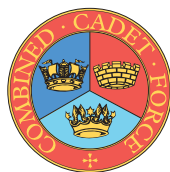




air cadet publication
instructors guide

communications



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Communications

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Chapter 3 Radio Equipment.

Instructors' Guide

CHAPTER 1

INTRODUCTION TO RADIO

The invention of radio

1. Communications are an important part of everyday life. We constantly need to pass on information, thoughts and ideas from one person to another. This is particularly important in a military environment, where intelligence of enemy activity can play an important role in the success or failure of a mission.
2. The invention of radio has revolutionised communication for everybody. Using radio waves, people can now communicate all over the world with relative ease. This section introduces you to radio communications, its limitations and its benefits. As a Cadet you will learn how a simple radio system works and how to operate it correctly and efficiently.

Fig 1-1 Radio at work



The Air Cadet radio Stations

3. The Air Cadet Organisation is fortunate, in that it has its own nation wide system of radio stations for you to get in contact with. This system was originally set up just after the Second World War to train Cadets in the use of High Frequency (HF) radio equipment, and is called a 'network'. The word network is used because a large number of radio stations are working together, connected by the invisible strands of a single frequency - rather like a net.

Directed Network

4. A Directed Network (Net) is a group of radio stations each operating on the same frequency for the purpose of communicating with each other. A Directed Net is always 'CONTROLLED', i.e. there will always be a 'Network Control Station' (NCS) controlling the radio communications. The level of control exercised by the NCS will

- a. The level of radio discipline being observed by those using the network.
- b. Adherence to proper procedures.
- c. The type of network being operated.

Net Control Stationc

5. Only one station on the network can act as the NCS (network control station) at any onetime. A number of factors will dictate which station is chosen to undertake the NCS duties for any specific occasion. Some of these factors include:

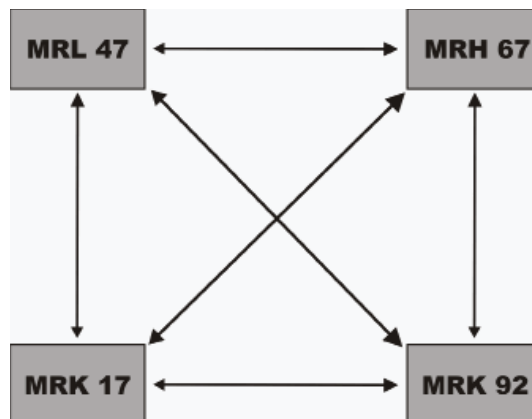
- a. Equipment efficiency.
- b. Operator experience.
- c. Volume of radio communication to be passed.

6. It is usual for the NCS to be a fixed base station, located in a room intended specifically for radio operations - the radio room.

Free Network

7. A network operating without an NCS is called a 'Free Network' (Free Net). Here, each of the stations is permitted to freely contact any other station they wish without permission from the NCS.

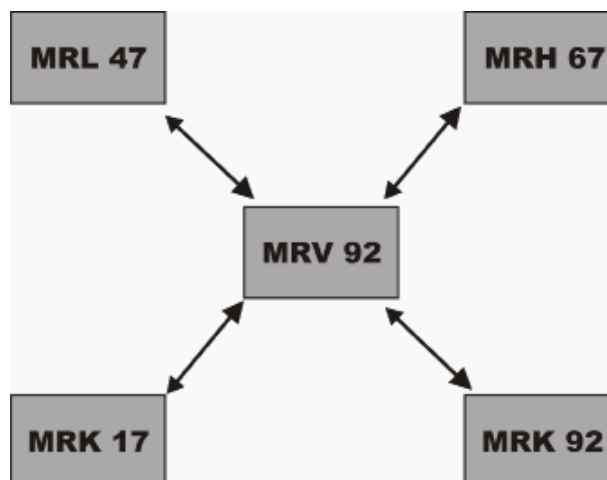
Free Network



Directed Network

8. On a Directed Net, stations may only communicate with the express permission of the NCS who will dictate priorities and orders. This means that NCS (network control station) will do most of the communicating as they will be the first

point for any message.



