



Framework for Land Mobile Radio Operations in St. Lucia

**National Telecommunications Regulatory Commission
Saint Lucia**

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1.0 Introduction

Land mobile radio is an essential form of wireless communications, which can be used for personal and commercial purposes. Users are permitted to establish their own unique communications networks, which may cover from a few metres to several hundred kilometres depending on the complexity of the network.

Land mobile radio is also a form of telecommunications, which is governed in Saint Lucia by the Telecommunications Act [No. 27 of 2000] and its associated Regulations. As presently drafted, the Act focuses almost exclusively on the provision of telecommunications service to the public. As a result, there is little guidance for telecommunications operations that are established for personal use, or for a specified purpose.

The Commission has prepared this framework to collate information pertinent to land mobile radio operations in Saint Lucia. It is hoped that the document will provide much needed guidance to interested persons.

2.0 Scope

- 2.0.1 The purpose of this document is to provide a clear and comprehensive outline for the operation of land mobile radio equipment in Saint Lucia. It shall describe, among other things, the licences, rules, standards, important procedures and operating limits for land mobile radio operations.
- 2.0.2 In the event of any inconsistencies between this framework and the Act or Regulations, the provisions of the Act or applicable Regulations shall take precedence.

3.0 Resources

- 3.0.1 The material from the following sources was used to prepare this document:
- The Telecommunications Act 2000;
 - The Telecommunications (Terminal Equipment and Public Networks) Regulations, 2002;
 - The National Telecommunications Regulatory Commission Procedures Manual;

- The ECTEL Regional Radio Spectrum Plan;
- The Code Federal Regulations (Title 47, Part 90);
- “Coaches and Officials Guidebook” - New York State Ski Racing Association.

4.0 Glossary of Terms

Act – The Telecommunications Act, No. 27 of 2000, in the jurisdiction of Saint Lucia.

Applicant – A person applying for a licence or a frequency authorisation under the Act.

Application – An application for a licence or frequency authorisation, including a modification or renewal of a licence, under the Act.

Application fees – The fees payable by applicant for a licence or frequency authorisation.

Band – A range of frequencies.

Bandwidth – The width of a frequency band (outside of which the mean power of the transmitted signal is attenuated at least 26 dB below the mean power if the transmitted signal within the band).

Base Station – a radio transceiver designed to be operated from a fixed location.

Commission – The National Telecommunications Regulatory Commission, established under section 8 of the Act.

ECTEL – Eastern Caribbean Telecommunications Authority, as established by the Treaty.

Frequency Authorisation – an authorisation granted by the Minister for the use of radio frequencies in connection with the operation of a telecommunications network and/or the provision of telecommunications services.

FM – Abbreviation for frequency modulation.

Handheld unit – a radio transceiver that is designed to be physically carried by the user.

Harmful interference – Any radiation or induction which endangers the functioning of radio navigation service or of a safety service or obstructs or repeatedly interrupts a radio service operating in accordance with the approved Table of Frequency Allocation and with the Telecommunications (Spectrum Management) Regulations, 2002.

Licence fees – Initial and annual fees that are payable by a land mobile radio operator.

Land Mobile Radio Licence – A document granting authorisation issued by the Minister to a land mobile radio operator that permits a land mobile radio operator to use and to be in possession of telecommunications equipment required to engage in land mobile radio operations.

Land mobile radio operator – A person holding a valid land mobile radio licence permitting the operation of a land mobile radio station.

Land mobile radio station – A station licensed for land mobile radio operations, which includes the required equipment.

Minister – Minister responsible for Telecommunications.

Mobile unit – a radio transceiver designed to be operated whilst moving, for example, from within a vehicle.

Regulations – Refers to the Regulations that have been made under the Telecommunications Act, No 27 of 2000 in the jurisdiction of Saint Lucia.

Repeater – A land mobile radio station on land at a fixed location established for the retransmission of signals to extend the range of communication of land mobile radio stations.

