Aviation Radio Communications

Tonight . . .

Introduction and Objectives

Purposes and Priorities in Aviation Communications

Law and Regulations Part I – Essentials

Technical Basics . . . Radio Spectrum, Equipment & Operation

Break

Vocabulary & Vocal Technique

Phonetic Alphabet & Numerics

Emergency and Urgency Communications

Law and Regulations Part II – the ROC-A Exam

Study References & Links

Recap Q's & A's

Objectives . . .

Provide background knowledge for pilots to use radio for in-flight and field operations

Provide study information needed to obtain the Transport Canada Restricted Operators Certificate (Aviation) - ROC-A.

When might aeradio be used?

Ground operations . . . flight line movements, facilities, runways in use

Pre-flight radio check . . . between glider and tow pilot or ground station

Take-off and tow . . . between glider and tow pilot

In-flight between aircraft . . . position report, conditions & PDM

Air-to-ground and ground-to-air . . . position reporting, circuit entry for landing, pilot & public service

Glider to Ottawa Terminal . . . position report, requesting clearance to altitude, leaving airspace, going off frequency

Distress or Urgency

Field Ops

Aviation Communications

- Use of radio in aeronautical service is restricted to communications relating to

(a) the safety and navigation of aircraft

(b) the general operation of aircraft

(c) the exchange of messages on behalf of the public

Radio Communication Regulations S(6)

Radio Communication Act . . .

No person shall . . .

9(1)(a) - knowingly send, transmit or cause to be sent any false or fraudulent distress signal, message or call of any kind

9(1)(b) - interfere with or obstruct any radio communication without lawful excuse

4(1) - install, operate or possess radio apparatus, except under or in accordance with a radio authorization.

Fines up to $25,000, depending on nature of offence.

9.1 & RIC-21 4.2

Radio Communication Act . . .

A license is required to possess and to operate an aviation radio.

Applicants must satisfy the examiner (RIC-21 3.1) that they:

- are capable of operating the equipment
- possess general knowledge of radio operating procedures and international regulations and specific knowledge of regulations relating to the safety of life
- possess general knowledge of the Radio Communications Act and its Regulations

Radio Communication Act . . .

Privacy of Communications

9(2) No person shall intercept and make use of, or intercept and divulge, any radio communication, except as permitted by the originator of the communication or the person intended by the originator of the communication to receive it.

Restrictions do not apply to messages of distress, urgency, safety or to messages addressed to “all stations.”

