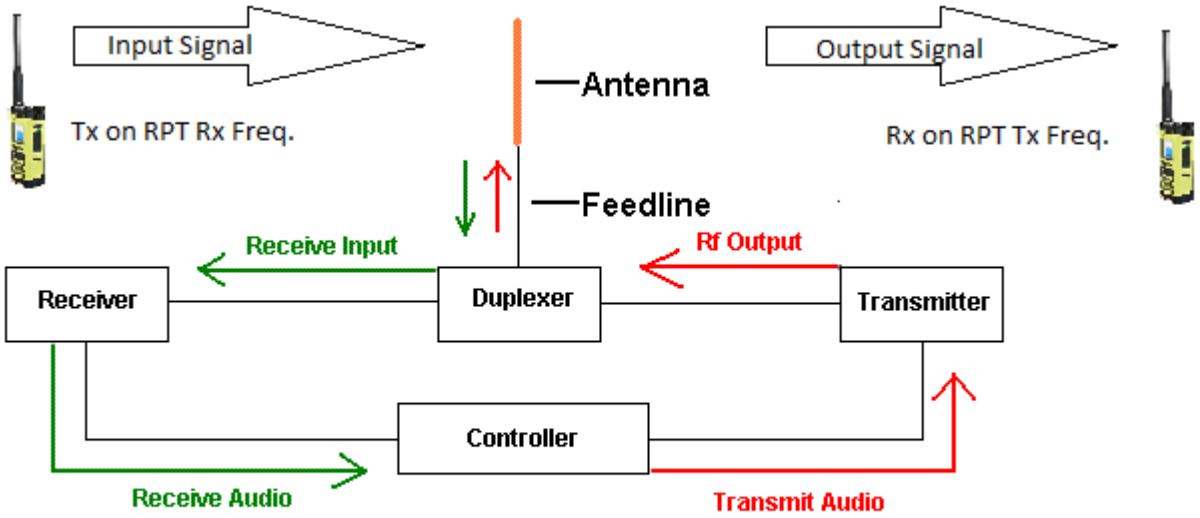
Operating & Procedures 002-series questions.

1. **voice operating procedures for channelized VHF/UHF repeater operation.**



BASIC REPEATER BLOCK DIAGRAM

There are 11 possible exam questions in the section:

The key elements of knowledge are:

- *Amateur repeaters are typically established by amateur radio clubs on behalf of their members as well as general amateur users in a geographical area.*
- *The main* ***purpose of an repeater*** *is to* ***increase the communications range*** *of portable and mobile stations.*
- ***Repeaters typically use FM (frequency modulation) and operate on VHF and UHF amateur allocations****. Some newer*

repeaters may use Digital Voice modes such as D-Star, DMR or P25 and Yaesu "System Fusion".

- *A **repeater consists of a receiver and transmitter co-located at the same site** and typically connected to the same antenna using a highly selective filter system called a **duplexer.***
- *What the **repeater receiver hears, the repeater transmitter transmits** in real time using two different frequencies.*
- *Usually a repeater installation will be at a site with a high tower and high elevation to maximize its reception and transmission range.*
- ***A repeater may be equipped with a Time-Out-Timer** that limits the time period it will repeat a continuous transmission from a user. Time-out-time periods may be set at 2 or 3 or 4 minutes. After time out, the timer is reset by another transmission into the repeater. **Time-out-timers are usually implemented to prevent long-winded transmissions and preventing a stuck microphone (PTT) button from transmitting over the repeater for long periods of time.***
- *By convention and for practical reasons, amateur repeaters on the 6 mtr band have the receiver and transmitter frequencies separated by 1 MHz; on the **2 mtr band the separation is 600 kHz** and on the 70 cm UHF band, the separation is 5 MHz.*
- *Frequency channelization of repeaters is a matter of **band planning and coordination** by National and Local area Amateur organizations to **ensure co-channel interference with neighbouring areas (and their repeaters) is minimized**.*