RF – Abbreviation for radio frequencies; a range of frequencies that can travel through space in the form of electromagnetic radiation.

Telecommunications – Any form of transmission, emission or reception of signs, texts, images and sounds or other intelligence of any nature by wire, radio, optical or other electromagnetic means.

Unwanted emissions – Spurious emissions and out-of-band emissions as defined in the Radio Regulations.

UHF – Ultra High Frequency. Refers to a band of frequencies that range from 300 MHz to 3 GHz (3,000 MHz).

UHF radio – A transceiver operating in the UHF band of frequencies.

VHF – Very High Frequency. Refers to a band of frequencies that range from 30 MHz to 300 MHz.

VHF radio – A transceiver operating in the VHF band of frequencies.

5.0 The Role of the Commission

5.0.1 The National Telecommunications Regulatory Commission was established under the Telecommunications Act 2000 to regulate the telecommunications sector in Saint Lucia. Based on the functions of the Commission as stipulated in section 12 of the Act and pertinent to the land mobile radio sector, the Commission is required to

- (i) be responsible for technical regulation and the setting of technical standards of telecommunications and ensure compatibility with international standards;
- (ii) plan, supervise and manage the use of the radio frequency spectrum in conjunction with ECTEL, including the assignment and registration of radio frequencies to be used by all stations operating in Saint Lucia or on any ship, aircraft or other floating or airborne contrivance or spacecraft registered in Saint Lucia;
- (iii) Receive and review applications for licences and advise the Minister accordingly;
- (iv) Monitor and ensure that licensees comply with the conditions attached to their licences; and
- (v) Maintain a register of licensees and frequency authorisation holders.

5.0.2 Reference is also made to section 29, subsections (1) and (2), which stipulate that “[a] person shall not establish or operate a telecommunications network or provide a telecommunications service without a licence”, and “[w]here a frequency authorisation is necessary for or in relation to the operation of a telecommunications network or a telecommunications service, a person shall not operate that network or service with that authorisation”. An obligation therefore exists to ensure that one is appropriately licensed and have frequency authorisation when required, since contravention of the above-stated subsections results in an indictable offence, which carries a fine not exceeding one million dollars or imprisonment for a period not exceeding ten (10) years.

5.0.3 The Commission is therefore keen that persons comply with the telecommunications legislation. The Act does not apply to programme content and scheduling, and so the Commission has no jurisdiction in respect of the information conveyed via telecommunications networks and operations. In sum, the Commission’s responsibility is to ensure that the legal and technical requirements for the establishment of telecommunications networks and the provision of telecommunications services are satisfied.

6.0 Overview of the Land Mobile Radio System in Saint Lucia

- 6.0.1 Land mobile radio systems are used mainly by companies, government offices and other organizations that require a level of privacy to meet a wide range of communication requirements, such as to coordinate people and materials, and for safety and security needs. As the name suggests, land mobile radio is a form of wireless terrestrial communications between stationary and/or moving users. However, in Saint Lucia, and by extension ECTEL Member States, land mobile radio refers primarily to voice communications that require the use and assignment of specific frequencies in the UHF and VHF bands. These operations use a combination of base (or fixed) stations and/or mobile/portable devices to establish a wireless private network for its users.
- 6.0.2 As private networks, land mobile radio users do not need to conform to certain basic requirements instituted on other types of radio communications, such as Amateur Radio or Maritime Mobile Radio. In that regard, the use of calls signs is not mandatory, and examinations to establish the proficiency and competence of prospective users is not a condition for the issuance of a Land Mobile Radio Licence.