Also RIC-21 4.2

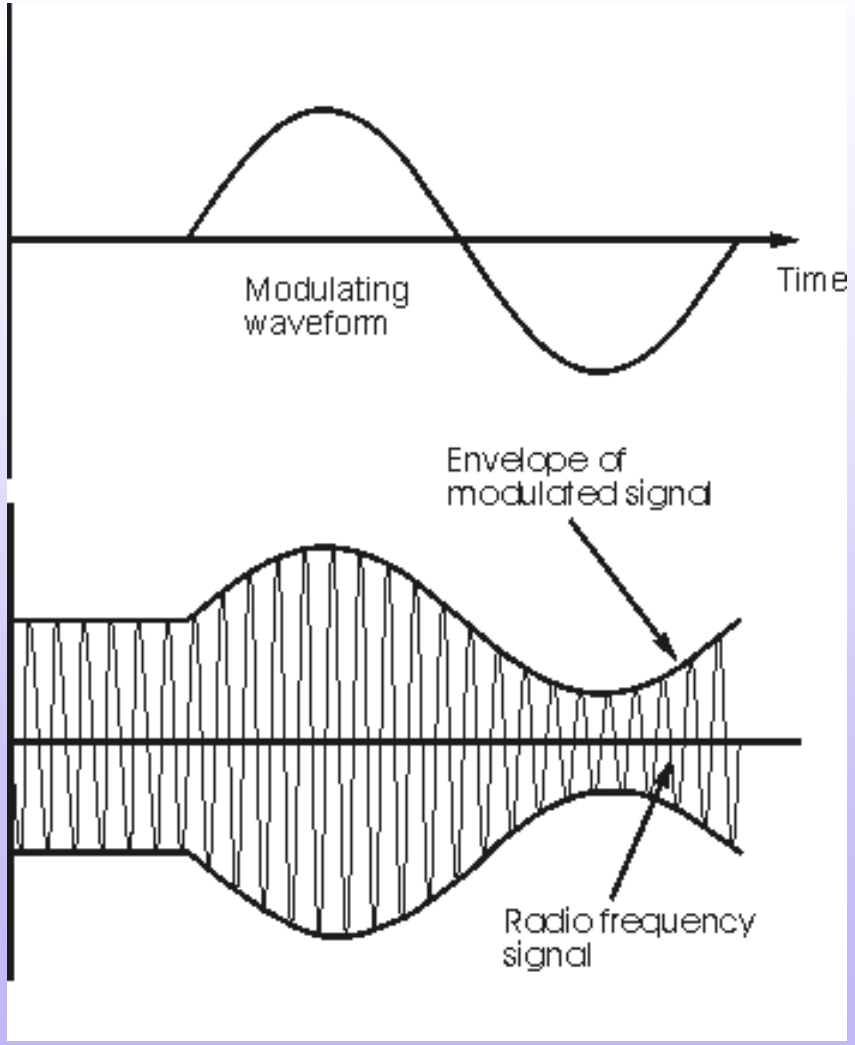
“What’s on-air stays on-air.”

Radio Communication Act . . .

Priority of Communications

1. Distress – grave or imminent danger requiring immediate assistance. All non-affected stations clear the frequency.
2. Urgency – concerning the safety of an aircraft or a person, not requiring immediate assistance.
3. Radio direction finding - eg. FLARM, transponder, VDF steer
4. Flight safety – eg. traffic movement in circuit, land-out
5. Weather messages
6. Technical service/operations (Flight regularity) – eg. Refueling
7. UN Charter messages
8. Government messages – priority expressly requested
9. Service comms - related to the telecom service or previous messages

