, you emphasize this part of the call to get your correspondent's attention so he can correct the error.

## II.9.13. Call a station that's finishing a QSO

- To whom of the two *belongs* the frequency?
  - Did they both send 'SK' at the end of their QSO?
  - Has one of them sent 'CL' as well? This one is leaving the frequency (CL means *closing down*).
- If the situation is not clear, wait a second to see if either one calls CQ.
- Example:
  - W1ZZZ finishes a QSO with F1AA: '...73 CUL (see you later) F1AA de W1ZZZ SK.'
  - As neither one calls CQ after the QSO, you can call either one.
  - You (G3ZZZ) want to call F1AA: 'F1AA de G3ZZZ G3ZZZ AR.'
  - In this case calling without mentioning the callsign of the station you want to contact would be inappropriate. Send the call of the station you want to work once, followed by your call once or twice.

## II.9.14. Using the equality sign '=' or 'DAH DIT DIT DIT DAH'

- The equality sign (DAH DIT DIT DIT DAH) is used to pause for a split second while you *think*
- This is to prevent the other station from starting to transmit, as you have not yet finished your *over*
- It is the equivalent of 'euh' or 'eh' in phone.
- It is also being used as a separator between chunks of text (alsmost like a full stop).

## II.9.15. Send good sounding code

- Listening to your CW should be like listening to good music, whereas one never feels like *working* at deciphering an unknown code or assembling a puzzle.
- Make sure you *space* letters and words appropriately. Fast sending with a little extra spacing usually makes overall copy easier.
- Experienced CW operators don t listen for letters but for words. This can of course only be done successfully if the right spacing exists between words. Once you start hearing words instead of a stream of letters, you are getting there! In normal face to face conversation we also listen for words, not for letters, don t we?
- On an automatic keyer, adjust the DIT/space ratio (weight) correctly. It will sound nicest (most pleasing) if the ratio is a little bit on the high side (DIT a little longer than a space), compared to the standard 1/1 ratio.
- Remark: weight is not the same as DIT/DAH ratio! The DIT/DAH ratio is usually fixed at a 1/3 ratio on most keyers (not adjustable).

## II.9.16. I am a QRP station (= low power station)

- In many countries identifying as 'G3ZZZ/QRP' is illegal.
- In many countries only the suffixes /P, /A, /M and /MM can be *glued* to the callsign.
- Adding /QRP only makes it more difficult for other stations to decipher your call.
- You can always mention that you are QRP during your QSO.
- If you want to call CQ for QRP stations only, do it as follows: 'CQ QRP CQ QRP G3ZZZ G3ZZZ QRP AR'. Note that there is no *slash* between the call and the letters QRP.

## II.9.17. The correct use of 'QRZ?'

- 'QRZ?' means only 'who called me?'
- Use it when you did not quite copy the station that *called* you. In that case send 'QRZ? F9ZZZ'
- In such a case always send QRZ followed by a question mark ('QRZ?'), as you are asking a question.
- If you have been able to copy part of a call (ON4...), send 'ON4 AGN (again) K' or 'ON4 AGN KN'
  - Note that in this case you use 'K' or 'KN' and not 'AR' because you turn it back to one station in particular, the ON4 station whose suffix you missed.
  - Don't send 'QRZ?' in this case or all the stations will start calling you again.
- 'QRZ?' does not mean 'who is there?' nor 'who is on the frequency?'
  - Assume someone passes by a busy frequency and listens in. After quite a while nobody having identified, he wants to find out the calls. The proper way to do so is to send 'CALL?' or 'UR CALL?' (or 'CL?', 'UR CL?'). Using 'QRZ?' is totally inappropriate here.
  - In such a case, when you send 'CALL?', you should in principle add your call, otherwise you make an unidentified transmission, which is illegal.

## II.9.18. The use of ' ? ' instead of ' QRL? '

- Before using an apparently clear frequency, you need to actively check if no one is there already (maybe you are not hearing one end of a QSO because of propagation).
- The normal procedure is: send ' QRL? ' (on CW) or ask ' is this frequency in use? ' on phone.
- On CW, some send ' ? ', because it is faster and thus potentially creates less QRM if someone else is using that frequency.
- But ' ? ' can be interpreted in many ways (it says: *I am asking a question, but I did not say which one...*). Therefore always use ' QRL? '. Merely transmitting a question mark can create a lot of confusion.

## II.9.19. Sending ' DIT DIT ' at the end of a QSO

- At the end of a QSO both QSO partners often send as very last code two DITs with some extra spacing between them (like e e). It means and sounds like *bye bye*.

## II.9.20. Correcting a sending error.

- Assume you make a sending error. The official procedure:
  - Immediately stop sending.
  - Wait a fraction of a second and
  - send the prosign ' HH ' (= 8 DITs). Not always easy to send exactly 8 DITs, you're already nervous because you made an error, and now they want you to send exactly 8 DITs: DIT DIT DIT DIT DIT DIT DIT DIT, not 7 nor 9!
- In actual practice, many hams send just a few (e.g. 3) DITs, with extra space in between the DITs: ' DIT _ DIT _ DIT '. These extra spaced DITs indicate that the sender is not sending the code for a letter nor figure.
- Resend the word where you made an error and carry on.
- Often even these 3 DITs are left out altogether. When the sender realizes he's made an error, he stops for about a second and starts sending the same word again.

## II.9.21. CW contests (1)

- Contest means speed, efficiency and accuracy. Hence, send only what's strictly necessary.
- Calling CQ in a contest: "CQ TEST GM3ZZZ GM3ZZZ TEST"
  - In this case "TEST" is short for "contest"
  - Why "TEST" as last word?
  - Because anyone tuning across the frequency at the end of your CQ then knows that you call CQ.
- A station calls you: "W1ZZZ." If you do not reply to that station, he will likely give his call once more after about 1 second.
- How do you reply to that station (W1ZZZ)?
  - "W1ZZZ 599001"
  - Or, in abbreviated format "W1ZZZ 5NNTT1."
  - Or still faster: "W1ZZZ 5NN1." More about cut numbers later.
  - *001* is the QSO sequential number (sometimes zone number, age etc.).
  - Do not send *K*, *73*, *GL* or any other formality, it's all a waste of time.
- W1ZZZ answers: "599012" or "5NNT12."
  - As he did not ask for a repeat it means that your report was received OK. Hence there is no need to send "TU," "QSL," "R" or whatever else to confirm reception of the report.
- All there's left to do is to end the QSO: "TU GM3ZZZ TEST."
  - *TU*: is the code used to nicely round up the QSO (TU = *thank you*). TU is sometimes left out to speed up the procedure.
  - *GM3ZZZ*: you identify for stations wanting to call you.
  - *TEST*: you call CQ contest again.
- There are of course slight variations possible, but the key words are speed, efficiency and accuracy.

## II.9.21. CW contests (2)

- Most contesters use a computer contest program.
  - Most code is sent via the keyboard via preprogrammed messages.
  - A separate CW paddle and keyer allows for the operator to manually intervene if necessary.
  - Such a setup makes long contests less tiring and will increase accuracy.
  - To be really competitive, pencil and paper logging is too slow.
- Search and pounce (looking for new multipliers / new contacts).
  - Scan the band looking for new ones.
  - When you find one, call as follows: 'GM3ZZZ.' Do not send his callsign, it's a waste of time.
  - Do not send 'DE GM3ZZZ,' the word *DE* contains no additional information.

Example of a CW contest QSO:

DL0ZZZ TEST (CQ call from DL0ZZZ)

G6XXX (G6XXX calls DL0ZZZ)

G6XXX 599013 (DL0ZZZ gives G6XXX a report)

599010 (G6ZZZ gives DL0ZZZ his report)

TU DL0ZZZ TEST (DL0ZZZ confirms reception and calls CQ Contest)

## II.9.22. Abbreviated numbers (cut numbers) used in contests

- The code to be exchanged in most contests consists of a series of numbers, e.g. RST, followed by a 3-digit serial number.
- To save time, the CW code for some numbers (digits) is often shortened (*cut*):

| | |
|---|---|
| 1 = A (DIT DAH, instead of DIT DAH DAH DAH DAH) | 6, 7 and 8 are usually not *cut* |
| 2, 3 and 4 are usually not *cut* | 9 = N (DAH DIT) |
| 5 = E (DIT instead of DIT DIT DIT DIT DIT) | 0 = T (DAH) |

- Example: instead of sending '599009' one could send 'ENNTTN.' Most frequently you will hear '5NNTTN.' As we expect numbers, and although letters are received, we write down numbers.
- In some contests (e.g. CQ WW) you need to send your CQ zone number as part of the contest exchange. European countries are in zone 14 and 15. Instead of sending '59914' we often send '5NNA4' or even 'ENNA4.'

## II.9.23. Zero beat

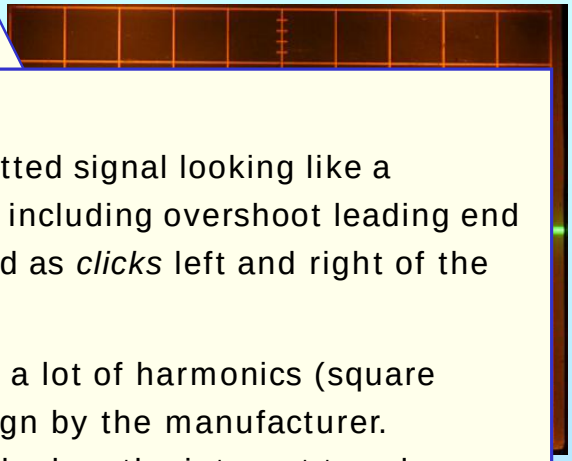
- A major advantage of a CW QSO is its narrow bandwidth (a few hundred Hz)...
- ...if at least both stations transmit on exactly the same frequency.
- Unless working *split*, all QSOs are made with both stations transmitting on the same frequency. In such a case both stations are (*at) zero beat*.
- Make sure you know exactly how to transmit zero beat using your transceiver.
  - With modern transceivers zero beat operation is generally achieved if the frequency of the sidetone and the frequency of the received signal are the same.
  - On most transceivers the frequency of the sidetone is adjustable.
- Many experienced CW operators listen at a fairly low beat tone (400 – 500Hz, sometimes even as low as 300 Hz) instead of the more usual 600 – 1000 Hz (less tiring, better discrimination).

II.9.24. Where can we find slowly sending CW stations (QRS)?

- 80 m: 3.550 – 3.570 kHz
- 2
- 1
- 1

II.9

- N
- b
- M
- H
- A



*Possible causes of key clicks*

- Key clicks are caused by the envelope waveform of the transmitted signal looking like a (nearly) perfect square wave, with no rounded off edges, often including overshoot leading end spikes. All of this results in wide sidebands, which are witnessed as *clicks* left and right of the CW signal. There are three main causes for this problem.
  - One is an improperly shaped keying waveform containing a lot of harmonics (square edges). The cause of this is most often a poor circuit design by the manufacturer. Fortunately a number of circuit changes have been published on the internet to solve these problems.
  - The second one is having too much driving power to the amplifier combined with improper ALC (*automatic level control*) action (too slow attack time), resulting in leading edge spikes. It is always recommended to manually adjust the required drive power and not to rely on action of an ALC circuit.
  - A third one is improper open/closure sequence timing of RF relays during full break in operation.

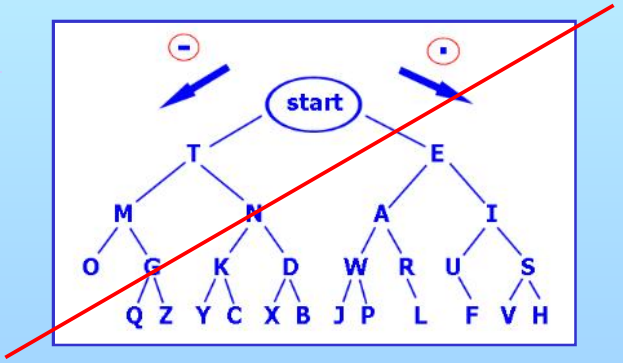
2ms rise time  4ms rise time  6ms rise time  8ms rise time

## II.9.26. Too fast?

- Is the CW speed you master not high enough to be able to make many QSOs?
- To increase your receiving speed, you need to exercise at a speed which is at the limit of your capabilities, where you gradually and constantly increase the speed (à la RUFZ).
- Up to approx. 15 WPM you can write down a text sent in CW, letter by letter.
- At over 15 or 20 WPM you should recognize words, and write down only what s essential (name, QTH, WX, power, antenna etc.).

## II.9.27. Programs to learn CW or improve your proficiency

- G4FON Koch method trainer (www.g4fon.net)
- Just Learn Morse Code (www.justlearnmorsecode.com)
- Contest simulation (www.dxatlas.com/MorseRunner)
- RUFZ: increase your CW speed (www.rufzxp.net)




A few important hints.

- Never learn CW by counting *DITs* and *DAHs*...
- Never learn CW by grouping together similar characters (e.g. e, i, s, h, 5): this will make you count *DITs* and *DAHs* forever!
- Never describe the CW code for a character using the words *dot* and *dash* but rather using the words *DIT* and *DAH*. *Dots* and *dashes* make us think of something *visual*, *DITs* and *DAHs* make us rather think of *sounds*.