- *ISED **does not** play a role in assigning specific frequencies to amateur repeaters.*
- *Repeaters will often require the user equipment transmitting on a specific CTCSS sub audible frequency tone**. CTCSS stands for Continuously Tone Coded Squelch System** and most radios can select up to 50 different standard CTCSS tones.*
- *When trying to call another station while the repeater is idle, call by the called station's call-sign, then identify with your own call-sign.*
- *Users of an amateur repeater should pause briefly between their exchange transmissions to allow other users to identify and join the conversation **or break-in to pass an urgent message**.*
- *10 codes are not usually used on amateur radio including through repeaters.*

2. phonetic alphabet

ALPHA	NOVEMBER
BRAVO	OSCAR
CHARLIE	PAPA
DELTA	QUEBEC
ECHO	ROMEO
FOXTROT	SIERRA
GOLF	TANGO
HOTEL	UNIFORM
INDIA	VICTOR
JULIET	WHISKEY
KILO	X-RAY
LIMA	YANKEE
MIKE	ZULU

Note: Alpha may also be spelled as Alfa

There are 11 possible exam questions in the section:

The key elements of knowledge are:

- *Use the above International Phonetics when giving your call-sign to increase intelligibility over-the-air especially under poor reception conditions.*
- ***Of the possible exam questions in this area, know the phonetics for A, B, D, E, G, I, P, and R.***

3. **<u>voice operating procedures, HF and non-repeater operation</u>**

There are 11 possible exam questions in the section:

- *When you wish to invite another listening amateur to call you, the accepted procedure is to say* ***"CQ" three times followed by your call-sign spoken out three times (preferably using the phonetic alphabet).***
- *When answering a CQ from another station,* ***"Say the other station's call-sign once, followed by "this is" then your call-sign given phonetically".***
- ***Simplex operation is transmitting and receiving on the same frequency*** *as opposed to when operating through a repeater, for a given channel, you transmit on the repeater input frequency and receive on the repeater output frequency.*
- *You should* ***<u>use</u>*** *direct radio-to-radio* ***<u>simplex channel operation when signals are reliable between communicating parties without using a repeater</u>.***

- *You should* ***use VHF or UHF bands for close range communications*** ***<u>to minimize interference on HF bands capable of long-distance communication</u>.***
- *Be* ***careful in choosing a simplex frequency on the VHF or UHF bands*** *because* ***<u>you may inadvertently choose a channel that is the input frequency to a local repeater</u>*** ***and not realize you are causing interference to repeater users.***
- *If two users are engaged in communication through a repeater, and if each listens to input frequency of repeater and hears the other user, then the two parties are in range for direct communication on a simplex channel.*
- *If you are operating on a simplex channel and you hear co-channel interference from a repeater, it is best to change channels to avoid the interference since the repeater is fixed on that frequency and can be changed in normal operation.*
- *There is a historical convention when operating Single Sideband (SSB) on HF frequencies and above. On the* ***160 mtr band (1.8 to 2.0 MHz), the 80 mtr (75 mtr) band (3.5 to 4.0 MHz), and on the 40 mtr band (7.0 to 7.3 MHz) Lower Sideband (LSB) should be used.*** ***<u>On all other bands</u>****, if you operate the SSB mode, then* ***<u>Upper Sideband (USB) should be used.</u>***
- ***FM is not allowed by regulation on the HF bands below 28 MHz*** *because it takes up more than the permissible bandwidth allowed for these bands (see schedule I in RBR-4)* ***Beacon stations are established on many amateur bands that will provide an indication if suitable propagation exists*** *to another area of the world.*

4. **<u>tune-up and testing, use of a dummy load (resistor)</u>**

There are 11 possible exam questions in the section:

The key elements of knowledge are:

- ***<u>Before you transmit</u>*** *on any frequency,* ***<u>you should listen</u>*** *carefully that others are not using the frequency.*
- *It is good courtesy and part of the International Regulations, to* ***<u>run as little transmit power as necessary for good reliable communications</u>*** *for given propagation and noise conditions on the band. (This allows better frequency reuse by other users).*
- *All initial* ***transmitter tuning adjustments should be made into a "dummy load"*** *resistor as opposed to antenna system; this to minimize causing over-the-air interference.*
- ***If your regular net frequency is occupied at net time, ask the occupants to relinquish the frequency****, but if they are unwilling, conduct your net on a free frequency just above or below the occupied channel; your other net participants will probably find it. (note that no amateur owns a frequency)*
- *If propagation changes and you are now experiencing QRM (interference from other stations) from distant stations also using the same frequency, it is best to change frequency to avoid the on-frequency interference.*
- ***The minimum separation between single sideband (SSB) signals should be at least 3 kHz.***