7.0 Equipment Requirements for Land Mobile Radio in Saint Lucia

- 7.0.1 The telecommunications equipment that can be used for engaging in land mobile radio communications must meet the requisite technical standards for Saint Lucia, and must be type approved by the Commission, pursuant to r. 4 of the Telecommunications (Terminal Equipment and Public Network) Regulations 2002.
- 7.0.2 Under r. 4(1), "A person shall not install, sell for use or use any item of equipment in Saint Lucia, unless the Commission grants a certificate of type approval in respect of that type of equipment." Based on r. 4(2), land mobile radio operators would be required to ensure that the following equipment has been type approved by the Commission:
- (i) wireless remote devices; (g)
 - (ii) radio receivers; (j)
 - (iii) radio transmitters; (k)
 - (iv) satellite earth stations; (l)
 - (v) other equipment emitting a radio signal. (p)
- 7.0.3 Land mobile networks may comprise some or all of the following pieces of equipment:

- (a) Base stations;
- (b) Mobile units;
- (c) Handheld units;
- (d) Repeaters.

7.1 Transmitting Equipment

- 7.1.1 The land mobile radio operator shall ensure that the emitted frequency of the transmitting equipment used, such as the base station, handheld and/or portable devices, is as stable and as free from unwanted emissions as the state of technological development for land mobile radio apparatus reasonably permits; and which ought to be in keeping with existing national standards, and
- 7.1.2 Notwithstanding any other term of the Licence, the Land Mobile Radio Operator shall ensure that the transmitting equipment is and maintained so that its use does not cause any undue interference to any other forms of wireless communication.

7.2 Unwanted Emissions

- 7.3.1 If any undue interference to other wireless communications systems is caused by the radiation of unwanted emissions or the field strength of electromagnetic energy radiated from the land mobile radio equipment, then the land mobile radio operator should suppress the unwanted emissions or reduce the level of the field strength to the degree satisfactory to the Commission.
- 7.3.2 The land mobile radio operator should conduct tests from time to time to ensure that the unwanted emission fall within the acceptable limits.

7.3 Equipment Inventory

- 7.3.1 Holders of a Land Mobile Radio Licence should maintain an up-to-date inventory of the land mobile radio equipment in his/her/its possession.
- 7.3.2 The listing for each piece of equipment should comprise, the following information:
 - (i) Type of equipment;
 - (ii) Make or manufacturer;
 - (iii) Model;

- (iv) Serial Number;
- (v) The date purchased or acquired;
- (vi) The person (or business) from which it was purchased or acquired;
- (vii) Status of the equipment (active, not operational, retired, sold, assigned to another operator)

7.3.3 In the event that equipment has been retired, sold or assigned to another person or entity, the listing ought to reflect the date and the persons who should be in possession of the equipment, as might be pertinent.

7.4 Inspections

7.4.1 The land mobile radio operator shall permit a representative of the Commission

- (a) to have access to the land mobile radio equipment,
- (b) to inspect the Licence, equipment inventory and log book (if one is kept), and
- (c) to inspect the apparatus comprising the land mobile radio station,

at any and all reasonable times (or when, in the opinion of the Commission an urgent situation exists, at any time) for the purpose of verifying compliance with the terms of the Licence.

7.4.2 It should be noted that although the Commission has the right to inspect and to carry out inspections, there are other agencies that also have those powers, which include the Police and the Customs Department.

8.0 Frequency Allocations, Modes of Operations and Power Limits for Land Mobile Radio Operations

8.0.1 Land mobile radio operations have been allocated frequencies in the VHF and UHF bands, which have been channelised (or divided into unique frequencies) with a spacing of either 12.5 kHz or 25 kHz between frequencies¹.

¹ There still exists in Saint Lucia land mobile equipment that uses 25 kHz channel spacing, which must be accommodated in the Commission's spectrum plans. Newer frequency assignments will specify 12.5 kHz channel spacing, which is generally the norm for newer devices.

8.0.2 Land mobile radio operations are configured to either simplex or duplex operation. For simplex communications, devices transmit and receive on one frequency, but those two activities cannot occur at the same time. On the other hand, for duplex communications, devices use two frequencies, one to transmit and another to receive, which are separated by 5 MHz, in keeping with the approved practices.