9. The Air Cadet radio network is now established to encourage Cadets to learn and practice the art of radio communication using proper service radio procedures. Used correctly, the information and instructions transmitted can be of vital importance in assisting in the safe and successful operation of your activities. However, the use of non-standard procedures and phraseology could cause misunderstanding with potentially dangerous consequences. In addition to this, the Services must always be aware that a potential enemy may be able to receive the transmitted information, and use it to their advantage.

10. From this you can see that the radio station is the smallest part of any radio network. The station will have at least one radio set capable of transmitting and receiving and which is generally known as a transceiver.

Fig 1-2 *Communication with remote location*



CHAPTER 2

RADIO PROCEDURES

SAD stands for

1. Correct radio procedures can be remembered using 'SAD'.

The letters stand for:

Security

Accuracy

Discipline

Security

Identity of a Station

2. The identity of a station must be kept as secret as possible. This is done by using a unique callsign allocated to each station, consisting of three letters followed by two numbers. For example:

MRA 23

M - Denotes that the Callsign is allocated to the United Kingdom.

R - Indicates that the station is associated with the RAF.

A - Is an indication of the geographical location.

23 - A serial number issued to the station by HQ Air Cadets.

If a station has mobile equipment, it is given an extension to the parent station's callsign e.g. MRA 23 M.

3. The M at the end of the callsign indicates a mobile unit. Each unit will have an additional number to identify it, such as M1, M2, M3, and so on.

The call sign for the second mobile unit for example, would be MRA 23 M2.

When referring to a callsign it must, on all occasions, be given using the Phonetic Alphabet. (We will learn this Alphabet later in the book) Therefore, the callsign in this example would be given as follows:

Radio Security

4. The fact that there may be more than one listener highlights another very important point. One or more of the listeners may be unauthorised. Unauthorised listeners are called interceptors. You must always assume that for every transmission there are three elements:

- a. The sender.
- b. The listeners.
- c. The interceptors.

5. Service radio procedures have been developed to safeguard the meaning of a message from an interceptor and also to ensure that all authorised listeners understand the message. These procedures also enable transmissions to be short, thus saving power (essential for mobile units) and allowing more stations to use the network.

6. When using a radio you should always consider security and the following list will help you:

NEVER

- X Use unauthorised codenames.
- X Use personal names or nicknames.
- X Use slang, jargon or foul language.
- X Transmit aircraft types, roles or weapon loads in clear speech.
- X Transmit details of arms or ammunition, particularly their movements.
- X Transmit unit locations in clear speech.

ALWAYS

- ✓ Use your callsign at the start of a transmission.
- ✓ Use only authorised codenames and codewords. (Examples of Code Names are shown at Annex B)

- ✓ Ask a station to 'Authenticate' if you think it may not be a genuine Station calling.

For security reasons, paras 7-13 have been omitted from this copy.

Authentication

14. There are several other aids to security including the use of Codes, Common Appointments and Veiled Speech.

a. Codes: There are many codes which enable non-classified information to be transmitted in a way that leaves an interceptor unaware of the message content. For codes to work effectively it is necessary for senders and listeners to have made prior arrangements, so that they both use the same code system.

b. Appointment Titles: An Appointments Title is a specific word chosen to indicate the holder of a particular appointment. These titles are an aid to security by concealing the level of command. Each title is specific to the Callsign in use. For example, the title SUNRAY could be used to indicate a Commander of a specific unit which should have its own callsign. A Squadron Commander would therefore be SUNRAY of the callsign for his Squadrons station and that may be MRQ 19. On exercise the Squadron may be using equipment with callsign MRQ 19 M5 and the team leader (Commander may be a Corporal but as the leader for that team they will also be SUNRAY. You can differentiate between the two by adding your/ my SUNRAY or SUNRAY callsign. e.g. MRQ 19 M5 SUNRAY. (see Annex B for list of common titles)

c. Veiled Speech: This simple method of conveying information is used when both the listener and sender are aware of the subject matter e.g. Meet me at the same time and place as last week.