## II.9.28. Abbreviations used in CW

AGN: again
ANT: antenna
AR: end of message
AS: wait a moment (prosign)
B4: before
BK: Break
BTW: by the way
CFM: (I) confirm
CL: closing (down), clear
CL: call
CQ: general call
CU: see you
CUL: see you later
CPY *or* CPI: copy
DE: from (vb. ON4BB de ON5AA)
DWN: down
ES: and
FB: fine business (good, very good)
FER: for
GA: go ahead
GA: good afternoon
GD: good
GD: good day
GE: good evening
GL: good luck
GM: good morning
GN: good night
GUD: good
HI: laughter in CW
HNY: happy new year
HR: here
HW: how (e.g. hw cpy)
K: over to you
KN: over to you only
LP: long path (propagation)
LSN: listen
MX: Merry Christmas
N: no (negation)
NR: near
NR: number
NW: now
PSE: please
PWR: power
OM: old man (man, male ham)
OP: operator
OPR: operator
PSE: please
PWR: power
R: roger, yes, I confirm, received (confirmation)
RCVR *or* RX: receiver
RIG: equipment
RPT: repeat
RPRT: report
SK: end of contact
SP: shorth path (propagation)
SRI: sorry
TMW *or* TMRW: tomorrow (morgen)
TNX *or* TKS: thanks
TU: thank you
UR: your
VY: very
WX: weather
XMAS: Christmas
XYL: wife, married woman
YL: young lady, single (unmarried) woman
YR: year
51 en 55: CB slang, do not use!
73: best regards (never use *73s*, *best 73* of *best 73s*, all these are pleonasms)
88: love and kisses

Overview of most common Q codes and prosigns used in CW

AR: end of transmission: indicates the end of a transmission which is not addressed to anyone in particular (e.g. at the end of a CQ)

K: over to you: ends a transmission of a conversation between 2 or more stations.

KN: over to you only: similar to ‘K’ but you emphasize you do not want to hear any other callers or breakers.

SK: end of QSO: is used to end a QSO (SK = stop keying).

CL: closing down station: last code sent before closing down your station (CL = closing down)

QRL?: is the frequency in use?: you must always use it before calling CQ on a new frequency.

QRZ?: who called me?: QRZ has no other meaning.

QRS: reduce your sending speed

AS: just a moment, hold on...

= : I am thinking, hold on, euh... (also used as a separator between portions of text)

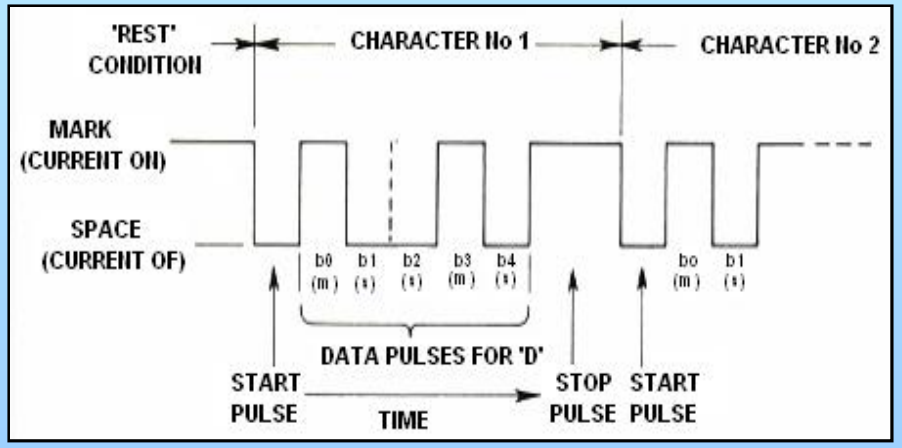
## II.10.1.1. What is RTTY?

- The oldest of all digital modes (after telegraphy).
- Code: 5 bits Baudot code.
- 5 bits only give you 32 possible combinations ($2^5$ = 2x2x2x2x2): too few for all letters and figures.
- This is why we have 2 statusses in RTTY: LETTERS and FIGURES.
- Modulation: FSK (Frequency Shift Keying): the transmitted carrier is shifted 170 Hz going from the OFF (Space) status to the ON (Mark) status of the Baudot code (which makes it FM).
- Duty cycle: 100% (there is no amplitude modulation).

Model 28ASR from Teletype, the *Cadillac* of RTTY machines in the 1960s.

## II.10.1.2. RTTY frequencies

- 160m: 1.838 - 1.840 kHz
- 80m: 3.580 - 3.600 kHz
- 40m: 7.035 - 7.043 kHz.
  For the USA: also 7.080 - 7.100 kHz
- 20m: 14.080 - 14.099 kHz
- 17m: 18.095 - 18.105 kHz
- 15m: 21.080 - 21.110 kHz
- 12m: 24.915 - 24.929 kHz
- 10m: 28.080 - 28.150 kHz




## II.10.1.3. Specific operational procedures

- All standard phone and CW procedures apply.
- RTTY is extremely sensitive to QRM (all kinds of interferences). Pileups must be run in split frequency mode.
- Use brag tapes *moderately*. Don t *impose* your transmissions.

TYPICAL RTTY QSO

QRL? DE PA0ZZZ

QRL? DE PA0ZZZ

CQ CQ DE PA0ZZZ PA0ZZZ PA0ZZZ AR

PA0ZZZ DE G6YYY GYYY K

G6YYY DE PA0ZZZ GA (good afternoon) OM TKS FER CALL UR RST 599 599 NAME BOB BOB QTH ROTTERDAM ROTTERDAM HW CPI? G6YYY DE PA0ZZZ K

PA0ZZZ DE G6YYY GA BOB UR RST 599 599 NAME JOHN JOHN QTH LEEDS LEES PA0ZZZ DE G6YYY K

G6YYY DE PA0ZZZ TKS RPRT JOHN STN 100 W ANT 3 EL YAGI AT 18M WX RAIN PSE QSL MY QSL VIA BUREAU 73 AND CUL G6YYY DE PA0ZZZ K

PA0ZZZ DE G6YYY ALL OK BOB QSL VIA BUREAU 73 AND TKS QSO PA0ZZZ DE G6YYY SK

73 G6YYY DE PA0ZZZ SK

## II.10.1.4. Nominal transmit frequency on RTTY (1)

- Two definitions were made long time ago:
  - The frequency of the mark signal determines the nominal frequency of an RTTY signal.
  - The mark signal must always be transmitted on the highest frequency.
- If we listen to an RTTY signal, how can we tell which of the 2 tones is the mark signal? If you receive the signal on USB (upper sideband), the mark signal is the signal that has the higher audio tone. In LSB it is, obviously, the other way around.
- RTTY usually employs one of three methods to be generated in a transmitter:

1. FSK (Frequency Shift Keying): the carrier is shifted according to modulation (mark or space). RTTY is actually FM.
   - All modern transceivers have an FSK position on the mode selector switch. These transceivers all indicate the correct frequency on the digital display (being the mark frequency) provided that the modulating signal (the Baudot code) is of the correct polarity.
   - You can usually invert the logic polarity either in your RTTY program or on your transceiver, or both (positions *normal* and *reverse*). If not set correctly, you will be transmitting *upside down.*
2. AFSK (Audio Frequency Shift Keying): in this method the Baudot code modulates a generator which produces two audio tones, one for mark and one for space.
   - These audio tones must fall within the audio passband of the transmitter. Modern RTTY programs on a PC generate these two tones using the soundcard.
   - These tones serve to modulate the transmitter in SSB.

## II.10.1.4. Nominal transmit frequency on RTTY (2)

a) On USB: in this method the transmitter, in upper sideband position, is modulated by the AFSK audio tones.
   - Assume you transmit on 14090 kHz (zero beat frequency or suppressed carrier frequency on SSB).
   - If you modulate your transmitter with two audio tones being e.g. 2295 Hz for mark and 2125 Hz for space, the mark signal will be transmitted on 14092.295 kHz and the space signal on 14092.125 kHz. This agrees with the definition given above (mark → highest frequency).
   - Watch out, your transmitter will indicate 14090 kHz on its dial! In other words, if properly modulated (tones not inverted) and when using 2125 Hz (space) and 2295 Hz (mark) as modulation tones, you simply add 2295 Hz to the SSB dial reading (the nominal SSB frequency) of your transceiver to obtain the nominal RTTY frequency.

b) On LSB: same as above but transmitted in LSB. Here the two transmitted frequencies will be below the suppressed carrier frequency.
   - If we use the same frequencies for the mark and space tones as for USB (mark = 2295 Hz and space = 2125 Hz), the mark signal will now be on 14090 – 2.295 = 14087.705 kHz and the space signal on 14087.875 kHz.
   - This does not meet the definition that the mark signal always is the signal with the highest frequency.
   - Therefore we have to invert the modulating audio tones on LSB. Note that here too the transmitter dial will indicate 14.090 kHz! In this case (now 2125 Hz is the mark frequency and 2295 Hz the space frequency) we shall subtract the frequency of the mark tone from the nominal SSB frequency (shown on the dial of the transceiver) to obtain the nominal RTTY frequency. Using the same example: 14090 – 2.125 = 14087.875 kHz.

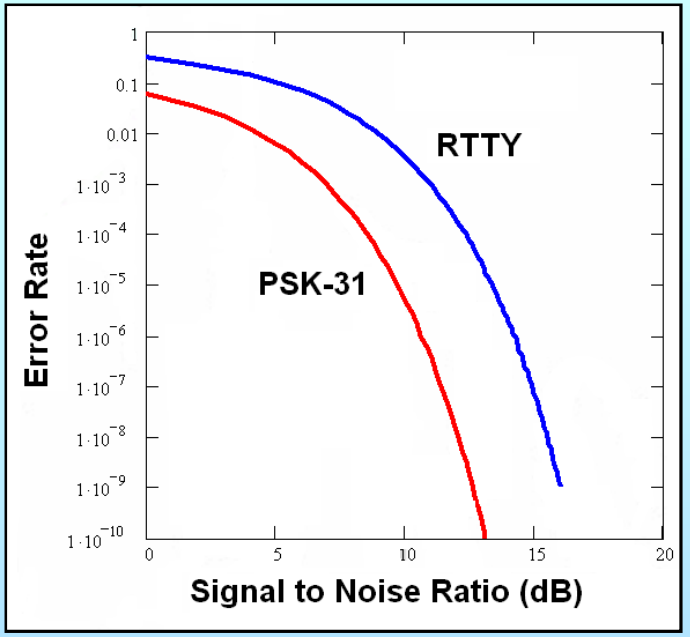
## II.10.1.4. Nominal transmit frequency on RTTY (3)

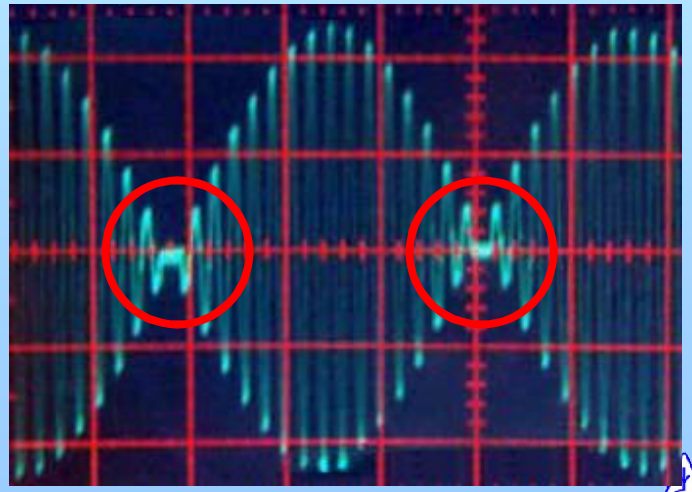
- Why is it so important to know the correct nominal frequency?
  - Assuming you'd like to spot an RTTY station on a DX Cluster, it is better to give the correct frequency and not something that may be a couple of kHz off.
  - Another reason is the need to stay within the frequency ranges of the IARU Band Plan for RTTY. Example: according to the Band Plan 14099-14101 is reserved for beacons (e.g. the NCDXF beacon network). This means that if you use AFSK with 2125 (space) and 2295 Hz (mark) as modulating tones in USB, you should never transmit with a dial reading on your transmitter higher than 14099.000 – 2.295 = 14096.705 kHz. Taking into account the effect of the sidebands, it is safe to round off this figure to 14096.5 kHz.
- Why do we use such high audio frequencies (2125 and 2295 Hz) for the AFSK generator?
  - To achieve extra attenuation of any harmonics of these audio signals, by having all harmonics fall outside the SSB filter passband.
- If at all possible, use your transmitter in FSK rather than AFSK to generate RTTY signals. In most cases the quality of signals generated in FSK is far superior.

## II.10.2. PSK31

### II.10.2.1. What is PSK31?

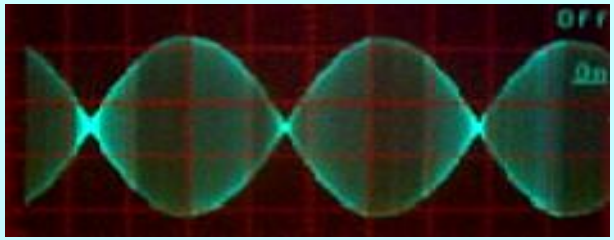
- PSK= Phase Shift Keying.
- Is a digital mode for keyboard to keyboard QSOs.
- Transmission speed: 31,25 Bd (45 Bd voor RTTY).
- Theoretical bandwidth: 31 Hz at -6 dB (in practice approx. 80 Hz, re. carrier noise etc.) .
- No error correcting mechanism.
- Almost error free if signal to noise ratio > 10 dB, in case of S/N < 10 dB the error rate is about 5 times better than with RTTY.
- PSK31 uses a varicode :
  - the letter 'q' is coded using 9 bits '110111111'.
  - The letter 'e' with only 2 bits '11'.
  - On average a character contains 6.15 bits.
  - Most lowercase PSK31 characters have fewer bits in them than their uppercase equivalents.
  - Uses no start nor stop pulse.
  - Modulation: uses a single audio tone of which the phase is shifted 180 degrees to switch from logical 1 to logical 0.
  - IN ADDTION the single tone is *amplitude modulated* to achieve minimum amplitude at the time of phase switching (in order to minimalize bandwidth).