8.0.3 Table 8.1 presents the start and end frequencies of the allocations for land mobile radio operations and the type of operation permitted in each sub-band.

VHF Band		UHF Band	
Allocations/MHz	Operation Type	Allocations/MHz	Operation Type
148.000 to 151.000	Duplex A1	300.000 to 328.600	To be decided
151.000 to 153.000	Simplex	406.100 to 410.000	Simplex
153.00 to 156.000	Duplex A2	410.000 to 414.925	Duplex C1
162.050 to 166.100	Duplex B1	415.000 to 419.925	Duplex C2
166.100 to 167.050	Simplex	450.075 to 455.000	Duplex D1
167.050 to 171.100	Duplex B2	455.075 to 460.000	Duplex D2
171.100 to 174.00	Simplex	460.075 to 462.475	Simplex
225.000 to 300.000	To be decided	462.725 to 467.475	Simplex
		467.800 to 470.000	Simplex

Table 8.1: Allocations in the VHF and UHF Bands for Land Mobile Radio Operations

8.0.4 The power limits for land mobile radio operations is dependent on the devices that is being used:

- Handhelds 5 watts carrier power;
- Mobile stations (*not including handhelds*) 50 watts carrier power;
- Base stations 100 watts carrier power;
- Repeaters 150 watts carrier power.

9.0 Application Process

9.1 Application for a Land Mobile Licence

9.1.1 An application for a Land Mobile Radio Licence shall be submitted to the Commission, at its office in the Global Tile Building, Bois d'Orange, Gros Islet, and shall be:

- (i) in the prescribed form and contain such information and particulars as specified in the form, which found in the Appendix A of this document, and on the Commission's web site, and
- (ii) accompanied by the prescribed application fee.

9.1.2 Upon receipt of the application, the Commission shall:

- (i) Issue a receipt in respect of the application fees paid.
- (ii) Acknowledge receipt of the application.
- (iii) Conduct a preliminary review of the application to ensure that all sections of the application have been completed and that all stated supporting documents have been supplied. If the application is deemed complete, it shall initiate its formal review process.
- (iv) If omissions have been identified in the application as submitted, notify the applicant and specify a deadline to supply outstanding information.
- (v) When the deadline has for submitting the outstanding information has lapsed, promptly initiate its review procedure.

10.0 Assessment of Applications by the Commission

10.0.1 The Commission will assess the application and when necessary, it may request additional information from the applicant in order to complete its review of the application.

10.0.2 In reviewing applications for a Land Mobile Radio Licence, the Commission will ensure that in addition to receiving all stated supporting documents, the required technical content and equipment listings have been provided².

² It is strongly recommended that prospective applicants review the *Guidance Notes for Application Processes*, which is available on the Commission's website, www.ntrc.org.lc.

- 10.0.3 Since the Application for a Land Mobile Radio Licence has a frequency authorisation component, for the assignment of specified frequencies to a licensee, a copy of the application will be forwarded to ECTEL for its review and recommendation of the frequencies that could be assigned.
- 10.0.4 Upon completion of the evaluation processes for licence and frequency authorisation components, and ratification of its decision, the Commission will forward to the Minister its recommendation on whether or not the applicant should be awarded a Land Mobile Radio Licence and Frequency Authorisation.

11.0 The Land Mobile Radio Licence and Licensing Process

- 11.0.1 The Land Mobile Radio Licence issued under the Telecommunications Act 2000, is a station licence: it permits an entity to use and be in possession of telecommunications equipment for the purpose of engaging in land mobile radio communications.
- 11.0.2 The Land Mobile Radio Licence also includes the frequencies that have been assigned for use by a licensee, and well as other parameters associated with the use of the radio frequency spectrum for land mobile radio operations.
- 11.0.3 As prescribed by the Act, the Minister shall decide whether or not to grant a licence to the applicant and shall notify the applicant of that decision within 90 days of receipt of the application.