Technical Basics

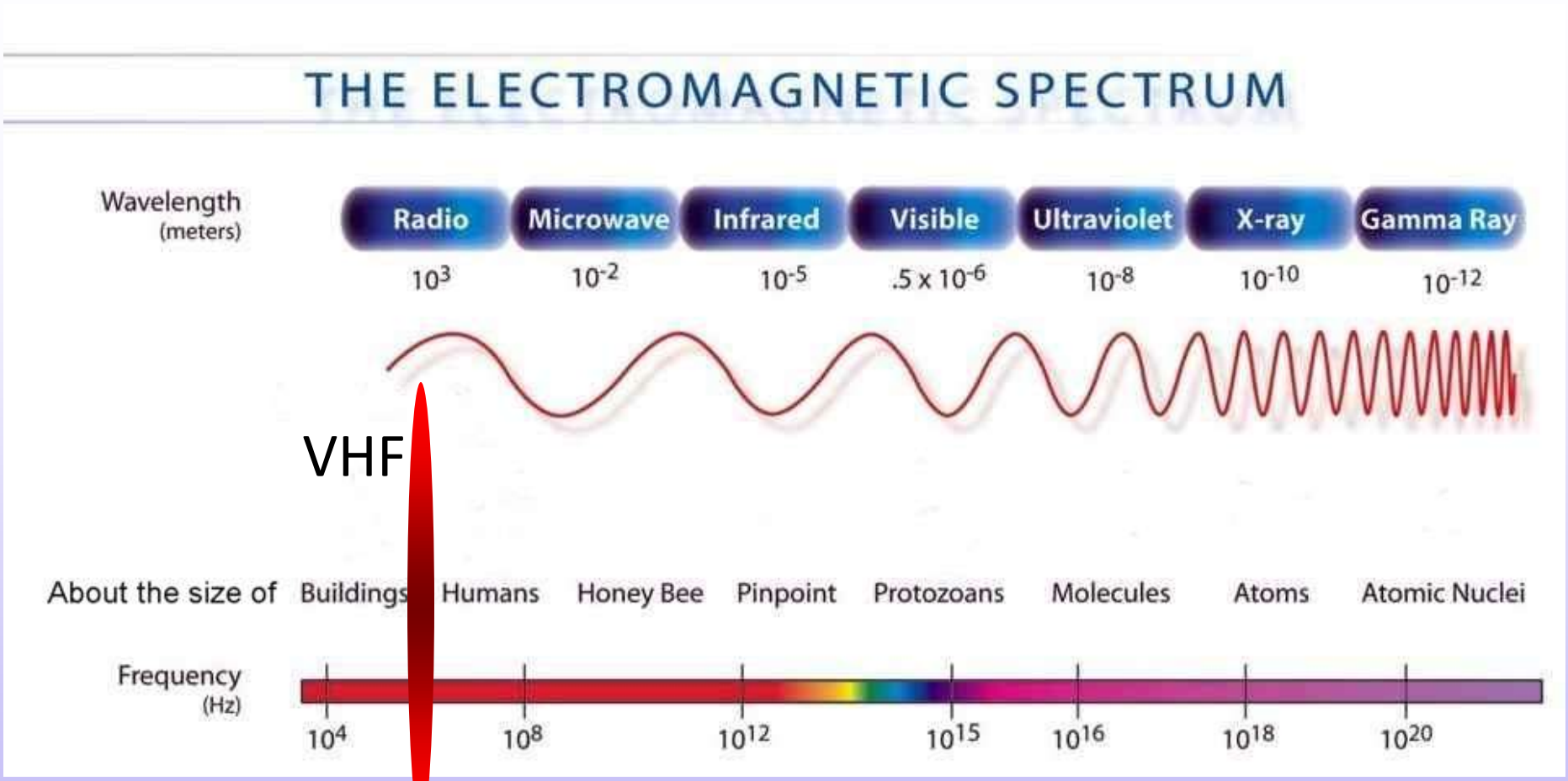


Radio frequencies are expressed in cycles per second, in thousands of cycles per second (kHz), in millions (MHz) or billions (GHz).

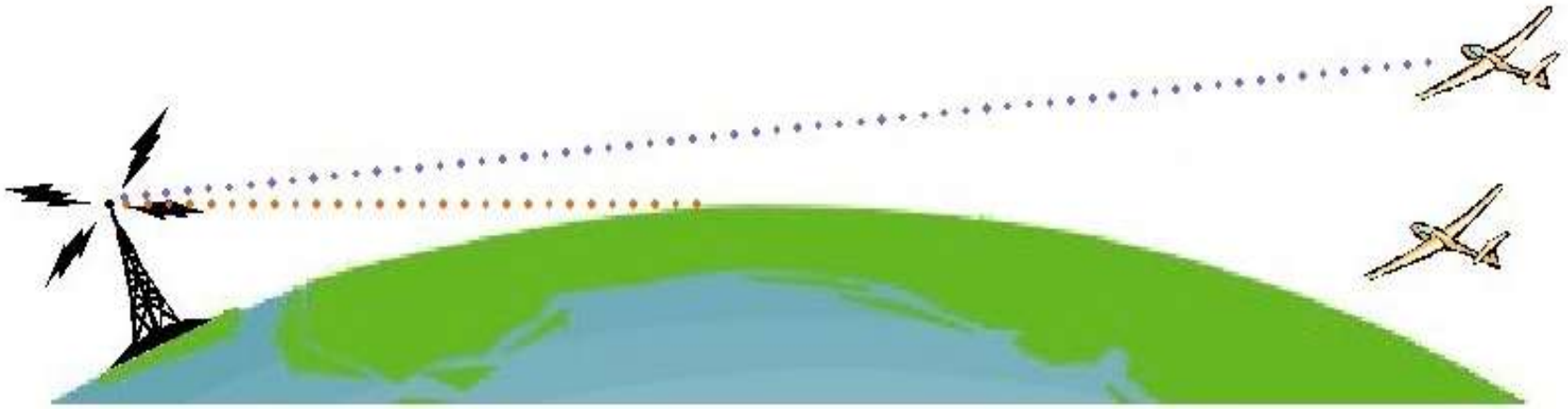
The linear measurement of the wave is the **wave length.**