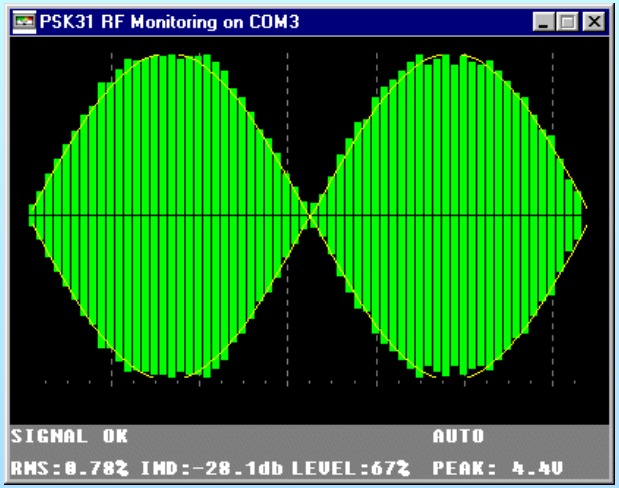
## II.10.2.2. PSK31 frequencies

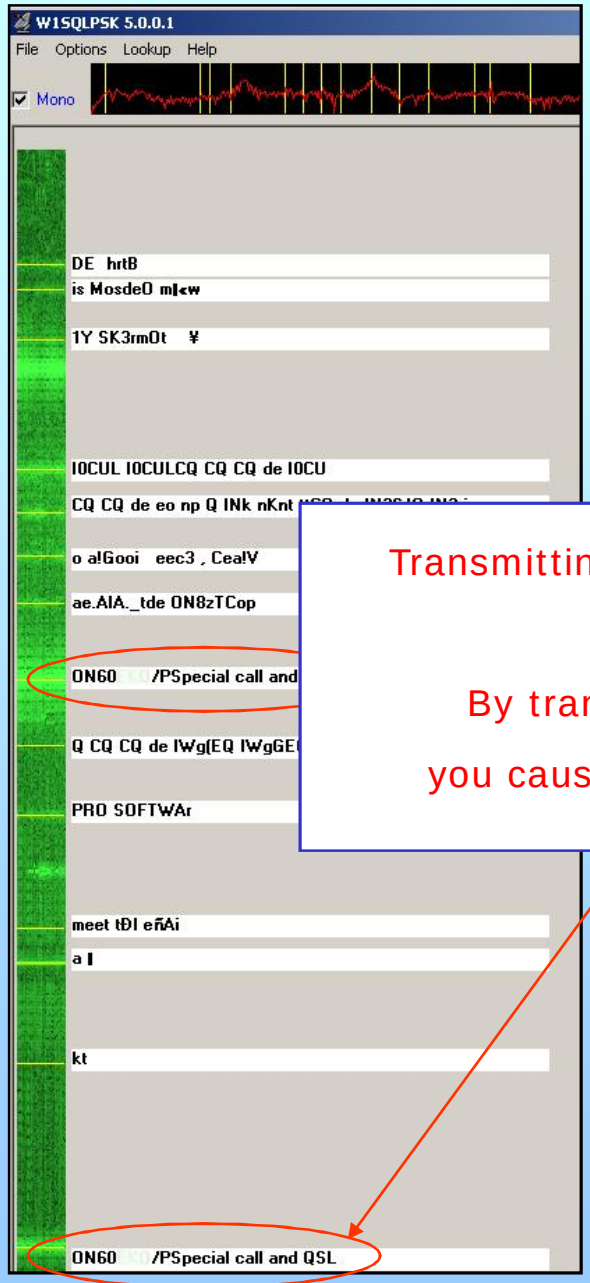
- 160m: 1.838 - 1.840 kHz
- 80m: 3.580 - 3.585 kHz
- 40m: 7.035 - 7.043 kHz (also 7.080 in Region 2)
- 30m: 10.130 - 10.140 kHz
- 20m: 14.070 - 14.075 kHz
- 17m: 18.100 - 18.102 kHz
- 15m: 21.070 - 21.080 kHz
- 12m: 24.920 - 24.925 kHz
- 10m: 28.070 - 28.080 kHz

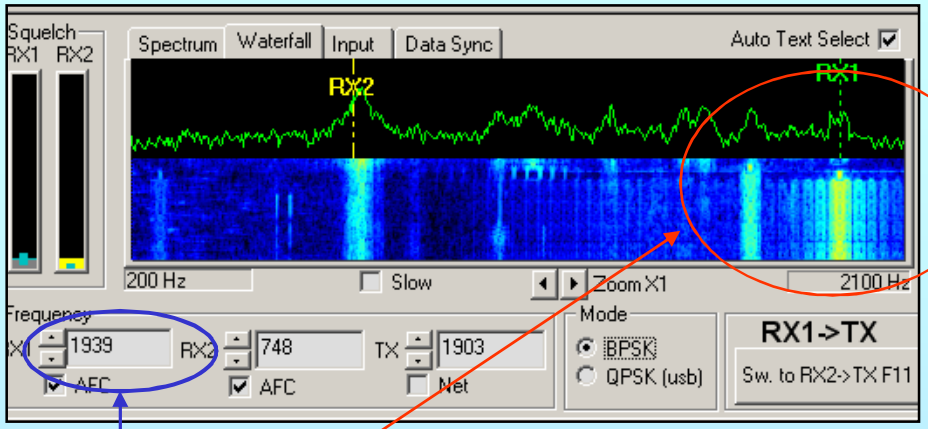


## II.10.2.3. Adjusting the transmitter for PSK31

- Switch off all speech processing/clipping *at all times*.
- Normally USB mode is used.
- Run as little power as necessary to have a solid QSO.
- Make sure you use a reliable system to monitor that you are not overdriving your transmitter.
  - Using an oscilloscope, the waveform of a well adjusted PSK31 signal should resemble the waveform of a two-tone test, used for measuring PEP power in SSB.
  - Use dedicated test equipment for monitoring the intermodulation of your transmitted signal (e.g. the PSKMETER by KF6VSG or the IMD-meter by KK7UQ).
- When running 100 W PEP, the power meter of the transmitter will indicate 50 W, provided the transmitter is not overmodulated.
- A 100 W transmitter can be run at 100 W PEP (not average!) for long periods of time (the wattmeter indicating 50 W). The *duty cycle* is 50%.




Heavily overmodulated PSK31 signal

Transmitting a clean PSK signal of minimal bandwidth

is a question of ethics

By transmitting an overmodulated PSK signal

you cause interference to other users of the band

d (harmonics of signal!)

ware, multiple

- better S/N ratio (less noise in narrow bandwidth)
- no gain reduction by AGC action on strongest signal in window

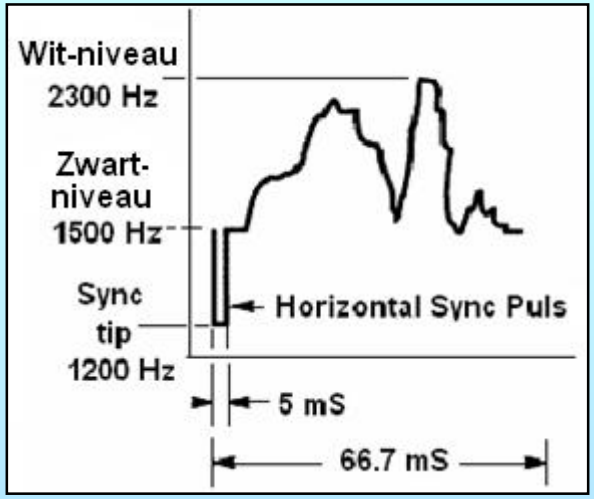
Nominal frequency in PSK31

- Add the frequency of the audio signal to the VFO frequency (if using USB). Subtract if using LSB.

## II.10.3. SLOW SCAN TV (SSTV)

### II.10.3.1. What is SSTV?

- SSTV is NOT a digital mode.
- It is narrow band TV → bandwidth < 2.7 kHz.
- A single image takes up to several minutes to transmit.
- Modulation in FM, frequency of modulating tone is function of the brightness of the picture spot considered.
- Black = 1500 Hz, white = 2300 Hz.
- Color pictures: information per color component.
- There are > 20 different SSTV-protocols.
- Typical SSTV setup uses a PC + sound card and a dedicated SSTV program.
- duty cycle: 100 % like in RTTY (carrier is always transmitted at full power)




### II.10.3.2. SSTV frequencies

- 80m: 3.735 +/- 5 kHz in LSB
- 40m: 7.035 – 7050 kHz in LSB
- 30m: only CW and narrow bandwidth modes
- 20m: 14.220 -14.235 kHz in USB
- 17m: very little SSTV (narrow band)
- 15m: 21.330 - 21.346 kHz in USB
- 12 m: very little SSTV (narrow band)
- 10m: 28.670 - 28.690 kHz in USB

## II.10.3.3. Operating SSTV

- Which images to transmit?

  To stay within the limits of the rules and good behavior, we should only transmit images related to our hobby (test pictures, schematics, sketches, as well as pictures of equipment, the station, the operator, the antennas, etc.) or very neutral pictures (landscapes, flowers, QSL card).

- A few operational hints
  - Prior to making any CQ call, listen for a while to make sure the frequency you intend to use is clear.
  - Next, ask a few times "Is this frequency in use?", if no reply make your CQ call.
  - It's a good idea always to precede pictures with a phone CQ ("CQ SSTV, this is...").
  - Always announce the mode (protocol) of transmission before sending a picture.
  - Do not break in on a QSO by sending a picture. Use SSB to do so.
  - Never send a picture to another station without his invitation or OK to do so.
  - Never transmit a series of pictures one after the other without any reasonable pause. The object of SSTV is to make a QSO and not to put on a slide show.
  - Always ask the station you want to work if he is ready to copy your picture.
  - DX stations often work from a list, which they have taken previously on the frequency.
  - It is nice to show both your call and the call of the station you contact on the image you transmit,
  - Try to use images with plenty of contrast, and if text is part of it, show it in large, bold letters.

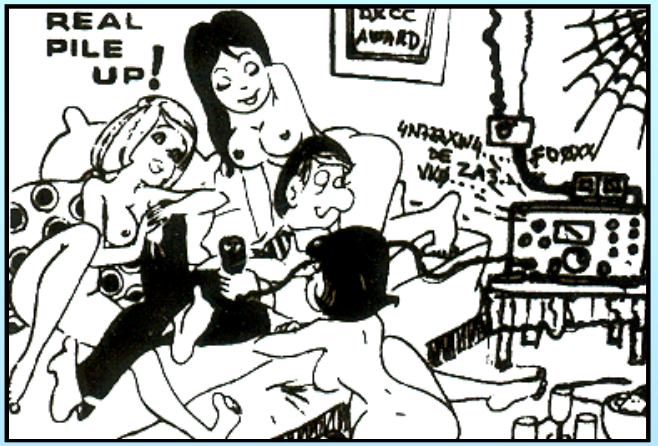
## II.10.3.4. The RSV report

In SSTV we do not exchange an RS report (phone) nor an RST report (CW), but an RSV report where V stands for Video and reports the Image Quality. R and S stand for Readability and Strength.

| | |
|---|---|
| V = 1 | heavy QRM and image deformation, parts of image indiscernible |
| V = 2 | heavily distorted image, callsign barely readable |
| V = 3 | average quality image |
| V = 4 | good image, little deformation, little interference |
| V = 5 | perfect image |

# III. ADVANCED OPERATING

## III.1. PILEUPS




CT1BOH (one of the best contest operators in the world) wrote:

*'There is a price to be paid when a DX operator runs a pileup.*

That price is QRM and is totally dependent on the DX pileup operator skill.

The better the skills of the pileup DX operator the cheaper will be the price he has to pay for his show.

At the same time the better the skills of the DX pileup operator the better the pileup will behave because everybody will try to mimic him in admiration of his skills.

*There is a price to be paid when a DXer tries to break through a pileup*.

That price is TIME and is totally dependent on two factors:

The first one is the skills of the DXer. The second one is the skills of the DX pileup operator.

The not so skilled pileup operators DESERVE all the QRM they generate and get. It should be seen as an incentive to improve. .. "

Let's see how we can improve the DXer's operating skills.

## III.1. PILEUPS (2)

- Chances that you get infected by the DX bug are real, if that is not the case yet.
- In that case you will inevitablye b confronted with *pileups.*
- A pileup is a situation where a great number of stations all together call another – usually rare – station.
- Without *rules of behavior,* the rare station will literally disappear under the hordes of stations all calling in an uncontrolled way.
- The net result will be: total chaos.
  - Nobody can work the rare DX station.
  - The DX station gives up and goes QRT...
- There are two sorts of pileups:
  - SIMPLEX pileup
  - SPLIT (frequency) pileup

## III.1.1. Simplex pileup

- Both the DX station and the callers are on one and the same frequency.
- Merit: is space conservative (only one frequency being used).
- Disadvantage: poor QSO rate if many stations are calling simultaneously.
- What is many? Depends on the *expertise* of the DX station.
- What starts as a simplex pileup often evolves into a split pileup.

## III.1.2. Split (frequency) pileup

- Most QSOs are made when both stations transmit on exactly the same frequency (simplex).
- When the DX station is confronted by an ever growing simplex pileup, the QSO rate will decrease for one or more of the following reasons:
  - interference from stations calling one on top of the other;
  - the callers will have difficulty copying the DX station because some (many) of them call while the DX station is transmitting;
  - more and more stations don t hear or do not follow the instructions given by the DX station.
- In order to be heard by the callers, the DX station operator will *move* the pileup: he will listen on a frequency away from his transmit frequency (often 5 kHz or more).
- The net result is that the calling stations no longer interfere with the DX station s transmissions, as they are now transmitting on separate frequencies.
- The problem however remains that the DX station still has to listen to the *single frequency* pileup in order to pick out stations one by one.
- To maximize his chances of doing so, he will spread out the pileup and listen over a certain frequency range, e.g. 5 to 10 up .
- This method of course uses more frequency spectrum than strictly necessary. The spread should be kept as small as possible, to leave room for other stations.
- Out of consideration for other spectrum users (other than those wanting to work the DX station) it is recommended only to use the split frequency method if the pileup has grown too large to be handled successfully using the *simplex* method.