11.1 Minister Decides to Grant Licence

- 11.1.1 Upon receiving notification from the Minister that he/she has decided to grant a Land Mobile Radio Licence, the prospective licensee must make arrangements:
 - (a) to pay the licence fee, and
 - (b) to arrange with the Minister's office for the release of the licence.

11.2 Minister Decides Not to Grant Licence

- 11.2.1 In the event that the Minister decides not to grant a Land Mobile Radio Licence, the Minister is required to provide reasons for his/her refusal in writing to the applicant.
- 11.2.2 An earlier refusal does not preclude a person from re-applying for that licence at a later date.

11.3 Licence Document

11.3.1 As prescribed under the Act, there are a number of compulsory and optional provisions that a licence must/may contain. The licence will also detail the operating parameters pertinent to the licence, including the privileges and obligations on the licensee, as a land mobile radio operator.

12.0 Fees

12.0.1 The main fees associated with land mobile radio operations have been prescribed under the Telecommunications (Fees) Regulations, 2002. They include

- (a) application fees,
- (b) licence fees, and
- (c) frequency authorisation (spectrum) fees.

12.0.2 Application fees are payable to the Commission upon submission of an Application for a Land Mobile Radio Licence.

12.0.3 Licence fees are payable to the Inland Revenue Department on notification of the grant of a Land Mobile Radio Licence by the Minister, and subsequently on the anniversary date of issue for the duration of the licence.

12.0.4 Frequency authorisation (spectrum) fees are payable annually to the ECTEL, when invoiced.

13.0 Renewal of Land Mobile Radio Licences

13.0.1 Renewal of a Land Mobile Radio Licence will become necessary when the term of an existing licence is about to expire and the operator would like to continue his/her/its land mobile radio operations.

13.0.2 The Commission may notify the licensee of the pending expiration date and provide guidance as to the process for renewal of the licence. The licensee should begin the renewal process at least one (1) month before the expiration date of his or her existing licence by submitting all prescribed forms and supporting documents.

- 13.0.3 The Commission shall review the application for renewal of a licence and shall make its recommendation to the Minister as to whether or not the licence and frequency authorisation should or should not be renewed.

14.0 Termination of a Land Mobile Radio Licence

- 14.0.1 A Land Mobile Radio Licence, and by extension a licence granted under the Telecommunications Act, can be terminated by the Minister for a number of reasons. It can be terminated when a Licensee is in breach of the Licence, the Act or Regulations and under less severe circumstances, a licence might be suspended for a specified period of time.
- 14.0.2 When a Land Mobile Radio Licence has been terminated, a person is not permitted to use or operate that Land Mobile Radio equipment. In the case when a licence has been suspended, it is usually the land mobile radio operations using the licensed equipment that have barred for the time frame specified.

15.0 Lost, Misplaced and Stolen Equipment

- 15.0.1 Any incident involving the lost or theft of Land Mobile Radio equipment must be immediately reported to the nearest Police Station and to the Commission at the earliest opportunity.
- 15.0.2 For the lost and theft of equipment, the report to the Commission shall include the following information:
- (a) The name of the land mobile radio operator making the report;
 - (b) The call sign of the land mobile radio operator (if applicable);
 - (c) The date when the equipment was stolen or lost, or realised to have been lost or stolen;
 - (d) The make, model/type of equipment;
 - (e) The serial number of the equipment;
 - (f) A description of the equipment;
 - (g) Frequencies programmed into equipment.

- 15.0.3 The land mobile radio operator would be required make a declaration in respect of the truthfulness of the report and to affirm that the efforts made to find or secure the return of the equipment have been unsuccessful.