Accuracy

Microphone Technique

15. Voice messages over the radio should be clear, logical and brief. The following techniques will assist you in making sure that your transmitted speech is clearly and satisfactorily received.

a. Before transmitting listen out on the frequency to ensure that there will be no interference with a transmission from another station.

b. Be familiar with the operation of your microphone and do not turn your head away from it whilst talking. Try not to vary the distance between the microphone and your mouth.

c. Do not touch the microphone with anything whilst transmitting, even your lips can cause severe distortion.

- d. Do not talk too close to the microphone. The microphone should be about 50 mm (2 inches) away from your mouth and you should speak across it rather than directly into it.
 - e. Do not hold the microphone or boom of a combined headset/microphone system.
 - f. Use a normal conversational tone, speak clearly and distinctly.
-

Fig 2-1 *Microphone in use*



- g. A slight pause before and after numbers will make them easier to understand.
 - h. Do not use hesitation sounds such as 'er' or 'um'.
- Only press the Press To Transmit (PTT) switch when ready to speak, and ensure that you press it fully before speaking. If you stop speaking during your message, release the PTT switch until you are ready to start speaking again - such breaks in transmission should be avoided.
- j. Do not release the switch until you have finished talking, this will ensure that the message is complete, and not clipped.
 - k. Always ensure that the PTT switch has released correctly and that there is no likelihood of it being inadvertently switched on. This would avoid the potentially dangerous and irritating situation of a 'stuck' microphone blocking out all other transmissions.

RSVP

16. The letters RSVP will help you remember how to talk on the radio. They have the following meaning:

R - Rhythm. You should try to develop a natural rhythm when speaking, and divide the message into sensibly sized sections.

S - Speed. You should use an even rate of speaking, slightly slower than normal. This will aid understanding and give you time to think. When you know that the contents of a message will have to be written down by the listener, speak at an even slower rate. If your message is long, break it down into smaller more manageable parts and use standard Prowords (see below) to shorten the message where possible.

V - Volume. You should maintain your speaking volume at a constant level. There is no need to shout but you should ensure that it is loud enough to overcome any background noise. It is far better to reduce the background noise than it is to shout louder.

P - Pitch. The voice should be pitched slightly higher than normal. Female operators, and those with a naturally higher pitched voice, may not need to increase their pitch noticeably.

Prowords

17. By using standardised words and phrases it is possible to keep voice transmissions brief and clear. Whole sentences can be replaced by easily pronounced and widely recognisable prowords that convey a specific meaning.

18. A list of common prowords and their meanings are given below:-

THIS IS Indicates the callsign of the sender is about to follow.

OVER This is the end of my present transmission to a listener - a reply or acknowledgement is required.

OUT This is the end of my transmission - no reply is expected.

WAIT OUT Your transmission has been received, a reply will follow later.

WILCO Message received, understood and I will comply with your instructions.

ROGER I have received your last transmission satisfactorily.

SAY AGAIN Request for repetition of a whole, or part of a message.

MESSAGE The transmission to follow will require to be written down.

FIGURES Used before groups of numbers sent digit by digit.

GRID Used before any encoded reference or grid reference sent in clear speech.

RADIO CHECK Report how you receive my transmission.

SPEAK SLOWER Transmit at a lower speed.

BREAK I am separating the text (during a long transmission) or I have finished transmitting to you and want the next identified station to reply.

TIME The following group is a time group or a date time group.

UNKNOWN STATION Used when calling a Station whose identity is not known.

WRONG Your last transmission was incorrect. Correct version is...

Phonetics

19. Sometimes it may be necessary to spell out words in a clear, deliberate and unmistakable way. You may need to do this when radio reception is weak, interrupted, background noise is high, the word is difficult to pronounce, or perhaps when a radio operator has strong accent. The system of representing vocal sounds and spellings the same way is called the phonetic alphabet and the standard is internationally accepted and understood.

Phonetic Pronunciation 20. Phonetic pronunciation can be used for both letters and numbers; the individual letters being replaced with a single word. The first letter of the word is the same as the letter it represents, and the words are specially chosen to be unmistakable. The numbers also have a single distinctive word to represent them and a list of letters, numbers, words and the appropriate pronunciations are given in (Annex A) a small selection is shown on the next page.