## III.1.3. How to behave in a pileup?

### A few basic rules

- Never call the DX station if you cannot copy it well enough.
- Make sure your station is properly adjusted before calling.
- Do not tune your transmitter on the frequency where the DX station is transmitting.
- Is the antenna in the right direction?
- Have you heard the instructions of the DX station? If not, wait and listen for instructions first!
- Listen first...
- Listen some more...
- Listen and get acquainted with the operating rhythm of the DX station.
- If you hear frustrated hams making comments on the DX station's frequency: keep quiet and wait until the chaos has subsided.

Only if all these requirements are met, can you call the DX station!

How?

## III.1.4. Simplex pileup in phone (1)

How do you *break* through a simplex pileup?

- Never call before an ongoing QSO is completely finished. This means: no tail-ending.
- Correct timing is the *key to success*.
  - Do not start calling immediately, rather wait until most of the havoc on frequency has died down somewhat and chances of getting through are increased.
  - This is not a competition where you need to be the first and fastest caller! What is important is to call at the right moment.
  - Wait a number of seconds until the most excited callers have stopped calling and the QRM has died down somewhat, before giving your call. This may be several seconds (5 to even 7 seconds).
- How should you call?
  - Never give the call of the DX station you are calling; the DX station certainly knows his own call.
  - Send your full call just once.
  - Partial calls are bad. Not ‘zulu zulu zulu’ but ‘george three zulu zulu zulu’. Giving just part of your call creates confusion and lengthens the whole procedure.
- Yes, you will hear many stations giving only part of their call. It is bad practice and it is also illegal.
- Do not speak too fast nor too slowly, act normally (don’t shout).

## III.1.4. Simplex pileup in phone (2)

- For spelling, use only the international spelling alphabet. No fantasies! No *London* but *Lima*, no *Ocean* but *Oscar*, no *Nancy* nor *Norway* but November etc.

| Letter | Phonetic word | Pronunciation | Letter | Phonetic word | Pronunciation |
|---|---|---|---|---|---|
| A | Alpha | **al** fah | N | November | no **vemm** ber |
| B | Bravo | **bra** vo | O | Oscar | **oss** kar |
| C | Charlie | **tchar** li or char li | P | Papa | pah **pah** |
| D | Delta | **del** tha | Q | Quebec | kwe **bek** |
| E | Echo | **ek** o | R | Romeo | **ro** me o |
| F | Foxtrot | **fox** trott | S | Sierra | si **er** rah |
| G | Golf | golf | T | Tango | **tang** go |
| H | Hotel | ho **tell** | U | Uniform | **you** ni form *or* **ou** ni form |
| I | India | **in** di ah | V | Victor | **vik** tor |
| J | Juliette | **djou** li **ett** | W | Whiskey | **ouiss** ki |
| K | Kilo | **ki** lo | X | X-ray | **ekss** re |
| L | Lima | **li** mah | Y | Yankee | **yang** ki |
| M | Mike | **ma** ik | Z | Zulu | **zou** lou |

consonants/sounds in these words and a defined number of syllables. If a syllable gets lost due to static (QRN) or QRM, he can often reconstruct the word by completing the missing consonants and/or number of syllables.

- Only use the correct English pronunciation for the spelling words.
- Of course, when you converse in your native language, which is different from English, you have a little more leeway.

## III.1.4. Simplex pileup in phone (3)

- If the DX station answers: '3ZZZ you're 59, QSL?', this means: *the station with the call ending in 3ZZZ, you are 59, copy?*
- Reply as follows: 'this is _george three, _ george three zulu zulu zulu, 59 QSL?'
- Make sure the DX station has copied your call correctly. If not sure , call again. You want to hear him say your call correctly!
- If the DX stations returns for you but with an error in your call, repeat a few times that part of your call where the error occurred. Example: he says 'G3ZZW 59'. Go back to him with: 'this is G3ZZZ zulu zulu zulu G3ZZZ 59 over'. Normally he will then answer 'G3ZZZ thanks'.
- If he comes back for another station: keep quiet, refrain from calling, wait and listen.
- If you keep calling, one of the following things may happen:
  - the DX station notices you are not following his instructions and you end up on his black list;
  - alternatively the DX station may call you and give you a RS '00' report, by which you have been identified as an *offender* and displayed as such.
- If you keep calling out of turn while the DX station is trying to work another station, you are only causing QRM to that station, and you are slowing down the whole process.
- Are you sure you know what the DX station wants?
  - Is he calling for a particular region or continent?
  - Is he maybe working *by numbers* (the number in the callsign)?
  - Unless your callsign fits his instructions, wait, keep quiet and listen!
- Are you a QRP station?
  - Don't call with '/QRP' added to your call: it's illegal in most countries, and it is difficult enough as it is for the DX station to copy your call without the extra letters! Keep it simple.
- If the DX station comes back to you with 'G3ZZZ 59', just answer 'thanks 59 also' or 'also 59 thanks'.

## III.1.5. Simplex pileup in CW (1)

- The same general rules of conduct apply as for SSB.
- Never call as follows: "DE DL9ZZZ"
  - "DE" is just a waste and can only cause confusion. He wants to hear calls, nothing else.
- Never end your call with a "K" at the end (K as invitation to send).
  - This can cause confusion.
  - If you send "K" after your call (maybe after too short a space), the DX station may think that it is the last letter of your callsign.
  - Do not send anything but your call. He only wants to hear callsigns!
- Determine the most appropriate keying speed:
  - listen to the pileup to determine the sending speed you should use. What's the speed of the stations he works?
  - Don't show off by sending too fast, like we sometimes hear. This is always counter productive.
- In CW, "KN" at the end of a transmission means "over to you only". When the DX station sends: "...W1Z? KN" (or "W1Z KN"), he wants to hear only the station with the callsign containing the characters *W1Z*. All others should stand by.
- If the DX station sends "CQ NA" or "QRZ NA", it means that he is looking for stations from North America only.

  SA = South-America
  AF = Africa
  AS = Asia
  PAC or OC = Oceania (Pacific)
  EU = Europe
  JA = Japan
  USA = United States of America

## III.1.5. Simplex pileup in CW (2)

- The DX station sent an error in your call:
  - Repeat a few times that part of your call where the error occurred.
  - Example:
    he sent: 'G3ZZW 599'
    Answer as follows: 'DE G3ZZZ ZZZ G3ZZZ'.
    Normally he will confirm with: 'G3ZZZ TU'
- If you are a low power station, do not send your call as 'G3ZZZ/QRP'
  - '/QRP' is ballast.
  - Takes extra time to send.
  - Can cause confusion.
  - Increases the chances for errors.
  - Is illegal in most countries.
- If the station comes back for you with a report ('G3ZZZ 599'),answer with a short confirmation plus the report 'TU 599', and nothing more!
  - There are many other stations waiting...

## III.1.6. Split (frequency) pileup in phone (1)

- If too many calling stations → DX station will switch to *'split (frequency) mode'*.
- You want to work a rare station in split. How do you go about this?
- The preparatory phase
  - Start by listening. First listen to the DX station and make sure you have copied *yourself* his instructions: where is he listening (the range), and who is he listening for (everybody, a particular continent or by numbers).
  - Once you have all of that, keep listening to his frequency with one ear, but focus on what's going on in his receive window. If he specifies *'listening 14200 to 14225'*, trying to work him is almost like playing roulette unless you know where exactly he is listening.
  - Therefore, keep listening in the receive window and find out the exact frequency where the stations operate that he works. Most DX stations move slowly up and down in that range. Some just jump around like a kangaroo... In general you will have the best chance to catch the DX station by calling slightly above or under the frequency where he worked his last station.
  - Make sure you get the rhythm and the pattern of the DX station. A good DX station operator uses a fixed QSO pattern. Know the last words he sends before listening (usually either his call or *'thank you'* or *'5 UP'* etc.).
- Time to call
  - Before making any transmission, make sure all controls on your radio are set correctly.
  - Is your transceiver set for *split frequency* work, and is your transmit frequency set correctly?
  - Make sure you do not accidentally transmit on the DX station's frequency! Double check!

## III.1.6. Split (frequency) pileup in phone (2)

- Time to call (ctd)
  - If you found where the DX station made his last QSO, adapt your strategy to his operating pattern and give your call just once and listen.
  - If he did not come back to you within 1 or 2 seconds, call again on the same frequency. Repeat this procedure until you hear the DX station coming back to someone (hopefully you!).
  - If he comes back to another station, do NOT continue calling and immediately listen where in the receive window that station is transmitting.
  - Unfortunately you will always hear stations that keep endlessly throwing in their call even while the DX station is working someone. Some stations do this all the time.
  - By acting like this, these stations cause QRM and make progress much slower than what it could be with a little discipline. They are the proverbial bad examples.
  - Operators who indulge in such procedures quickly make a non-enviable reputation for themselves.
  - Maybe the DX station operator will identify them as poor operators by replying to these offending perpetual callers and giving them an RS 00 'report. Let's hope they understand what that means...

## III.1.7. Split (frequency) pileup in CW

- In general the rules and procedures as explained for split operation in phone and for CW simplex remain applicable.
- How does the DX station indicate it is working split? At the end of each contact it will send e.g.: 'UP', 'DWN', 'UP 5' 'DWN 10', 'QSX 3515', 'UP 10/20'. A simple 'UP' or 'DWN' usually means that the DX station will listen 1 to 2 kHz up or down from its transmit frequency.
- It would be ideal to be able to transmit and listen at the same time, which we can approximate by operating full break-in (also called QSK).
  - In full break-in we can listen between the *DITs* and *DAHs* of our own transmission.
  - This means that we can hear the DX station the same split second he starts transmitting.
  - Not all transmitters (and amplifiers) however are equipped for QSK.
- You can also work semi break-in (*slower break-in*), where the equipment switches from transmit to receive and vice versa between words or even letters. The delay time is usually adjustable to suit one's preference.
- Full break-in is an unmistakable advantage when calling in a split frequency pileup. It can prevent from ever transmitting while the DX station is on the air. After all we want to hear what the DX station is sending, don't we?
- If you operate full or semi break-in, make sure the RF relays in your station are correctly timed so that no hot switching takes place which can cause severe key clicks on the band.

The endless callers.

Yes they exist, and there are many, many of them. They just want to work the new rare one, whatever means it takes.

They do not have the slightest consideration for other stations. They transmit their call just like a broadcast station, and hardly listen at all.

Often one can hear the DX station coming back to them, two or three times, but to no avail. They don t hear the DX station because they (almost) never listen, and maybe because they have a typical *alligator* station.

Calling the DX station seems to be their hobby, not working the DX. All of this would not be so bad and sad if, by this shameful practice, they did not cause a lot of QRM to other stations.

What they do is pure and simple 'intentional jamming.'

This endless calling is an ultimate proof of egoistic behavior; shame on those who practice it.

## III.2. TAIL ENDING

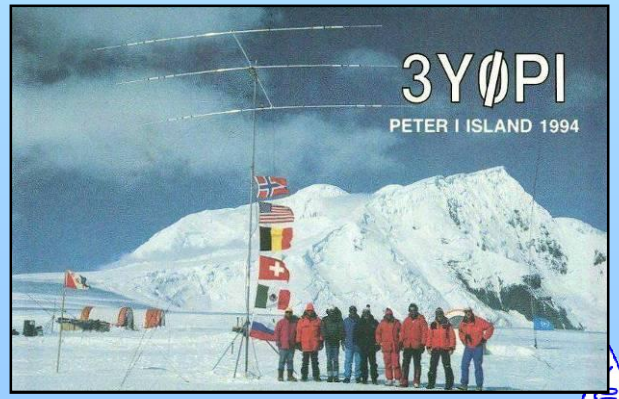
- What is tail ending? A tail ender tries to outrun the competition by being *faster than his shadow*. He is listening to the station being worked by the DX station, and a split second before that station turns it over to the DX station, he throws in his call, usually half on top of that station... He is literally *stepping on its tail.*
- Strictly speaking, tail ending is even illegal as you are intentionally transmitting on top of another station, and hence causing interference to that station.
- In many cases it's not only the tail they step on, but more or less the entire beast...
- This operating procedure is not very polite and rather aggressive. The consensus is: don't do it.


# DXpeditions

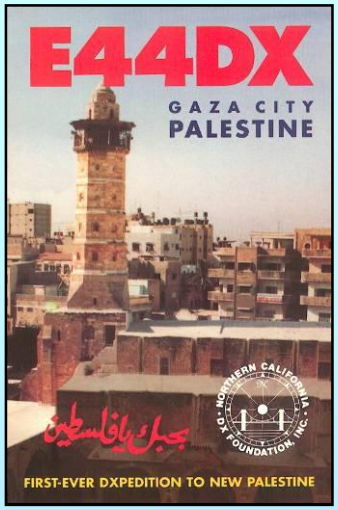
## III.3. DXPEDITIONS (1)

- Many hams chase DX stations or chase *rare countries* or *entities* with hardly any ham population or any population at all. At present there are approx. 340 such entities. Many try to contact these *new countries* on different bands and in different modes.
- Entity: definition given by DXCC (DX Century Club).
- DXpeditions
  - Expeditions to *rare* entities.
  - Larger (important) DXpeditions:
    - organized by a group of hams;
    - active day and night on all bands / modes;
    - often for weeks on stretch;
    - sometimes make > 100.000 QSO's in a few weeks time.
- Active and planned DXpeditions: see internet (e.g. NG3K).
- During important DXpeditions it can be very crowded in certain portions of the ham bands.
- We should take into consideration other users of the bands (not everyone is a DX chaser).
- Contacts with DXpeditions are usually as brief as contest QSOs.
- Normally all contacts are made in split mode.
- In split mode often a relatively wide listening window is used (e.g. 14200 to 14225 kHz).
- The quality and the expertise of DXpedition operators are often judged by the amount of spectrum they require to work a split pileup.