- *Although the ISED rules allow many different modes of modulation on the amateur bands and only limits them by the emission bandwidth they may occupy, by way of convention and guidelines established by Amateur Radio organizations both Nationally and Internationally, formal Band Plans have been established.* ***These Band Plans layout the orderly placement on the various bands of different modes such as CW, SSB voice, Beacons, Calling frequencies, and the various Digital modes.***
- ***For the IARU Region 2 Band Plans, GOTO:***
  http://www.iaru-r2.org/documents/explorer/files/Plan%20de%20bandas%20%7C%20Band-plan/R2%20Band%20Plan%202013.pdf

5. Morse code (CW) operating procedures and procedural signs

There are 11 possible exam questions in the section:

The key elements of knowledge are:

- *Before you transmit or call CQ on any frequency, listen to make sure others are not using the frequency.*
- ***CQ*** *is a procedural message meaning* ***"Calling any station"*** *to respond.*
- *If a scheduled "net" is about to begin on a frequency that you are using, you should, as a courtesy, move to another unoccupied frequency to carry on your* ***QSO****.*
- *If propagation changes and you begin to experience interference from distant signals, you should change to another available frequency.*

- *When calling CQ using Morse code for a routine contact, it is good practice to send CQ three times, followed by "DE" followed by your call-sign three times.*
- ***"DE"** is a procedural signal mainly used in **Morse code meaning "From".***
- *When answering a routine CQ, it is good practice to send the other station's call-sign two times, followed by "DE" followed by sending your call-sign twice.*
- *In responding to a Morse code CQ, it is good practice to respond at a speed that you are comfortable receiving.*
- *Sending **"K"** at the end of a transmission in **Morse code** means "**Any station please reply"**.*
- *The term **"DX"** means **Distant Station**.*
- *The number **73** is often used in Morse code for saying **"Best Wishes"**.*
- ***Full break-in radio telegraphy (QSK)** means incoming signals are able to be **received between transmitted Morse code dots and dashes.** Or in other words, key up, you are receiving, key down, you are transmitting.*
- *Morse code (CW) is a very narrow bandwidth signal mode of operation, therefore it is possible for many CW stations to occupy a very limited amount of spectrum without causing or experiencing adjacent signal interference providing the receivers used have a very high selectivity performance of 500 Hz or better.*

6. RST system and use of "S" meter

There are 11 possible exam questions in the section:

The key elements of knowledge are:

- *An RST report is the common way Amateur Radio Operators report to each other the quality and strength of the other's signal.*
- *The **"R" is for Readability**, having a **scale of 1 to 5**; the **"S" is for Signal Strength** having a **scale of 1 to 9**; and in the case of CW, **"T" is for "Tone"** in a scale range of **1 to 9**.*
- *A **CW signal** reception that is **perfectly Readable** with **very strong strength signal**, and with a **perfect sounding Tone** should be given a **RST report of 5-9-9.***
- *A **SSB or AM** signal reception is given a "RS" report. A **perfect RS report will be 5-9**.*
- *Most communications receivers have an "S" meter calibrated in "S" units. **The "S" meter will assist in giving the "S" part of an RS or RST report**.*
- ***Each "S" unit** as measured on an S-meter should be **equivalent to 6 dB** (dB = decibel) and S -9 should be equivalent to 50 uV (microvolts) across the 50 ohm impedance of the receiver antenna input. (more on what this means in the course later)*
- *We will study the decibel conversions later in the course, but suffice to say for questions in this part of the course material, for every doubling, (or halving) of power at the transmitter end of the radio circuit, this is equivalent to 3 dB*

change in reception signal strength, therefore a 6 dB change (or one "S" unit) in reception strength will happen when the transmitter power at the transmitting end is changed by a factor of 4.