<u>Letter</u>	<u>Word</u>	<u>Pronuciation</u>
A	Alpha	<u>AL</u> FAH
B	Bravo	<u>BRAH</u> <u>VOH</u>
C	Charlie	<u>CHAR</u> LEE
D	Delta	<u>DELL</u> TAH

21. By looking at the above list you will see that any message containing phonetics is going to be much longer than one that does not. As a result you should always use phonetics with care, being aware that transmission time will be increased, reducing battery life on portable equipment and net availability.

22. Certain parts of a transmission are vital and should always be sent using phonetics to prevent any misunderstanding. For example, the callsign of a station, map references, times and ATC channel numbers. Callsigns are sent using phonetics so that the listener can be sure they are being called. It can be confusing if more than one station tries to answer a message at the same time.

Map References

Grid References

23. Map References should always be preceded by the Proword GRID to alert the listener that the phonetic numbers that follow are a map reference. It is most likely that the map reference will be written down so it should be given at a slower speed than normal. It will assist you as a sender if you write the grid reference down yourself so you can repeat it if necessary.

Example

Grid reference TQ 123 456 would be given

“GRID Tango Quebec Wun Too Tree Fower Fife Six”.

Time

24 Hour Clock

24. Particular care should be taken when a message contains timings or reference to time. The recipient of a message should be under no illusion as to the units of time to be used, hours, minutes or even seconds.

25. The time of day should always be given using the 24-hour clock with the word hours missing.

Example

Time 13 40 Hours Would be given "Time Wun Tree Fower Zero"

Air Cadet Frequencies

Radio Frequencies

26. The Air Cadet Organisation has been allocated a selection of Radio frequencies. The frequencies most suitable for hand held and mobile equipment are those using Very High Frequencies (VHF) and Ultra High Frequencies (UHF). The range of these frequencies are suited to short range and normally limited to about line of sight. You are most likely to use this short-range equipment throughout your training and when on camps or exercises.

Discipline

27. Poor Discipline degrades communications efficiency, accuracy and security. You should always try to follow these guidelines:

ALWAYS

- ✓ Use correct voice operating procedure.
- ✓ Maintain a constant listening radio watch.
- ✓ Ensure the correct frequency or channel is selected and used.
- ✓ Answer all your calls promptly.
- ✓ Think before transmitting and make sure that you know your message.
- ✓ Release the transmit switch as soon as you have finished speaking and make sure that the set returns to receive.

NEVER

- X Violate radio silence unless an emergency makes it necessary.
- X Compromise classified information by using plain language.

- X Make unnecessary, over-long or unofficial transmissions.
- X Identify yourself or your unit by name.
- X Swear or lose your temper.
- X Disclose Air Cadet Frequencies.
- X Give telephone numbers or addresses.

Sending a Message

Radio Check

28. When a radio station first switches on it is necessary to establish if communications are satisfactory. The operator should carry out a 'Radio check' to achieve this. A radio check is a two-way communication which reports on two aspects of the transmission, its strength and readability. The strength of a signal is divided into 5 levels or degrees. They are:

- Loud (the strongest)
- Good
- Weak
- Very weak
- Fading (the weakest signal)

Readability

29. Readability is the capacity of understanding and has six different grades or degrees which are:

- Clear
- Readable
- Unreadable
- Distorted
- Intermittent
- Interference

30. Replies should be any combination of strength and readability. For example:
Loud & clear, very weak & readable or fading & intermittent.

31. Radio checks can be with a known station. For example:

MRG91 This is MRG84 Radio check over.

MRG84 This is MRG91 Good Readable radio check over.

MRG91 This is MRG84 Loud clear out

32. Alternatively radio checks can be obtained by calling generally on the net using the two phonetic code words ALPHA CHARLIE. When a radio check is preceded by Alpha Charlie, it indicates that any station may give a reply for example:

Alpha Charlie This is MRG84 Radio check over

MRG84 This is MRG77 Good readable radio check over.

MRG77 This is MRG84 Weak readable out.

Messages

Callsign

33. Messages sent on the radio consists of 3 distinct elements they are:

- a. The Call. The call is always at the start of a message and is in the following format:

MRG 02 M1 This is MRV 12 over.