The period, or timeframe, in which the wave vibrates between its crest and trough is called a **cycle.**

The number of cycles per second of time is the **frequency.**



Aviation Band: 118.000 – 136.000 MHz



Aircraft (VHF) Radio works in line of sight only.

Local Aerodrome Frequencies

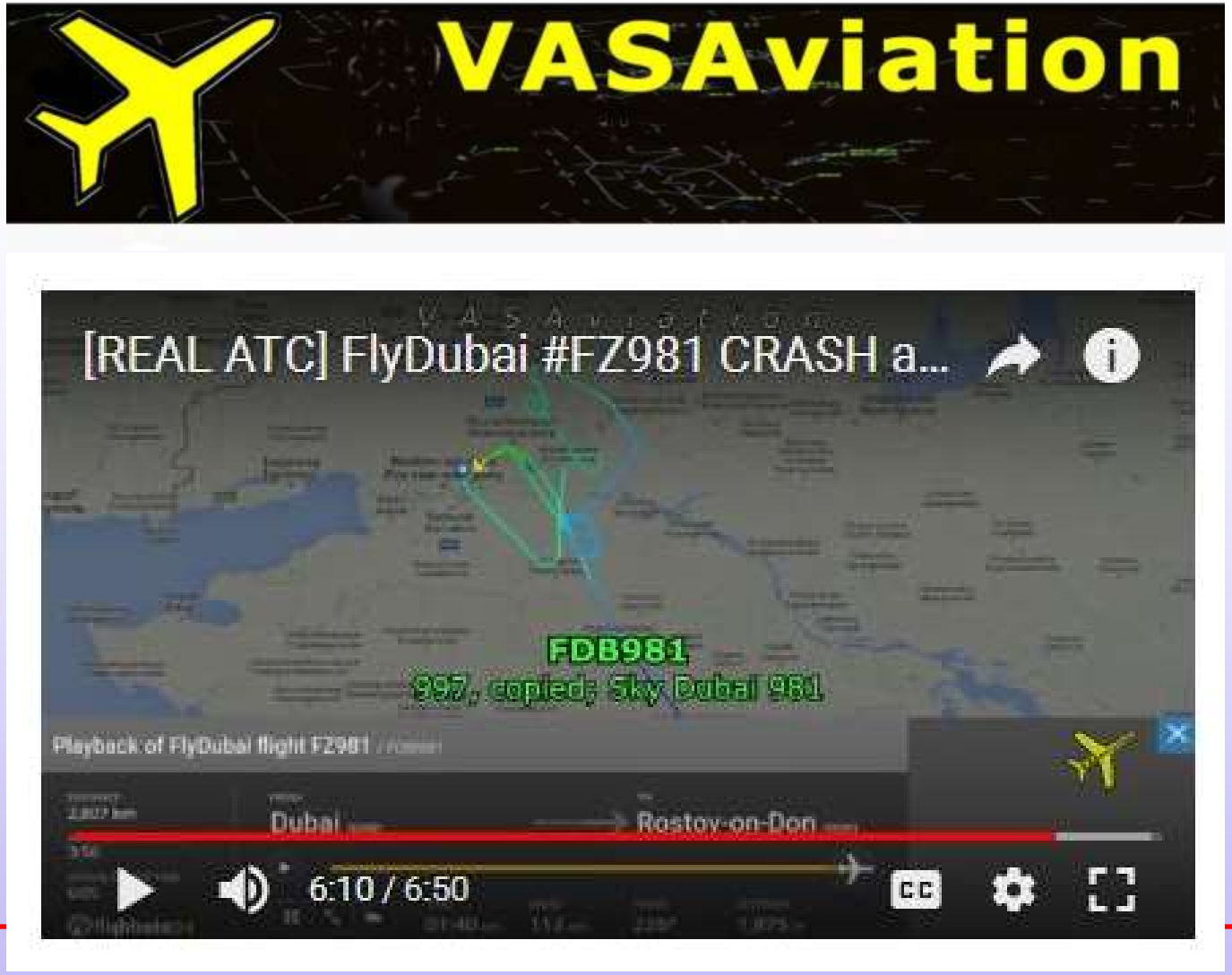
Pendleton/GGC	123.3
Hawkesbury/MSC	123.3
Kars/RVS	123.4
Ottawa Terminal (Montreal)	127.7
In-flight – Cross-country	126.7
- recorded by FISE/FIC (SAR)	
In-flight – Soaring	123.4
Aeronautical Emergency	**121.5**
Search and Rescue	**121.6**