16.0 Harmful Interference

- 16.0.1 Under the Telecommunications (Spectrum Management) Regulations, 2002, 'harmful interference' is defined as "*... any means of radiation or induction which endangers the functioning of a radio navigation service or of a safety service or obstructs or repeatedly interrupts a radio service operating in accordance with the Table of Frequency Allocations and these Regulations*".
- 16.0.2 Under these Regulations and upon receipt of a complaint of harmful interference, the Commission may issue a directive suspending the operation of a station on that particular frequency for a period not exceeding 30 days pending investigation of the complaint. It should be noted that these Regulations apply to land mobile radio operators, which can be invoked by other radio operators should they be the victim of harmful interference, or can be applied against any other radio operators should their stations be the alleged source of harmful interference.

To be inserted: Application Form for a Land Mobile Radio Licence.

Phonetic Alphabet

A	Alpha	.	decimal (point)
B	Bravo	.	(full) stop
C	Charlie	1	Wun (One)
D	Delta	2	Two
E	Echo	3	Tree (Three)
F	Foxtrot	4	Fower (Four)
G	Golf	5	Fife (Five)
H	Hotel	6	Six
I	India	7	Seven
J	Juliet	8	Ait (Eight)
K	Kilo	9	Niner (Nine)
L	Lima		
M	Mike		
N	November		
O	Oscar		
P	Papa		
Q	Quebec		
R	Romeo		
S	Sierra		
T	Tango		
U	Uniform		
V	Victor		
W	Whiskey		
X	X-Ray		
Y	Yankee		
Z	Zulu		

Useful Radio Lingo

RADIO PHRASE	INSTEAD OF	MEANING
NEGATIVE	Nope	No
THAT IS CORRECT	Yup	Yes, Confirm
AFFIRMATIVE	Yup	Yes, Confirm
ROGER	Yup	Yes, Confirm
ACKNOWLEDGE	Eh?	Confirm that you understand my message
SAY AGAIN	Huh? (USA)	Repeat last message
GO AHEAD	Yeah, what?	Listening, proceed with your message
CORRECTION	Oops...	I made a mistake, correct version is...
DO YOU READ	Are ya there?	Called you once or more, reply please
STAND-BY	Wait a sec...	Busy, please pause for a moment
HOLD	Oh God...Stop!	Hold further racers at the start
CLEAR TO SEND	Let 'em rip	Start or Restart the race
WILCO	Okey Dokey...	Message understood, will comply
OUT	I gone	My message ended, no reply expected
OVER	Huh, Eh	Message completed, reply expected
CHECK	Got it	Understood
CONTACT	I see 'em...	Visual contact at this position
CONFIRM	Is that right eh?	My version is...Is that correct?
VERIFY	Who says?	Confirm info with the source
READ BACK	Get it?	Repeat this message back to me

Guidelines on the Use of Land Mobile Radio Equipment³

To achieve effective land mobile radio communications, proper operating practices and standards must be adhered to. The two-way radio is an essential tool used to conduct and manage day to day business activities. Radios facilitate instant communication at the press of a microphone key. In addition, an almost limitless number of people may be communicated with in the same instant with the press of that key.

In as much as the unlimited potential to simultaneously communicate with many people is a great advantage, it is a disadvantage in that an almost unlimited number of people can answer back -- instantly at the press of a microphone key. Excessive radio traffic over a common channel may defeat the advantages of the two-way radio.

Good Radio Etiquette

Good radio etiquette demands, that all users limit their communication to essential radio calls only. Remember always:

- 1 Have something worthwhile to say. Content makes a difference. Engage your brain.
- 2 Form a concise thought.
- 3 Hold the microphone about 6 inches from your mouth.
- 4 Listen before you begin your transmission, and always wait a split-second before you speak after keying the push to talk button.
- 5 Articulate your message clearly in a normal tone of voice.
- 6 Acknowledge the receipt of all messages directed to you regardless of how trivial.

Having something worthwhile to say is important to the overall concept of having radios in the first place; content makes a difference. Once you have decided that the outside world can't live without your most recent thought, here are some simple things you can do to improve your chances that your radio will work and that you will be understood.