- *Most "S" meters also have a calibration in **dB above S - 9** in 10 dB increments.*
- *As an example, a report of a very strong signal report may be given as 5 - 9 + 30 db.*
- ***Picture of "S" meter scale***

7. Q code signals

There are 11 possible exam questions in the section:

The key elements of knowledge are:

- *Q code signals is a standardized collection of three-letter message encodings or brevity codes for radiotelegraphy that all start with the letter Q. Although they were created for*

radio Morse code, they have also been adopted into amateur voice communications.

- ***Refer to your Study Guide Book, 12.2 for a complete list of Amateur Radio "Q" codes.***
- *The Basic exam will require knowledge of the following commonly used Q codes >*
  - ***QRS*** *meaning "Send (Morse code) more slowly"*
  - ***QTH*** *meaning "My location is" or "What is your location?"*
  - ***QRL*** *meaning as a question "Is the frequency busy?"*
  - ***QSY*** *meaning "Change frequency"*
  - ***QSB*** *meaning "Fading of signal"*
  - ***QRM*** *meaning "Interference from* ***"Man"*** *made sources like other ham radio signals*
  - ***QRN*** *meaning "Interference from* ***"Natural"*** *sources like a lightning storm approaching.*
  - ***QRZ*** *meaning "Who is calling me?"*
  - ***QRX*** *meaning "I will call you again" or "Please standby"*
  - *QSL meaning "Do you confirm?" or in answer "Yes I confirm"*
  - *QSO means "A contact or conversation with another station operator"*
  - *QRT means "Stop sending" or "Shutting down the station".*

8. emergency operating procedures

There are 11 possible exam questions in the section:

The key elements of knowledge are:

- *You may **only** use an amateur station to transmit an **SOS or MAYDAY in a life-threatening situation.***
- *Encountering a radio emergency call, you are expected to acknowledge the call and provide assistance.*
- ***SOS** is the **Distress** call using **radiotelegraphy**.*
- ***MAYDAY** (de m'aider en francais) is the **Distress** call using **voice**.*
- *A prudent Radio Amateur will be prepared for emergency situations by having alternative means of powering equipment. Always have spare charged batteries for your hand-held portable radio.*
- *A dipole or other wire antenna is a good antenna choice to quickly deploy a portable HF station to provide emergency communications.*