MRV 12 This is MRG 02 MI send over.

Text

- b. The Text. The text is the part of a message which conveys the meaning or the instructions. It may take more than one transmission to pass on the entire message. This is an example of text:

End of a message

MRG 02 M1 This is MRV 12 move to this location and report on arrival over.

it is the end of that message. For example:

MRV 12 This is MRG 02 MI wilco out

34. In this example, the network control station MRV12 instructed a mobile unit MRG02 MI to report to his location. The mobile unit replies that the message has been received and understood and that they are complying with the instructions.

Established Communications

Abbreviated Callsigns

35. You can see from the above examples that the transmission is dominated by the callsigns. This makes for more difficult and overlong transmissions. To make transmissions shorter, VHF/UHF stations may omit the 'MR' part of a callsign after the initial contact has been made using the full callsign and on each station's last transmission the full call sign should again be given. The above example is now shown with the callsigns shortened:

MRG 02 M1 This is MRV 12 over.

MRV 12 This is MRG 02 MI send over.

G 02 M1 This is V 12 what is you location over.

V 12 This is G 02 M1 Grid Tango Lima wun too tree fower fife six over.

G 02 M1 This is V 12 can you see the castle over.

V 12 This is G 02 M1 negative over

MRG 02 M1 This is MRV 12 roger. Move to this location and report on arrival over.

MRV 12 This is MRG 02 MI wilco out

CHAPTER 3

RADIO EQUIPMENT

Base Stations

1. Fixed installations at Squadron or Unit HQs are known as Base Stations. Base Station equipment is chosen for its reliability, stability and power output. The range for UHF or VHF Base Stations may exceed 50 Km.

Fig 3-1 A VHF Base Station



Mobiles

2. Mobile installations fall into two sub-categories:
- Vehicle installations (temporary or permanent).
 - Man portable equipment.

Vehicle Equipment

3. For vehicle equipment, reliability is a most important criterion coupled with a requirement for robustness to withstand vibration and shock loads. Vehicle equipment is also required to be reasonably efficient as it is usually powered from the vehicle's battery. Power output requirements are not as high as for base station equipment. The effective range is usually less, perhaps up to about 30 Km.

Man Portable Equipment

4. Man portable mobile equipment either comprise of back-pack installations or hand-portable. As with vehicle mobile equipment reliability and robustness are most important. The choice of equipment depends upon the desired range, service

life of the battery and duty cycle.

5. Back-pack equipment will be necessary where the range required is up to 10-15 Km depending upon the terrain. Also, because a greater capacity battery can be used, it gives an operational capacity of between 12- 24 hours on say a 95-98% duty cycle.

Fig 3-2 A Hand Portable



6. Most hand portable transceivers will only have a range of about. 1-5 km, and again dependent upon the terrain. A normal 95% duty cycle will give a battery life of about up to 6-8 hours on a full charge.

Duty Cycle

Duty Cycle

7. The duty cycle is the ratio between transmit and receive time, expressed as a percentage. A usual duty cycle value of 5/10/85% is common, meaning the transceiver is used to transmit for about 5%, receives for about 10% and on standby for 85% of the battery life. This is important when considering power supply implications, since transmitting uses much more power than receiving or on standby.

Fig 3-3 Temporary Base Station



If a station is to carry out a lot of transmitting, it will need a much larger power supply than a station which spends a long time on receive.

Safety precautions

8. The type of batteries used for hand held and mobile equipments require a high current capacity. In view of this, when they are not attached to the radio they should be handled with care. You are reminded of the following points:

NEVER

- X Charge lead acid batteries in a confined space.
- X Carry loose batteries in pockets or bags.
- X Short the terminals together.

ALWAYS

- ✓ Cover battery terminals in transit or when not in use.
- ✓ Keep lead acid batteries upright.
- ✓ Charge with the correct type of charger.

Operating Range

9. The effective range of a radio depends upon a combination of several factors. The main factors, which will affect the range you will be able to achieve, are:

- a. The frequency band in use.
- b. The power output of the transmitter.
- c. The sensitivity of the receiver.
- d. The efficiency of the aerial system.
- e. The prevailing atmospheric conditions.
- f. The position of the aerial.