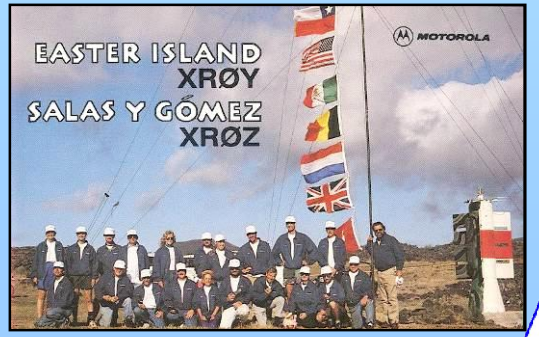




## III.3. DXPEDITIONS (2)

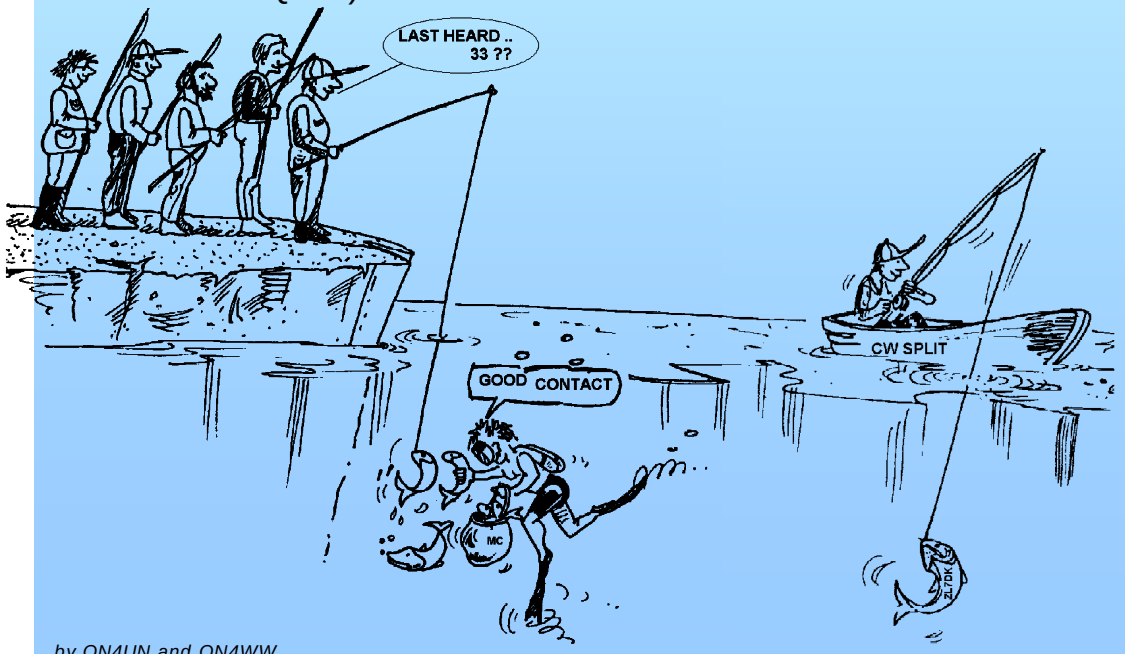



- The frequency police problem during DXpeditions: if you want these cops to go away and stop interfering, simply ignore them.
- Never feel tempted to play frequency cop yourself. Later more on this subject.
- Others, mainly frustrated minds, seem to enjoy making deliberate interference to such expeditions (re. the well known problem on 14195 kHz):
  - if you witness this, do not react, just ignore it, they will go away if they have no audience to interact with;
  - it is sometimes difficult to keep quiet but making comments only worsens the chaos. Just refrain from giving comments.
- Information about the DXpedition:
  - don't ask on the air, just check the Internet.
- Pilot stations:
  - are the public relations managers as well as contact persons for a DXpedition.
  - If you cannot find an answer to your question on the DXpedition's website, address your question or remarks to the pilot station.
- Never ask on the DXpedition's frequency e.g.:
  - QSL MGR? 'or
  - PSE SSB 'or
  - QSY 20M 'etc.
  - Better yet, *don't ever transmit on their frequency* (assuming we're talking split frequency operation)!

## III.4. DX NETS

- Pre-Internet days: DX nets were mainly *DX information* nets, operating on different bands at given times of the day. In later days these were first replaced by systems via Packet Radio, and later via the Internet.
- Nowadays DX nets are places where one can work DX with assistance:
  - a *net control* station (or *MC*, *Master of Ceremony*) calls for stations wanting to work a DX station who's waiting on the net's frequency. Many DX nets exist mainly to boost the ego of the MC.
  - The MC will request stations to check in with only the last two letters of their callsign, which is an illegal way of identifying in most countries.
  - The MC makes a list of those callers. When the list is compiled, he will feed the stations one by one to the DX station.
  - If a QSO is not succeeding immediately, the MC will be glad to assist (or even make half of the QSO )...




- All of this has little to do with the real sport of DXing! Both serious DXers as well as experienced DX stations will stay away from such DX nets if at all possible.
- What is the satisfaction one can obtain from a *QSO* 'made under such circumstances?
- By participating in similar DX nets one does not become a better DXer!

- Enjoy real DXing on your own, using your own means!

## III.5. USING PARTIAL CALLS

Example:

The MC says: 'stations for ZK1DX, check in please.'

- OH9ZZZ gives his (full) call: 'OH9ZZZ.'
- If later in the procedure the MC calls OH9ZZZ, he simply says 'station with ZZ at the end of the call, make your call.'
- OH9ZZZ now calls the DX station: this is OH9ZZZ, oscar hotel nine zulu zulu zulu calling ZK1DX, you are 55 over.'
- etc.

It could not be simpler, and every step in this procedure is legal.

- In addition to being illegal it is inefficient. Why?
  - Some simple mathematics will tell you: assume your call has 6 characters. If you only send 2 letters, the chance that at least part of your call will be copied is 3 times smaller than if you had given all 6 characters.
  - Your call is unique; two letters from your call are far from unique. This means that this procedure will often lead to confusion (several stations with those 2 letters calling simultaneously).
  - If the DX station copied your two letters (hopefully you're the only one using those 2 letters to call) he will still have to ask for the rest of your call. It is a pure waste of time. If he could copy two letters, there's a good chance he could have copied all 6 characters! All of this takes time, creates confusion and increases the chances of QRM.
- Conclusion: never send just a part of your call. Are you ashamed of your call? Always send your full call, be proud of it! If, under whatever circumstances, someone asks you to identify by 2 letters of your call, identify by your full call and perhaps tell him you cannot do what he asks because it is illegal.

## III.6. DX-CLUSTERS

These replace the DX information nets from yesteryear.

```
14190.0  LZ1QI        19-Aug-2007 2157Z  59                              <WB2JSM>
 7007.1  4X4FC        19-Aug-2007 2157Z                                    <NR1R>
28133.0  G4DBL        19-Aug-2007 2157Z  CQ JT6m 1st beaming SW          <G4DBL>
14009.4  W0WP         19-Aug-2007 2156Z  Tom on freq                     <SP2LNW>
 7002.0  JW/DL3KR     19-Aug-2007 2156Z  WKD SIMPLEX NOW CLG CQ .. FE <G3PHO>
14183.0  ER1QQ14183   19-Aug-2007 2156Z  Boris 59+ Fl                    <N4DMD>
14023.9  F5NOD        19-Aug-2007 2156Z                                   <N2CU>
 7088.0  SV9CVY       19-Aug-2007 2157Z  cq dx strong                    <PY5EW>
14183.0  ER1QQ        19-Aug-2007 2154Z                                  <HP1AC>
28133.0  UT5UB        19-Aug-2007 2154Z  IO91JH<ES>KO50 band still op <G4DBL>
14258.0  YV1RDX       19-Aug-2007 2155Z  55/59 73                        <DL3WJ>
14258.0  YV1RDX       19-Aug-2007 2153Z                                  <VE3LLL>
14277.0  EA5LC        19-Aug-2007 2153Z                                  <KD4JRX>
 7000.0  W8L          19-Aug-2007 2153Z  NW QRT QSL via K8PT TU ALL      <K8PT>
14325.0  DEAN         19-Aug-2007 2152Z  http://hwn.org                 <KI6CCH>
14212.0  A61A         19-Aug-2007 2151Z                                  <KG2KJ>
14267.5  SV3DCX       19-Aug-2007 2151Z  qrz                            <VE3LLL>
14184.0  ER1QQ        19-Aug-2007 2151Z                                  <N0PKX>
14205.0  LU4DJB       19-Aug-2007 2150Z  opr dan cerca baires           <DK6LH>
10102.9  PY1OTO       19-Aug-2007 2150Z                                  <VA3AVP>
14267.0  SV3DCX       19-Aug-2007 2150Z                                  <KD4JRX>
14205.0  LU7DP        19-Aug-2007 2150Z  59                             <LA4GPA>
50230.0  CT1FJC       19-Aug-2007 2150Z  hrd CQ JT6M still ES IO82      <G0CUZ>
 7088.0  SV9CVY       19-Aug-2007 2149Z  efxaristo gia to qso           <PY2DY>
10107.9  VP9/OH1VR    19-Aug-2007 2149Z  up 1                           <OH9PH>
14032.0  ON14CS       19-Aug-2007 2149Z  cq cq                          <OE6HZG>
14018.5  EA1DR        19-Aug-2007 2149Z  CQ CQ                          <K8SIA>
14258.0  YV1RDX       19-Aug-2007 2149Z  59 venezuela                   <ISOYTG>
14167.8  W8VLN        19-Aug-2007 2149Z  mr Larry                       <IK0OZH>
14015.0  3A2MD        19-Aug-2007 2148Z  qsx NA                         <MU0FAL>
```

### III.6.1. Main purpose

- Which are the rare DX stations now active?
- On which frequency?
- It is real-time information.
- It is global information (worldwide network).
- It is bi-directional:
  - Spotting: supply interesting DX information.
  - Using spots that are interesting for you.

### III.6.2. Who do you spot?

- Rare DX stations that are of interest to DX chasers. An example: *14025 ZK1DX QSX UP5.*
- Do not send spots that have no added value. Do not spot *common* stations, e.g. all stations from countries where there is plenty of activity such as W, F, G, ON etc., unless there is a good reason for it that makes your spot valuable. You can e.g. spot W6RJ on 160m from Europe, as we don t work W6 s every day from Europe on 160m.
- Before spotting a DX station, first check if no one else has just spotted that same station.
- Watch out for typos! Wrong calls can sometimes be found in logs because the operator worked a station without ever having heard its callsign, blindly having copied a busted (incorrect) call from the DX Cluster.

## III.6.3. Which information is available, how to retrieve it?

- DX spots
  - Arrive in more or less chronological order.
  - Retrieve by band: example *sh/dx on 20m*, *sh/dx 25 on 20m*
  - By call: *sh/dx ZK1DX*, *sh/dx ZK1DX 20*
  - By combination band/call: *sh/dx ZK1DX 20 on 15m*
- WWV, Solar Flux Index: sh/wwv and *sh/wcy*
- QSL information: *sh/QSL call* or *sh/dx call QSL or sh/dx call via*
  - If these commands do not work, try: *sh/dx call 25.* Chances are great that one of these 25 spots will carry the QSL infoormation.
- Never spot a station begging for info in the commentary field (e.g. *QSL info please ).*
- If you need QSL info look it up on the Internet using one of the search engines (e.g. Google).

## III.6.4. A spot appears: a new country for you. What now?

- Do not start calling the DX station blindly.
- Make sure you copy the station well enough.
- Verify if the spotted callsign is correct.
- Before calling, make sure you have heard the DX station's instructions:
  - his listening frequency;
  - is he working *everybody* or working by numbers or by geographical areas?
- Apply the guidelines as explained under SPLIT PILEUP.

## III.6.5. Things not to do on a DX Cluster (1)

- Self spotting
  - *'Here I am, on this frequency, please call me'...*
  - If you want to make QSOs, call CQ or anwer stations that call CQ.
  - Self spotting results in disqualification in contests.
- Disguised self spotting
  - After a QSO with a DX station (on a frequency you called CQ on), you spot that station (which left the frequency).
  - DX hunters come to the frequency and only find you, calling CQ. Don't do it. They don't appreciate it.
- Bragging
  - A spot is not for telling the world how great you are: don't spot a DX station (that's been spotted several times anyhow) with a remark: *Bingo, I finally did I....* Modesty is a nice virtue...
- Friend spotting
  - Your local friend is calling CQ without reply. You want to give him a little push and you spot him. Neither your friend nor you will gain respect in the eyes of the ham community by doing so.
- Asking a friend to spot you
  - You know it's unethical to do self spotting, and you ask a friend to spot you...
- Being a *cheerleader*
  - Repeatedly spot the same (your favorite) station during a contest. Unfair and unsportsmanlike.
- Send a spot which actually is a private message
  - We need to realize that each spot, each message on a DX Cluster is sent to many thousand of hams all around the world.
  - Unfortunately many spots are simply private messages which do not belong on a DX Cluster.
  - An example: UA0--- spots: *ZL2--- on 3505* with as remark *'tr 339, is my report 449? PSE CFM... '*
  - Another one: HA7--- spots *VK3IO on 1827* with as remark *'QRV??? '*

## III.6.5. Things not to do on a DX Cluster (2)

- Use the DX Cluster as a worldwide chat channel
  - TALK function: send a private message to another ham connected to *your* DX Cluster.