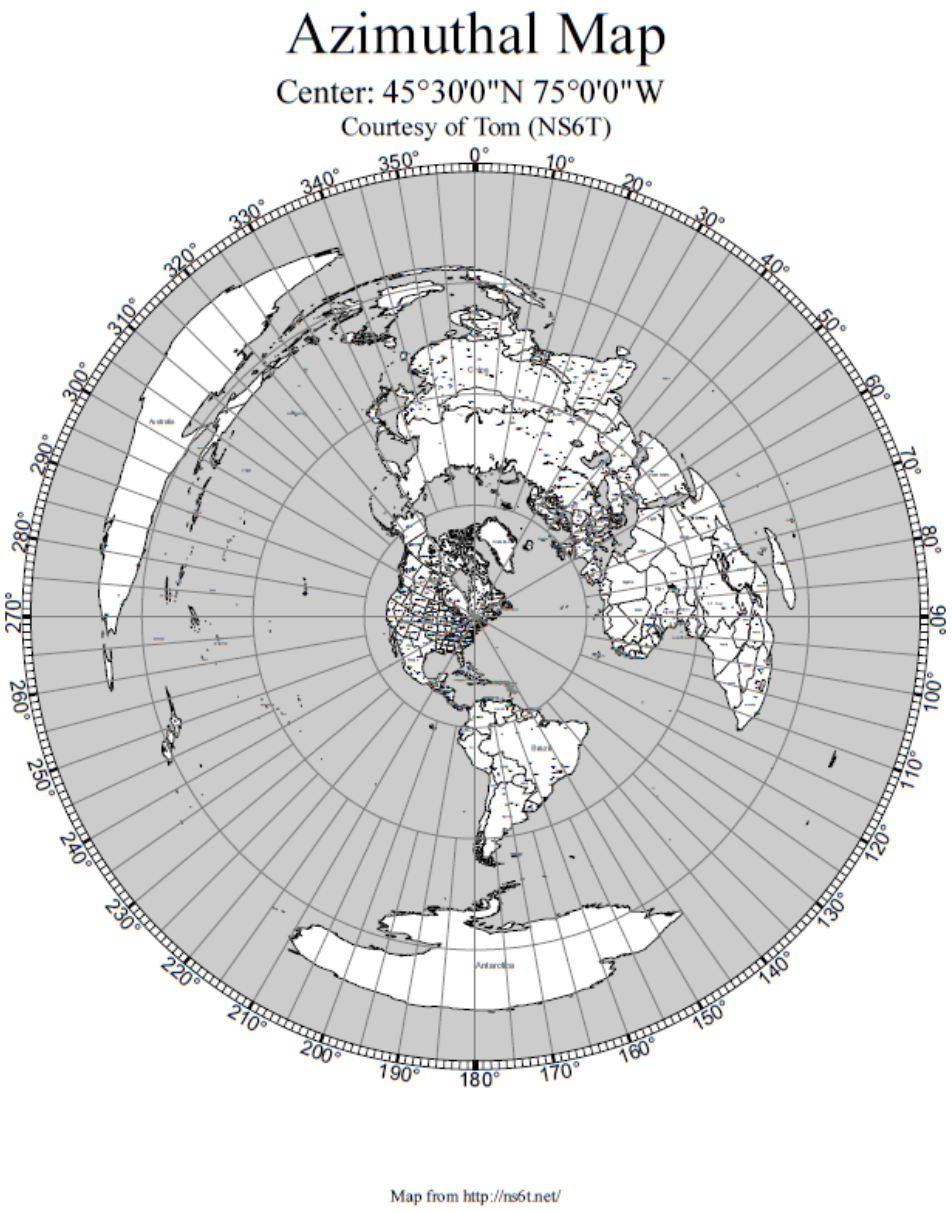
9. **<u>record keeping, confirmation practices, maps/charts and antenna orientation</u>**

   There are 11 possible exam questions in the section:

   The key elements of knowledge are:

   - ***<u>QSL means to confirm</u>***. ***<u>A QSL card is a post card report</u>*** *sometimes exchanged after an Amateur Radio contact confirming the station call-sign, time and date, frequency, mode and signals report. QSL cards are considered by some Radio Amateurs as collectables. QSL cards confirm contacts towards awards and certificates. Nowadays, there are on-line mechanisms for contact confirmation such as "Log-Book-of-the-World" and "e-QSL".*
   - *As a matter of Radiocommunications Regulations,* ***<u>keeping a Radio Log of is NO LONGER REQUIRED</u>*** *for an Amateur Radio Station. However, most Radio Amateurs keep a log of contacts they make especially for DX contacts and contacts they wish to have confirmed for awards. Log keeping is often done using special application software available for your station computer.*

- *An **"Azimuthal Map"** is a map projection **centred on a particular location on the Earth's surface** used to determine shortest path and direction to another location. Radio Amateurs can use such a map centred on their station's QTH to determine the best direction to point their rotatable antenna to the other station they wish to contact.*



- ***Near-path vs Long-Path (propagation)*** *. Sometimes propagation to a distant station is not always best in the path of the shortest or Near Path distance. If you are using a directional Beam antenna, it may be that the Long Path produces better propagation results.* ***The direction of Long Path is the 180 degrees directly opposite from the Near Path direction.***

- ***Radio log keeping should be kept in UTC (Universal Time Coordinated);*** *this is the Standard Time on the Prime Meridian (zero degrees longitude) running through* ***Greenwich, England.***
- ***An accurate UTC time reference*** *can be obtained by tuning in on HF radio stations* ***CHU*** *(here in Ottawa operated by NRC) and* ***WWV and WWVH*** *operated by the National Institute of Standards and Technology, USA) . CHU transmits on 3.330, 7.850, and 14.670 MHz and WWV transmits on 2.500, 5.000, 10.000, 15.000 and 20.000 MHz exactly. Google these stations to find out more details.*