10. Many of these you will be unable to change but some you will be able to influence, for example a fully charged battery in a portable will mean maximum power output during transmission.

Aerial Position

11. The Aerial positioning can have a marked effect on range. Standing too close to metal objects or buildings can restrict range dramatically. Since the UHF and VHF bands are effectively limited to line of sight communication, the aerial should be positioned as high as possible to achieve the greatest range. There are several safe and effective ways to increase the height of an aerial. For example, if you are in a valley and are having difficulty contacting others, then you could walk to the top of one of the hills. You should never try climbing up a steep cliff to gain height as you could fall and hurt yourself. You may be tempted to climb a tree or some other structure to achieve better results, but this again could result in a serious fall and should never be attempted. In an urban environment you could, quite safely, go to the top of a multi-storey car park and this would be an effective way to increase range.

12. One of the more common ways to increase the range of a base station is to put up a mast type aerial. A properly designed and erected aerial can be extremely effective. However, care must again be taken. A falling mast has the potential to cause great injury or damage to property. Masts may present some unforeseen hazards. They may be blown over in a high wind, struck by lightning, touch nearby power lines or you could even trip over the guy ropes. All these problems can be avoided with care and planning. You must always consider the hazards, identify the risks and plan accordingly.

13. A useful exercise to try if you have access to portable equipment is mapping effective communication within your local area. This could initially be carried out on foot with the mobile units moving from one location to another under the direction of a fixed base station or NCS (network control station). The NCS would record the results for review by the group at the end of the exercise. Should one of the mobile units not be able to contact the NCS, then they would return back to the last known good communication point to inform the NCS, and receive further instructions. This exercise could be repeated at different times of the year to see if climatic

affect the results. It would also be useful to carry out a similar survey while on camps, or participating in some other activities. This will help identify the limitations of your communication equipment and enable you to plan activities accordingly. (A blank Exercise form is contained in Annex C)

RADIO RECEPTION - EXERCISE

Sqn Address <i>1142 Sqn Falkirk Peebles Rd</i>		NCS Location <i>GR533 047 Building A46 Callsign MRQ 72</i>		Date <i>05 Jun 99</i> Start Time <i>09 00 Z</i> End Time <i>17 00 Z</i>		Group Names <i>I Jarvis, J Tucker L Hunt, D Brown Callsign MRQ 72 M1</i>	
	Location	Time	Signal Strength	Readability	Remarks		
1	<i>GR545055 Phone Box</i>	<i>09 45</i>	<i>Loud</i>	<i>Clear</i>			
2	<i>GR552043 Phone Box</i>	<i>10 35</i>	<i>Good</i>	<i>Readable</i>			
3	<i>GR549037 Phone Box</i>	<i>11 00</i>	<i>Weak</i>	<i>Readable</i>			
4	<i>GR542022 Phone Box</i>	<i>11 30</i>	<i>Very Weak</i>	<i>Inter-ferance</i>	<i>Suspect power lines causing interference</i>		
5	<i>GR528015</i>	<i>12 15</i>	<i>Very Weak</i>	<i>Readable</i>	<i>Battery changed still the same</i>		
6	<i>GR526026 View Point</i>	<i>12 45</i>	<i>Good</i>	<i>Readable</i>			
7	<i>GR514039</i>	<i>14 15</i>	<i>Loud</i>	<i>Clear</i>			
8	<i>GR514039</i>	<i>14 35</i>	<i>Fading</i>	<i>Readable</i>			
9	<i>GR522047</i>	<i>15 10</i>	<i>Loud</i>	<i>Clear</i>			
10	<i>NCS</i>	<i>16 10</i>					
Briefing & Emergency Instruction <i>Lunch at point 6 (GR 526026) 1 hour duration from 12 30 For emergencies use telephone Boxes and call number below. For lost contact move onto next contact point.</i>							
Emergency phone number <i>01357 431143</i>				Supervisors name & signature <i>Mr Bill Bowman</i>			

Equipment

14. The types of equipment you are likely to come across as a cadet are likely to be quite varied and your Unit Radio Officer will brief you accordingly.