    Nowadays often possible to hams on another DX Cluster. These functions can be freely used.
  - ANNOUNCE FULL (*To All*): such message is received by ALL stations on the worldwide network
    - Use this function only to make announcements containing valuable information for the majority of DXers on the DX Cluster.

      Example: you can announce that a DXpedition has changed bands, or has annouced to be on this or that band at such and such time.
    - However: often used for private messages. Examples (non fictive!):
      - a *To all* message from *ON7---: 'ON4--, good morning Frans !'*
      - Another one from DF0--: *'wir warten auf 3714 !'*..
      - ... there are many hundreds of such messages pushed down our throat every day...
  - Never use the *TO ALL* function to chat!
    - Doing this is guaranteed to make your reputation!
    - Never use this function to settle an argument or insult someone. The world is watching you!
- Using someone else's callsign on the DX Cluster
  - It appears that some disturbed minds check into a DX Cluster with other people's callsign, and do totally unacceptable things.
  - This is even worse than anonymous transmissions, as in addition the call of an ignorant ham is being defamed.
  - Never react on the DX Cluster if you are confronted with a similar situation.

## III.7. DX WINDOWS

- The IARU Band Plan is a worldwide accepted *gentlemen's agreement* to which 99 % of the radio amateurs adhere.
- This Band Plan lists a couple of formal DX windows, where it has been agreed upon to give full priority to long distance work (DX contacts).

### III.7.1. On the HF bands (1)

- Presently there are three such windows in IARU R1 (Europe, Africa, Middle East):
  - 3.500-3.510 kHz (CW): only for intercontinental QSOs.
  - 3.775-3.800 kHz (phone): only for intercontinental QSOs.
  - 14.190-14.200 kHz (SSB): priority for use by DXpeditions.
- DX windows on 80m
  - In the middle of the day: in principle no DX propagation.
  - But: after sunrise and before sunset propagation is possible to areas 1000-2000km away in the direction of the terminator
  - Hence: in winter time (November – March) keep the DX windows clear from local traffic, also during day time.
  - In general: stay out of the DX windows unless you are working DX stations.
- The 20m DXpedition window
  - Created in 2005, as a result of a continuous problem caused by an IT9 station.

## III.7.1. On the HF bands (2)

In addition to these *formal* windows, there are a number of *de facto* DX windows.

- On SSB: 28490-28500, 21290-21300, 18145, 14190-14200, 7045 and 1845 kHz
- On CW: first 5 kHz of most bands, also: 28020-28025, 24895, 21020-21025, 18075, 14020-14025, and 1830-1835 kHz
- In RTTY: ± 28080, ±21080 and ±14080 kHz
- Avoid making local contacts in those windows. These are the frequency ranges where you can look for interesting DX stations.

## III.7.2. On the VHF-UHF bands

- See the IARU Band Plan.

## III.8. SPECIFIC OPERATIONAL PROCEDURES FOR VHF AND HIGHER

- These are based on the same principles that apply to the HF bands.
- For QSOs via tropospheric propagation (local, or via temperature inversion) on the 50, 144 and 430 MHz bands, the procedures are exactly the same as on HF. The only difference is that often calling frequencies are used to initiate a contact. Once a contact is established, the stations will move to another frequency.
- QTH-locator: on VHF and higher, station locations are usually specified by using the QTH-locator, also called Maidenhead locator. The QTH-locator is a set of simplified coordinates (e.g. JO11) which allows the user to quickly judge the direction and the distance to the station he is working.
- There are specific operational procedures applicable to some very specific modes, mostly used on VHF and higher, such as:
  - Contacts via satellite.
  - EME QSOs (reflection via the moon).
  - Meteor scatter QSOs.
  - Aurora QSOs: reflection near the poles during Aurora.
  - ATV (wideband amateur television).
- It is outside the scope of this manual to enter into detail on these subjects. In all cases, operational behavior remains based on the principles as explained before.

## III.9. CONFLICT SITUATIONS

- The fact that all hams *play* their hobby on one and the same field, the ether, will inevitably sometimes lead to conflicts. How do we handle these, that is the question!
- Our behavior on the bands should be based on:
  - common sense
  - good manners
  - mutual respect
- *Rule # 1: never do or say what you would not want your best friend or anyone else in the world to know about*.
- A problem is that radio transmissions can be made anonymously. A person making unidentified transmissions with malicious intentions is not worth being a radio amateur.
- Never ever contemplate jamming the transmissions from another station. As jamming can be done anonymously, it is the utmost expression of cowardliness.
- There simply never is an excuse for such behavior, even if you think that the station deserves to be jammed.
- So, maybe there is a situation which in your opinion needs to be corrected? Perhaps rightfully so, but think twice what will be the added value to our hobby, to YOUR hobby, to your reputation, before you start doing or saying anything.
- Don t start discussions on the air. Chances are that others will join in and in no time what maybe started as a more or less friendly discussion, may degenerate. Keep personal conflicts off the air. Settle your arguments on the telephone, the Internet or better yet, in person.

## III.10. COPS (FREQUENCY POLICE)

- Cops are self appointed would-be *frequency policemen* who think they need to correct other hams making an error, on the air and on the spot.
- Sometimes it is indeed necessary that a *continuous offender* (e.g. someone keeps calling on the transmit frequency of a DX station working split) gets told that he is causing a problem. But there are ways of telling...
- Fact is that those correcting actions often cause more interference than what they are trying to correct!

### III.10.1. Types of *cops*

- Most *cops* have good intentions and are not using foul language. They remain polite and are often successful in their attempt to keep the frequency of a DX station clear.
- Some *cops* also have good intentions but by using bad language and manners they don't achieve their goal to clear a frequency. These *cops* create chaos instead of calm.
- A third category consists of those using foul language with the objective of creating chaos. Their bad language and manners attract comments from colleague *cops*, with a resulting total chaos!
- Do not react if you hear one of those would-be cops in action. Keep your distance and ignore them completely. This is the only way to make them stop.

### III.10.2. What makes the cops appear?

- *Cops* mostly appear on a rare DX station/DXpedition's frequency, usually when this station is working in split mode.
- The trigger for their appearance is when an operator forgets to activate the split function on his transceiver and starts calling the DX station on its transmit frequency. This is the time for *cops* to start shooting/shouting.

## III.10.3. The good sinners ...

- Most operating errors on the bands are made because of ignorance or lack of training.
- No ill intentions involved.
- *Errare humanum est* (to err is human).
  - Even so called *experts* make mistakes.
  - Everyone has on occasion transmitted on the *wrong* VFO...
- The first thing to consider in a situation where someone's error needs to be *corrected,* is how to pass the message.
- When one gets called to order by a cop shouting 'up you idiot', it's difficult not to react verbally.
- Keep quiet though, reacting will always be counterproductive.

## III.10.4. ...and the bad sinners

- Some hams seem to enjoy showing off their very poor operating habits. In this case Perseverare diabolicum (to persist is devilish) applies.
- These are the characters that try to disturb DXers with all means at their disposal. In many cases these are frustrated hams who, due to lack of knowledge and wisdom, are not successful in contacting the DX station, and who vent their frustration on their more successful colleagues.
- Sometimes we witness the most blatant use of vulgarity and obscenities from these characters.
- All they want is to make others react so that chaos erupts on the frequency.
- Some good advice: never react when you witness such an act. If nobody reacts, these characters will go away by lack of an audience.
- Do not react either via the DX Cluster. Rest assured they are watching the DX Clusters as well.

## III.10.5. Do you really want to be another cop?

- When you hear someone making a big or repetitive mistake, remember that you too have made errors in the past, haven't you? Be tolerant and forgiving!
- If you really need to say something (to correct a repetitive error), say it in a friendly and positive way, without insulting or sounding patronizing. If ON9XYZ by error repeatedly transmits on the wrong VFO, say "9XYZ up please", not "up you idiot". The insult brings no added value to the message. It only tells us something about the person making the insult.
- Realize that your intervention may cause more interference than the actual error you try to correct!
- Before playing cop, think twice in which way your act will have a positive added value. If you still think it needs to be done, twist your tongue three times before going ahead.
- Always be polite and constructive.
- If you need to tell someone he's transmitting on the wrong VFO, always add a part of that station's call. How else can he know that your message is addressed to him? Say "9XYZ up please" not just "up please" nor "up up up up".
- If you happen to be the 9xyz station, do not feel too embarrassed, *errare* only *humanum est.* Do not apologize because this will just cause more QRM.
- Don't forget that every cop, by acting as a cop, is doing something illegal: have you heard any frequency cops identifying as required?
- Another thought: *one good cop can be a blessing, two cops are a crowd*.

## III.10.6. How to behave in the middle of a "cop parade"?

- Being a DXer you will quickly grasp that you accomplish more by not reacting to cops at all.
- Try to swing something negative into something positive.
- Keep on listening (here's the magic word again) through the tumult to the DX station and in many cases you will be able to log the DX station while the cops are having a *jolly good time*.

CT1BOH (one of the best contest operators in the world) wrote:

"There is a price to be paid when a DX operator runs a pileup.

That price is QRM and is totally dependent on the DX pileup operator skill.

The better the skills of the pileup DX operator the cheaper will be the price he has to pay for his show.

At the same time the better the skills of the DX pileup operator the better the pileup will behave because everybody will try to mimic him in admiration of his skills.

There is a price to be paid when a DXer tries to break through a pileup.

That price is TIME and is totally dependent on two factors:

The first one is the skills of the DXer. The second one is the skills of the DX pileup operator.

The not so skilled pileup operators DESERVE all the QRM they generate and get. It should be seen as an incentive to improve. .. "

To round off this presentation, let us say a few words about the *skill*, the *know-how* and the *expertise* of the *operators of a rare DX station* (or DXpedition).

## III.11. TIPS FOR DX STATIONS AND DXPEDITION OPERATORS (1)

- Give your callsign after every QSO. If you have a very long call (e.g. SV9/ON4ZZZ/P), give it at least every few QSOs.
- If you work simplex and you cannot sort out the calls well enough (because too many stations call simultaneously on the same frequency), switch to split frequency mode and spread out the callers. Don't forget that, especially on the low bands where signals from far away DX stations can be very weak, you will be totally covered by the calling stations which are easily 50 dB stronger than you. For a rare DX station *split* is the way to operate.
- Before changing to split mode, check if the frequencies you want to use for listening are clear.
- If you work split, mention it after each QSO. For example in CW: "UP 5, UP5/10, QSX 1820" etc. In SSB: "listening 5 up, listening 5 to 10 up, listening on 14237, up 5, down 12", etc.
- In CW split, listen at least 2 kHz above (or below) your transmit frequency, to avoid interference to your signal from key clicks generated by callers. A split of only 1 kHz, as is done regularly, is often not enough.
- In SSB, this should be at least 5, preferably 10 kHz. Some signals of calling stations can be very wide and cause a lot of splatter on your transmit frequency.
- Keep your listening window as narrow as possible to avoid interference to other band users.
- If, as a DX station, you operate split in the 80m DX window (3.5 – 3.51 MHz on CW or 3.775 - 3.8 MHz on phone), listen for the pileup outside the DX window. If you transmit e.g. on 3.795 MHz, listen below 3.775 MHz for the pileup (in CW above 3.52 MHz).
- If on SSB you copied only part of a callsign, reply with that partial call plus a report, e.g. "Yankee Oscar 59". Do not say "Yankee Oscar, again please". Guaranteed this will attract a whole range of Yankee Oscars! If you have added a 59 report, you already made half of the QSO and there will be fewer disorderly callers.

## III.11. TIPS FOR DX STATIONS AND DXPEDITION OPERATORS (2)

- On CW, in a similar case, never send a question mark if you copied a partial call (e.g. 3TA). A question mark will trigger half of the pileup to start calling you. Send "3TA 599", and not: "?3TA 599".
- The following applies to all modes: if at first you copied only a partial call, always repeat the full call once you have it, so the station that called you is sure he worked you and can put you in his log. Example:
  - Assume you first copied a partial: "3TA".
  - Send "3TA 599" (in phone say "3 Tango Alpha 59").
  - He confirms: "TU DE OH OH3TA 599" (in phone: "oscar hotel, oscar hotel three tango alpha you're 59 QSL?").
  - If you send "QSL TU" (in phone: "QSL thank you"), there is no way OH3TA can tell you worked him.
  - Therefore, confirm with: "OH3TA TU" (in phone: "OH3TA thanks").
- Once you returned to a partial call with a report, stick to that station, and do not let him be overpowered by other callers. You're the boss on the frequency, show it. You decide who gets in the log, no one else. The pileup can be quite undisciplined, but often this is due to a lack of authority from the operator of the DX station. If the crowd notices that you stick to the original partial call, and that their out of turn calling is to no avail, they will eventually give up, and show more discipline.
- If you give up on the original partial call and just pick up one of the loud undisciplined callers, you admit the wild callers are in charge of the frequency. Now you're in trouble. In many cases, chaos is a result of the DX operator not showing authority or not living by his own rules.
- If the partial call you originally came back to disappeared, do not just pick up the call of one of the strong undisciplined callers who's been giving you a hard time the last several minutes. Just call CQ again and listen a few kHz higher or lower. Never give the impression you are now calling one of the undisciplined callers. Show them that their undisciplined calling was useless.