Know the Controls

Radios, like people, are not all the same. Your ability to hear and be heard will depend on your knowledge of the controls. Most important are the following:

³ Source: "Coaches and Officials Guidebook" - New York State Ski Racing Association

- ***On/Off-Volume Knob:*** Obvious, but the volume knob only affects incoming sound and turning it up will not boost your outgoing voice transmission. There are a lot of radios that get classified as the "don't work" type because they never get turned on.
- ***Squelch Control:*** Either a knob or a switch, the squelch control filters out the background "static" noise that would otherwise be heard when the channel is not being used. Most modern radios have an automatic squelch which can be bypassed by pressing a button to momentarily release the filtering action of the squelch setting when trying to listen to weak signals that keep cutting in and out. If the radio has a knob for squelch adjustment the setting should set just past the point where the radio becomes silent.
- ***Push To Talk Button (PTT):*** Normally on the side of your radio in the case of a hand held, find it and only use it when you want to transmit. Remember that you must wait a split-second before you begin to speak after "keying" the PTT transmit button. On certain radios that are linked to a repeater network, this delay before the repeater kicks-in may be a long, full second, and you must wait before you speak or risk having the beginning of your transmission cut-off. Be brief when you are on air, you are tying up the channel and using battery reserves of your radio at a much higher rate. Most modern radios have a time limit on the transmit function, so if the PTT gets stuck, the channel is tied up only for a minute or two, and then the radio automatically shuts off the transmission. It might even squawk a warning tone. If your radio often defaults to this auto-shut-down mode when you are speaking...chances are you're talking way too much.
- ***Channel Selector:*** Make sure you know what channel is being used and set the radio correctly.
- ***Speaker/Mic:*** The most important factor in your outgoing transmission quality is the relative position of your mouth to the radio's built-in microphone. Know where it is and speak directly into it at a distance of about 6 inches. Speak at a moderate pace, neither too slow nor too fast, avoid slurring your words, and never shout - increasing your voice level will only cause distortion of your voice by the microphone. Note that higher, constant pitched voices transmit best. Don't talk with your mouth full.
- ***Antenna:*** Antennas will give you best performance if placed in the vertical position. Never bend it and tape it. Doing this will drastically reduce radio performance, and is the reason why cars have their antennas installed on the roof rather than the doors.
- ***Battery:*** Solar powered radios are not yet common and have problems operating in the dark. Most radios have a battery that is attached to either the lower half, or the back of the unit. The method of attachment varies. Radio batteries are generally Nickel Cadmium or Nickel Metal Hydride (much longer life), meaning that they can be recharged hundreds of times, thereby avoiding the expense of buying new batteries. The down side is that rechargeable batteries fail rather abruptly when they reach the end of their charge. The

discharge curve is very flat until it suddenly fails. This is why your radio might work well one instant, and not the next. Precautions to avoid rapid discharge of the battery include:

- Keeping the volume knob turned down lower than full blast
- Limiting the duration of your transmissions
- Keeping the battery as warm as possible. Cold kills batteries.

Battery contacts can be cleaned by using a pencil eraser to remove oils and residue from the connectors, a simple reason why some radios function intermittently or fail in humid conditions.

Good Technique

Proper radio technique simply translates into being better understood.

Understand that voice communication is never reproduced with studio quality clarity. Remember that a simple message such "Go" may be heard as "No" and try to use unambiguous phrases that will reproduce without ambiguity.

Strict radio procedure is only a necessity when transmission conditions are difficult. In most cases when contact is established and you have developed a rapport with your members, you can dispense with the "overs" and "do you reads". It is however prudent to end all contacts with "out" so that others on the channel know you are finished, and to use specific, pre-defined terminology to avoid misunderstanding.

A Radio is not a Telephone

It doesn't even look like one, but some users just don't understand the difference. In essence, only one person can speak at a time, thus the idea of being brief, and only talking when absolutely necessary.