Use and treatment

15. Radio equipment is expensive to buy and maintain. You should take care of any equipment entrusted to you. A few pointers are set on the next page:

NEVER

- X Hold a set by the aerial
- X Leave a radio unattended
- X Alter the settings of the controls unless instructed
- X Transmit close to another radio

ALWAYS

- ✓ Switch off after use
- ✓ Keep dry and clean
- ✓ Turn off additional radios at the same location on the same channel

ANNEXES:

- A. Phonetic
- B. Code Names
- C. Radio Reception Form

PHONETIC ALPHABET

Letter	Word	Pronunciation
A	Alpha	AL FAH
B	Bravo	BRAH VOH
C	Charlie	CHAR LEE
D	Delta	DELL TAH
E	Echo	ECK OH
F	Foxtrot	FOKS TROT
G	Golf	GOLF
H	Hotel	HOH TELL
I	India	IN DEE AH
J	Juliet	JEW LEE ETT
K	Kilo	KEY LOH
L	Lima	LEE MAH
M	Mike	MIKE
N	November	NO VEM BER
O	Oscar	OSS CAH
P	Papa	PAH PAH
Q	Quebec	KEH BECK
R	Romeo	ROW ME OH
S	Sierra	SEE AIR RAH
T	Tango	TANG GO
U	Uniform	YOU NEE FORM
V	Victor	VIK TAH
W	Whiskey	WISS KEY
X	X-ray	ECKS RAY
Y	Yankee	YANG KEE
Z	Zulu	ZOO LOO

NUMBER OR WORD	PRONUNCIATION
0	ZERO
1	WUN
2	TOO
3	TREE
4	FOW ER
5	FIFE
6	SIX
7	SEV EN
8	AIT
9	NIN ER
DECIMAL	DAY SEE MAL
THOUSAND	TOU SAND

The letters A,R,N,J indicate Army, RAF, Navy and Joint use.

Some of these Code Names could be used for similar Air Cadet Appointments.

Code Name	A,R,N or J	Description
ACORN	J	Intelligence Staff
ATOLL	J	Transport support ops staff
BASEBALL	J	Direction / Air Traffic Control
BLUEBELL	J	Marine eng/REME/Engineer
BOXWOOD	N,	A NBC Staff
CRACKER	A	Locating incl artillery intell staff
CONROD	J	Direction officer/air defence rep
CONTRACTOR	J	Movements
FELIX	A	Ammo tech officer
FIREGUARD	R	RAF Regiment
FLOATER	N,A	Amphibious ops officer
FORTUNE	J	Forward air controller
FOXHOUND	A	Infantry
GLOWWORM	J	Ground liason / air liason officer
HAWKEYE	N,A	Aviation officer
HOLDFAST	A,R	Airfield construction
IRONSIDE	A	Armour
KESTREL	J	Infantry ops off.
KINGFISHER	J	Air Liason off.
MANHOLE	A,R	Admin staff
METEOR	N,R	Met forecaster
MOLAR	N,A	Logistics / QM
MOONBEAM	J	Chief of Staff
NOMAD	N,R	Navigation
NUTSHELL	A,R	Q Staff / eqpt
OFFSET	J	Offensive support ops rep
PADRE	J	Chaplain
PLAYTIME	A	Transport
PRONTO	J	Signals

RICKSHAW	A	Ordnance
SEAGULL	J	Air staff (ops)
SHELDRAKE	N,A	Gunnery staff
SHOTGUN	J	Armourer
SPINDLE	J	Airborne forward air controller
SPYGLASS	R	Air reconn
STARLIGHT	J	Medical
SUNRAY	J	OC
VESTMENT	J	Air contact officer
WATCHDOG	J	Provost

RADIO RECEPTION EXERCISE

Sqn Address		NCS Location		Date		Group Names	
		Callsign		Start Time			
				End Time			
	Location	Time	Signal Strength	Readability	Remarks		
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
Briefing & Emergency Instruction							
Emergency phone number				Supervisors name & signature			