## III.11. TIPS FOR DX STATIONS AND DXPEDITION OPERATORS (3)

- Always follow a standard pattern in your transmissions. Example: (you are ZK1DX)

  ZK1DX 5 to 10 up → you hear ON4XYZ calling

  ON4XYZ 59 → you give his report

  QSL ZK1DX 5 to 10 up → you confirm, identify and call again

- If you keep following that same pattern, the pileup will know that when you say '5 to 10 up', you are listening again for new callers. Always maintain this same pattern, the same speed, the same rhythm. This way everyone will know exactly when to call. Should be like clockwork.
- If the pileup remains undisciplined, do not get too excited about it. If the situation does not improve, just move to another mode or band, but let the pileup know.
- Always stay cool, don't start insulting the pileup. All you can and must do is to firmly show the pileup that you are in charge, and that you set the rules. It is important that you emanate authority.
- Do not work so-called two-letter calls. If you hear such stations, tell them you want to hear 'full calls only'.
- If in split mode it appears that many of the calling stations are not copying you well, it is likely that your transmitting frequency suffers from interference. If this situation persists, on SSB try changing your transmit frequency 5 kHz, and tell the pileup about your move. On CW, moving 0.5 kHz will usually suffice.
- On CW, 40 WPM is about the maximum speed to be used during a smoothly ongoing pileup. On the lower HF bands (40-160m) it's better to use a little lower sending speed (20-30 WPM, depending on circumstances).

## III.11. TIPS FOR DX STATIONS AND DXPEDITION OPERATORS (4)

- Inform the pileup abreast of your plans. When you go QRT, tell them. When you need a pit stop, tell them: QRX 5 ' (QRX 5 minutes ', standby ). If you move to another band, inform the crowd.
- If you want to keep the pileup calm and more or less disciplined, and keep your transmit frequency clear, the most effective way of doing so is to keep the callers happy. Let them know what you are doing. Know that (with one or two exceptions) they all want to work you.
- The DX station operator sometimes works *by numbers*. This means that he will only reply to stations having the number he specified in their prefix. Statistically the pileup should then be 10 times thinner!
- Avoid as much as possible working by numbers, it ś not a very good system. If you want to apply this method, apply the following rules:
  - When you workby numbers, go through all numbers at least once. If you go QRT in the middle of a sequence, or start working random numbers all of a sudden in the middle of a numbering sequence, you are going to create commotion.
  - Never forget, when you work by numbers that 90% of the DXers are *idling*, biting their fingernails! They keep a close eye on you and carefully count how many stations you work of each number, and you can be sure some operators will lose control if you do not soon reach *their* number.
  - Always start a sequence with 0, and move up in numbers one by one. No frills. Keep it simple.
  - Do not specify numbers at random: first 0 ś, then 5 ś, then 8 ś, then 1 ś etc... It will drive the pileup mad. If you follow a logical sequence, the pileup can more or less predict when it will be their turn. A random system will make them utterly nervous.

## III.11. TIPS FOR DX STATIONS AND DXPEDITION OPERATORS (5)

- (working by numbers – continued)
  - Work maximum 10 stations of each number. Make sure you work approximately the same total of stations per number. If you manage to work 5 stations a minute, it will still take you 20 minutes to complete the circle. This means some stations will have to wait and sit idle for almost 20 minutes, which is a long time. On average the waiting time is 10 minutes. Don t forget propagation conditions can change a lot in 20 or even 10 minutes!
  - Always tell the pileup how many stations you will work from each number and repeat that information every time you increment the number in the callsign.
- The method of calling by numbers is seldom used on CW.
- A better technique to make the pileup a little thinner is to work by continents or geographical areas. This also gives a better chance to remote regions of the world, where signals are often weak and openings short.
- In this case you will specify a continent, which means you insist that only stations from that area should call you. Example: if you want to work only North American stations, call 'CQ North America ONLY ' or on CW: 'CQ NA '.
- Use this technique primarily to reach those areas of the world that have poor propagation or short openings to you.
- If you use this technique because the pileup is too dense, rotate quickly between the continents or areas. A good rule of thumb is that one should not stay with the same area for longer than 15 to max. 30 minutes.
- Inform the pileup of your plans, tell them exactly how you will rotate between areas, and follow your planning.

## III.11. TIPS FOR DX STATIONS AND DXPEDITION OPERATORS (6)

- Switch back to working all areas/continents as soon as conditions permit.
- Both techniques (by numbers, by areas) should be avoided as much as possible, with one exception, where you look for difficult to reach areas.
- The main problem with these selective methods is that a large majority of hams is sitting idle, and getting nervous. Nervous DXers can easily change into aggressive cops. If you go QRT or change bands just before their number was supposed to come up, rest assured you will be called names on your transmit frequency.
- We have witnessed some DX operators trying to work by country. This must be avoided at all times for obvious reasons: now you have set 99% of the DXers wanting to work you, *on hold*. This way of operating guarantees chaos in no time.
- Watch out when using a preferential treatment for your friends or for stations from your home country. Do it very discretely and make sure it happens *invisibly.* Better yet, don t do it.

## LEGALLY BINDING?

Are all the procedures as outlined in this document legally binding? Most of them are not. A few examples: in most countries one should identify every 5 (in some 10) minutes. This rule exists for the monitoring stations and control authorities to be able to identify transmissions. These 5 minutes are a legal minimum, but good practice and sound customs as well as search for efficiency and good manners, in one word *correct operating practice* tells us to also identify at each QSO, especially if these are short contacts as e.g. during a contest or when working a pileup. These operating procedures must make it possible for the entire amateur radio community to be able to enjoy the hobby in best understanding.

A similar example concerns the IARU Band Plan which has no binding legal character in most countries, but clearly serves at making living together on the crowded bands more enjoyable.

Neglecting the apply the operating procedures as outlined in this document will probably not send you to jail, but it will certainly result in inferior operating practice from your side.

| Letter | Phonetic word | Pronunciation | Letter | Phonetic word | Pronunciation |
|---|---|---|---|---|---|
| A | Alpha | **al** fah | N | November | no **vemm** ber |
| B | Bravo | **bra** vo | O | Oscar | **oss** kar |
| C | Charlie | **tchar** li or char li | P | Papa | pah **pah** |
| D | Delta | **del** tha | Q | Quebec | kwe **bek** |
| E | Echo | **ek** o | R | Romeo | **ro** me o |
| F | Foxtrot | **fox** trott | S | Sierra | si **er** rah |
| G | Golf | golf | T | Tango | **tang** go |
| H | Hotel | ho **tell** | U | Uniform | **you** ni form *or* **ou** ni form |
| I | India | **in** di ah | V | Victor | **vik** tor |
| J | Juliette | **djou** li **ett** | W | Whiskey | **ouiss** ki |
| K | Kilo | **ki** lo | X | X-ray | **ekss** re |
| L | Lima | **li** mah | Y | Yankee | **yang** ki |
| M | Mike | **ma** ik | Z | Zulu | **zou** lou |

| CODE | QUESTION | ANSWER OR MESSAGE |
|---|---|---|
| QRG | What is the exact frequency? | The exact frequency is … |
| QRK | What is the readability of my signals? | The readability of your signals is: 1: bad, 2: Fairly bad, 3: Reasonably good, 4: Good, 5: Excellent. |
| QRL | Are you busy? Is the frequency in use? | I am busy. The frequency is in use. |
| QRM | Are you interfered with? | I am interfered with. 1: I am not at all interfered with, 2: Slightly, 3: Moderately, 4: Strongly, 5: Very strongly. |
| QRN | Are you bothered by atmospherics? | I am bothered by atmospherics. 1, Not at all, 2. Slightly, 3. Moderately, 4. Strongly, 5. Very strongly. |
| QRO | Should I increase power? | Increase your power. |
| QRP | Should I decrease my power? | Decrease your power. |
| QRS | Should I decrease my sending speed? | Decrease your sending speed. |
| QRT | Should I stop my transmission? | Stop your transmission. |
| QRU | Do you have anything for me? | I have nothing for you. |
| QRV | Are you ready? | I am ready. |
| QRX | When will you call me back? | I will call you back at …<br>Also: wait, standby |
| QRZ | Who was calling me? | You are called by … |
| QSA | What is the strength of my signals? | The strength of your signals is: 1. Bad, 2. fairly bad, 3. Reasonably good, 4. Good, 5. Excellent. |
| QSB | Is my signal fading? | Your signal is fading. |
| QSL | Can you confirm reception? | I confirm reception. |
| QSO | Can you make contact with … (me)? | I can make contact with … (you). |
| QSX | Can you listen on …? | Listen on … |
| QSY | Shall I start transmitting on another frequency? | Start transmitting on …<br>Also: change frequency (to …) |
| QTC | Do you have a message for me? | I have a message for you. |
| QTH | What is your location (latitude and longitude or by name of the location)? | My location is … latitude and … longitude or : my location is … |
| QTR | What is the exact time? | The exact time is … |

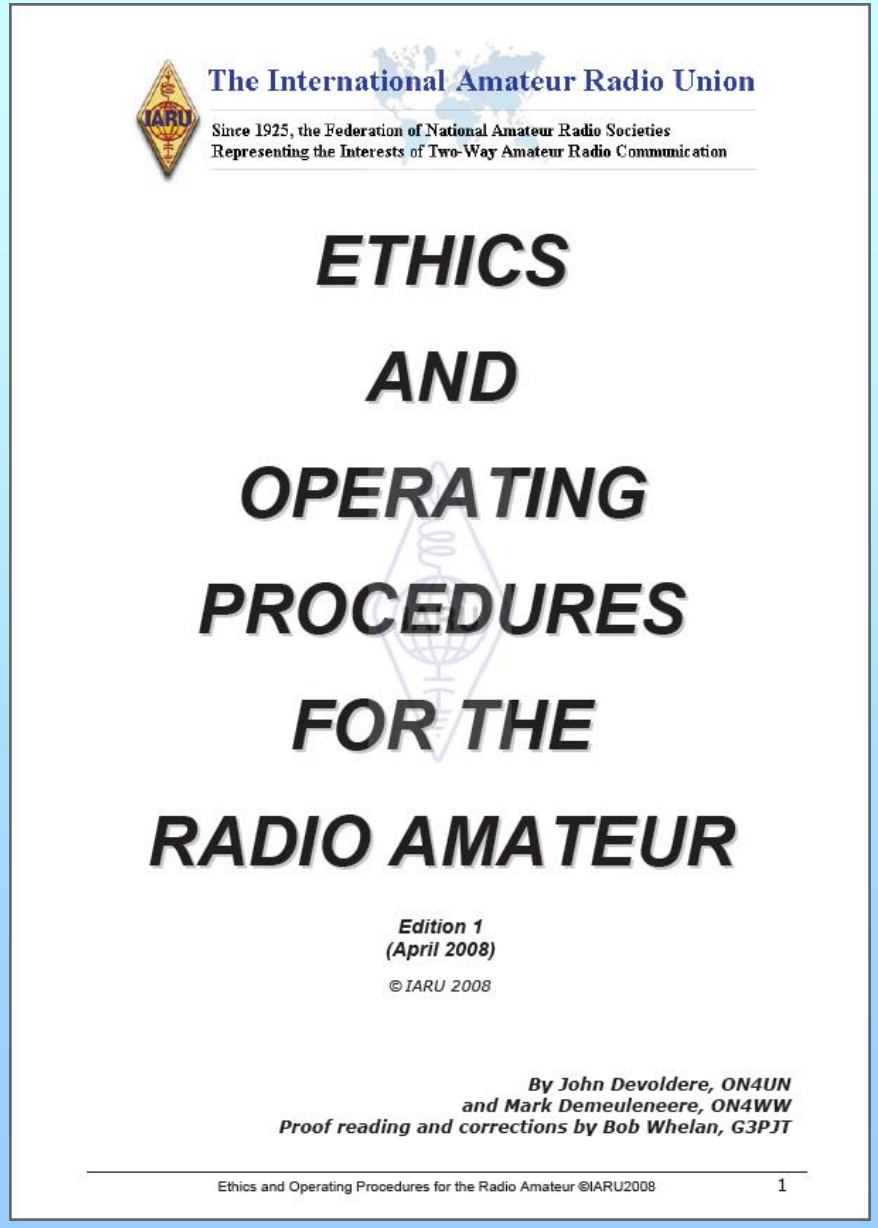
The content of this presentation is also availble in text format as a PDF file.

You can download the PDF file from the IARU website: www.iaru-r1.org .

Feel free to copy and distribute either doicument as you wish. The entire document or part of it can be used for non-commercial purposes, provided you inform the authors and give credit.

By making these documents available with no restrictions and at no cost, the authors ' only goal is to help improve the ethical behavior and the operating procedures on the amateur bands where and if necessary, and to provide accurate en complete training material for the newcomers to our wondeful hobby.

The next few slides show a couple of pages of the text document.



The International Amateur Radio Union

Since 1925, the Federation of National Amateur Radio Societies
Representing the Interests of Two-Way Amateur Radio Communication

# ETHICS AND OPERATING PROCEDURES FOR THE RADIO AMATEUR

*Edition 1*
*(April 2008)*



*By John Devoldere, ON4UN*
*and Mark Demeuleneere, ON4WW*
*Proof reading and corrections by Bob Whelan, G3PJT*

- In addition, many conflicts are handled in a poor way, once again through ignorance.
- This manual is intended to do something about this lack of knowledge, mainly aiming at avoiding conflicts of all sorts.

**I.2.4. The moral authority**

- In most countries the authorities do not care in detail how hams behave on their bands, providing that they operate according to the rules laid down by the authorities.
- The radio amateur community is said to be largely **self policing**, this means **self discipline** has to be the basis of our conduct. It does NOT mean though that the ham community has its **own police services**!

**I.2.5. The code of conduct**

What do we mean by ***code of conduct***? The code of conduct is a set of rules based on principles of **ethics**, as well as **operational considerations**.

- **Ethics:** determine our attitude, our general behavior as radio amateurs. Ethics have to do with morals. Ethics are the principles of morals.
  Example: ethics tell us never willingly to interfere with transmissions from other stations. This is a moral rule. Not living by it is immoral, as is cheating in contests.
- **Practical rules**: to manage all aspects of our behavior there is more than just ethics, there are also a number of rules based on **operational considerations** and on radio amateur **practice and habits**. To avoid conflicts we also need practical rules to guide our behavior on the amateur bands, as making contacts on the bands is one of our principal activities. We are talking very **practical rules** and **guidelines**, governing aspects that are not related to ethics. Most operating procedures (how to make a QSO, how to call, where to operate, what means *QRZ*, how to use the Q code etc.) form part of it. Respect for the procedures guarantees optimal performance and effectiveness in our QSOs and will be a key in avoiding conflicts. These procedures came about as a result of daily practice over many years and as a result of ongoing technological developments.

**I.2.6. This manual**

- The manual is entirely dedicated to the code of conduct of radio amateurs. For the greatest part this code of conduct consists of operational procedures, topped off with the moral principles which are the foundation for our general behavior as explained above.
- Knowledge of the **amateur code of conduct** is as important for hams as the knowledge of the national rules and regulations and the basics of electricity, electronics, antennas, propagation, safety etc.
- This manual aims to make all hams familiar with this code of conduct on the bands, whether they are old timers or newcomers or candidate hams.
- This has never been done so far in such great detail, and the detailed knowledge of this code of conduct has so far not been included in either the study or the exam material for candidate hams. This appears to be one of the reasons why, unfortunately, we hear so many shortcomings and infringements of this code of conduct on our bands.
- Teaching newcomers and testing their knowledge during the radio amateur exams will hopefully make it less necessary to correct situations on the air,



and will make our bands a more attractive place for all of us where cursing, jamming and shouting will soon be only a bad memory.

- Hams make errors regarding these operating procedures mainly because they have never been taught how to behave correctly. They have hardly been trained on this subject. We should not blame them, we should train them!
- This manual covers operating procedures regarding the most used transmission modes (SSB, CW, RTTY and PSK).

## *II. GENERAL OPERATING*

**II.1. HAM LANGUAGE**

- A ***ham*** is a radio amateur.
- Hams address one another exclusively with their first name (or nickname), never with *mister*, *miss* nor *misses* or with a family name. This is also true for written communication between hams.
- The ham etiquette says we greet one another in our writings using *'73'* (not *best 73* nor *many 73*), and not *sincerely* or other similar formal expressions.
- If you used to be a CB operator, erase the CB language from your memory, and learn the amateur radio idioms (jargon, slang) instead. As a member of the amateur radio community you are expected to know the typical amateur radio expressions and idioms, which will help you to become fully accepted by the ham community.
- During your on-the-air contacts, use the **Q code** (attachment 2) **correctly**. Avoid overkill by using the Q code all the time in phone. You can also use standard expressions that everybody understands. Some Q codes have however become standard expressions even in phone, e.g.:

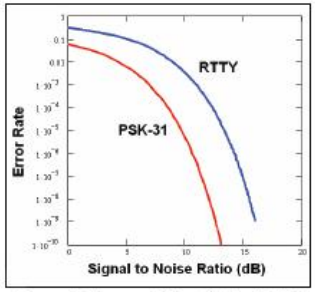
| | |
|---|---|
| **The QRG** | the frequency |
| **QRM** | interference |
| **QRN** | interference from atmospherics (static crashes) |
| **A QRP** | a child |
| **Going QRT** | leave the air, stop transmitting |
| **Being QRV** | being ready, being available |
| **QRX** | just a moment, stand by |
| **QRZ** | who called me? |
| **QSB** | fading |
| **QSL (card)** | the card which confirms a contact |
| **QSL** | I confirm |
| **A QSO** | a contact |
| **QSY** | change frequency |
| **QTH** | the place where your station is located (city, village)///// |

- As well as the small number of Q codes which are commonly used on phone, there are some other *short* expressions that stem from CW (see § II.9.27) and that have become commonplace on phone, such as 73, 88, OM (*old man*), YL (*young lady*), etc.
- Use the one and only **international spelling alphabet** (attachment 1) correctly. Avoid *fantasies* which may sound funny or amusing in your own language, but which won't make your correspondent understand what you are saying... Do not use different spelling words in one and the same sentence. Example: *CQ from ON9UN, oscar november nine uniform*

RTTY signals. In most cases the quality of signals generated in FSK is far superior.

## II.10.2. PSK 31 (Phase Shift Keying)

### II.10.2.1. What is PSK31?




- PSK31 is a digital mode, designed for keyboard-to-keyboard communications via radio. This mode uses the soundcard in your computer to convert your typewritten messages into a modulated audio signal, and to convert received PSK-31 audio signals into text.
- The PSK31 signal, operating at 31.25 bauds (which is ample for hand typed messages), has, theoretically, an extremely narrow bandwidth of 31 Hz at – 6dB (in practice bandwidth is approx. 80 Hz). PSK31 does not include an error correcting algorithm. But for S/N ratios greater than 10 dB, PSK31 is virtually error free. At lower S/N ratio's, PSK31 is approximately 5 times better than RTTY.
- Each of the characters of the Baudot code, used in RTTY, uses a binary code composed of a fixed number of 5 bits, which means that the length of each of those is the same. PSK31 however uses a ***varicode***, which means a code of **variable length**. Example: The letter 'q' is coded by not less than 9 bits ('**110111111**') , while the letter 'e' only contains 2 bits ('**11**'). On average a character contains 6.15 bits. Most lowercase PSK31 characters have fewer bits in them than their upper-case equivalents, so it takes less time to transmit lower-case characters.
- Unlike RTTY, the transmission of PSK31 signals does not use a start or a stop bit. Instead of using two frequencies to transmit the code, as is done in RTTY (using FSK), PSK31 uses a single frequency, of which the phase is changed (by 180°) to transmit logic states 1 and 0.

### II.10.2.2. PSK31 frequencies

The table below does not replace the IARU Band Plan, but gives a picture of the various band segments as they are actually being used in PSK31:

160m: 1.838 - 1.840 kHz
80m: 3.580 - 3.585 kHz
40m: 7.035 - 7.037 kHz (7.080 in Region 2)
30m: 10.130 - 10.140 kHz
20m: 14.070 - 14.075 kHz
17m: 18.100 - 18.102 kHz
15m: 21.070 - 21.080 kHz
12m: 24.920 - 24.925 kHz
10m: 28.070 - 28.080 kHz

### II.10.2.3. Adjusting the transmitter for PSK31

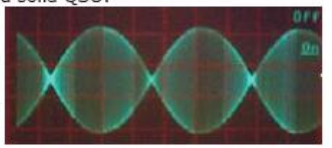
PSK31 is a popular digital mode where excellent results can be obtained using fairly low power and simple antennas. Its intrinsic bandwidth is very small, but it is very easy to overmodulate the transmitter, resulting in a very wide signal.



Therefore it is very important to adjust the equipment correctly.

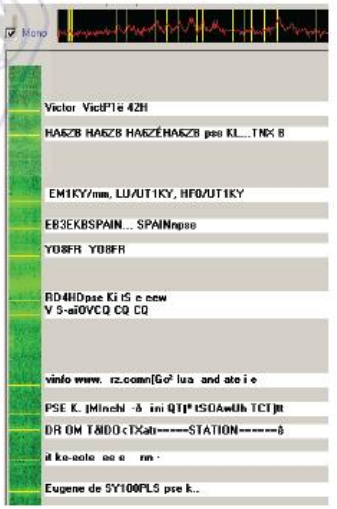
A few guidelines:

- Keep audio processing and/or speech processing switched off *at all times*.
- Set the transceiver in USB mode (LSB is also possible but normally USB is used).
- Run as little power as necessary to have a solid QSO.
- Use an oscilloscope to monitor the waveform of your transmitted signal. The picture shows the waveform of a well adjusted PSK31 signal, which resembles the waveform of a two-tone test, used for measuring PEP power in SSB.




- When running 100W PEP, the power meter of the transmitter will indicate 50 W, provided the transmitter is not overmodulated. A 100 W transmitter can be run at 100 W PEP (not average!) for long periods of time (the wattmeter indicating 50 W). The *duty cycle* is 50%.
- Small dedicated test equipment is now also available for monitoring the quality of the outgoing signal, e.g. the PSKMETER by KF6VSG (www.ssiserver.com/info/pskmeter/) or the IMDmeter by KK7UQ (kk7uq.com/html/imdmeter.html). The use of such equipment or an oscilloscope is highly recommended.

### II.10.2.4. Receiving PSK31 signals




- Some software makes it possible to decode dozens of PSK31 signals simultaneously. With such software you can monitor a whole chunk of the spectrum if you use a relatively wide filter in the receiver (e.g. 2.7 kHz). The waterfall spectrum shows all of the signals in that passband and all of these are being decoded on the screen. This is the ideal way of operating in **monitoring** mode or when you go ***search and pounce*** (hopping back and forth between stations on the band).
- If you want to really dig in the noise or just work stations on one and the same frequency, the narrowest filter in your receiver (e.g. 200 Hz) will give you improved performance (better signal to noise ratio, no reduction of receiver sensitivity due to AGC action triggered by strong adjacent stations within the receive passband, less chance of intermodulation etc.). In this case the waterfall display will only show you one station.

### II.10.2.5. Nominal PSK31 frequency

## III.1. PILEUPS

- Chances are that sooner or later you will be hit by the DX bug, if you have not been yet. In that case you will inevitably be confronted with pileups.

### III.1.1. Simplex pileup

- Both the DX station and the callers are on one and the same frequency.
- The main merit of this method is that it is space conservative (only one frequency being used).
- It is an inefficient method of operating when *many* stations are calling. Depending on the expertise of the DX station, *many* can mean as few as 5 stations. Under such circumstances the QSO rate will be slow.
- What starts as a simplex pileup often evolves into a split pileup.

### III.1.2. Split (frequency) pileup

- Most QSOs are made when both stations transmit on exactly the same frequency.
- When the DX station is confronted by an ever growing simplex pileup, his QSO rate will likely go down for one or more of the following reasons:
  - interference from stations calling one on top of the other;
  - the callers will have difficulty copying the DX station because some (many) of them call while the DX station is transmitting;
  - more and more stations don't hear or do not follow the instructions given by the DX station;
- In order to be heard by the callers, the DX station operator will move the pileup: he will listen on a frequency away from his transmit frequency (often 5 kHz or more). The net result is that the calling stations no longer interfere with the DX station's transmissions, as they are now on separate frequencies.
- The problem however remains that the DX station still has to listen to the *single frequency* pileup in order to pick out stations one by one.
- To maximize his chances of doing so, he will spread out the pileup, and listen over a certain frequency range, e.g. '5 to 10 up'.
- This method of course uses more frequency spectrum than strictly necessary. The spread should be kept as small as possible, to leave room for other stations.
- Out of consideration for other spectrum users (other than those wanting to work the DX station) it is recommended only to use the split frequency method if the pileup has grown too large to be handled successfully using the *simplex* method.

### III.1.3. How to behave in a pileup?

- Never call the DX station if you cannot copy him well enough.
- Make sure your station is properly adjusted before calling.
- Do **not** tune your transmitter on the frequency where the DX station is transmitting.
- Is the antenna in the right direction?
- Have you heard the instructions of the DX station? If not, wait and listen for instructions first!
- Listen.
- Listen.
- Listen and get acquainted with the **operating rhythm** of the DX station.
- If you hear frustrated hams making comments on the DX station's frequency: keep quiet and wait until the chaos has subsided.

Only if all these requirements are met, can you call the DX station!

### III.1.4. Simplex pileup in phone

How do you *break* through a simplex pileup?

- Never call before an ongoing QSO is completely finished. This means: no tail-ending (see § III.2).
- **Correct timing** is the *key to success*. Do not start calling immediately, rather wait until most of the noise on frequency has died down somewhat and chances of getting through are increased. This is not a competition where you need to be the first and fastest caller! What is important is to call at the right moment. Wait a number of seconds until the most excited callers have stopped calling and the QRM has died down somewhat, before giving your call. This may be several seconds (5 to even 7 seconds).
- How should you call? Never give the call of the DX station you are calling; the DX station certainly knows his own call. Send your full call **just once**. Partial calls are **bad**. Not 'zulu zulu zulu' but 'oscar november four zulu zulu zulu'. Giving just part of your call creates confusion and lengthens the whole procedure.
- Yes, you will hear many stations giving only part of their call. It is bad practice and it is also illegal.
- Do not speak too fast nor too slowly, act normally (don't shout).
- **For spelling, use only the international spelling alphabet** (see attachment 1). No fantasies!
  - In radio traffic the phonetic alphabet (Alpha through Zulu), prescribed by the ITU, serves to avoid mistakes during exchanges of letters and words. To achieve this goal a **unique** phonetic word has been attributed to each letter of the alphabet. Note there is only one such series of words, and not one for each language!
  - A DX station listens for these unique words in the pileup cacophony. His ears are tortured by the chaotic presence of all these words (and figures) and fatigue increases. If we use other words than the standard words of the spelling alphabet, the procedure may become very inefficient because we're using words that the DX station does not expect to hear.
  - Far too often in pileups one can notice that the DX station missed just **that** letter that deviated from the standard alphabet, and consequently he has to ask for a repeat. Example: The spelling word 'Lima' cuts like a razor blade. Often we hear 'London' as an alternative. If your signal is very weak or interfered with, the DX station will probably understand 'Lima' but not 'London'!
  - Not only is the DX station listening for the exact words, he is also expecting certain consonants/sounds in these words and a defined number of syllables. If a syllable gets lost due to static (QRN) or QRM, he can often reconstruct the word by completing the missing consonants and/or number of syllables.
  - Only use **the correct English pronunciation** for the spelling words.

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