Terminal 127.7

Break Time?

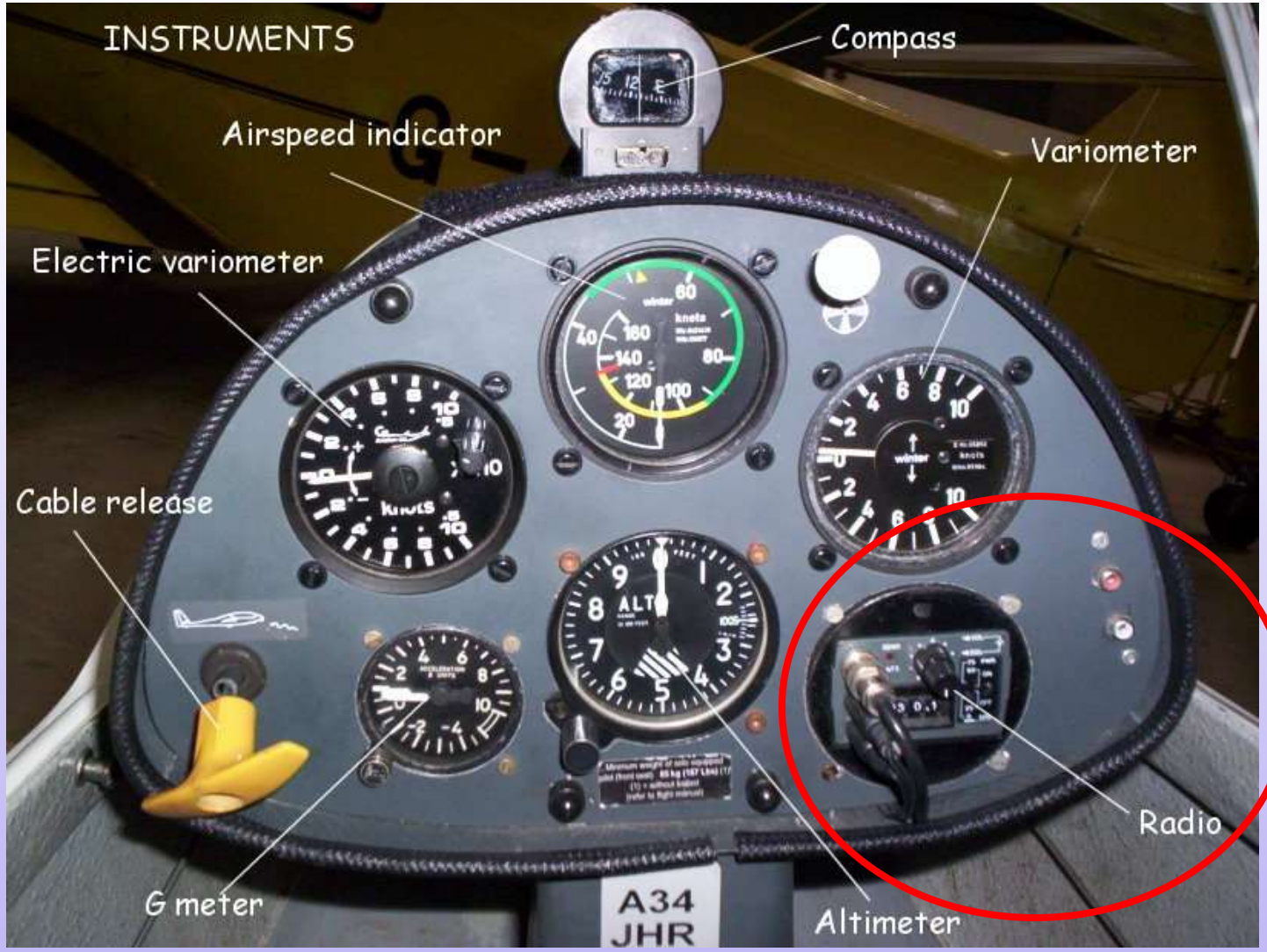
liveatc.net/

Ottawa Terminal Live . . . https://www.liveatc.net/hlisten.php?icao=cyow&mount=cyow3



[VAS Aviation]
https://www.youtube.com/@VASAviation

Onboard Radios


INSTRUMENTS
Compass
Airspeed indicator
Variometer
Electric variometer
Cable release
Radio
G meter
Altimeter
A34
JHR

Operating Procedure

Radio communication consists of four parts:

1. Call-up
2. Reply
3. The Message
4. Acknowledgement

Technique . . .

- Listen briefly on the channel before transmitting. Make sure you will not interrupt stations already in contact.
- Plan your message before transmitting so your call will be brief and clear.
- Speak clearly at a moderate rate, neither too fast, nor too slow.
- RIC-21 5.1 & VFR Phraseology Guide, pg. 15

International Phonetic Alphabet (RIC-21 5.3)

A – ALFA	B – BRAVO
C – CHARLIE	D – DELTA
E – ECHO	F – FOXTROT
G – GOLF	H – HOTEL
I – INDIA	J – JULIETT
K – KILO	L – LIMA
M – MIKE	N – NOVEMBER
O – OSCAR	P – PAPA
Q – QUEBEC	R – ROMEO
S – SIERRA	T – TANGO
U – UNIFORM	V – VICTOR
W – WHISKEY	X – X – RAY
Y – YANKEE	Z – ZULU

Pronouncing Numbers

(RIC-21 5.3)

NUMERAL	PRONUNCIATION
0	ZERO
1	WUN
2	TOO
3	TREE
4	FO-WAR
5	FIFE
6	SIX
7	SEVEN
8	ATE
9	NINER

Transmission of Numbers (RIC-21 5.4)

Except for whole thousands, all numbers should be pronounced using separate digits:

10 = “One Zero”

5800 = “Five Eight Zero Zero”

13,000 = “One Three Thousand”

Numbers with decimals:

123.4 = “one two three decimal four”

Altitudes: 2700 = “two thousand seven hundred”

Headings: 180 degrees = “heading one eight zero”

Common Words and Phrases (RIC-21 AppB) . . .

Acknowledge – Let me know you've received and understood

Affirmative – "Yes."

Cleared (or Approved) – Authorized to proceed under conditions specified

Confirm – I have received, or, Did you receive the message?

Correction – An error has been made. Correct version is . . .

Go Ahead – Proceed with your message

Over – Transmission ended, awaiting response (Out – No response)

Say again – Repeat for clarity or "I say again"

Monitor – Listen (on frequency . . . xyz)

Negative – "No," or that is not correct, or I do not agree.

Roger – I have received all of your last transmission

Standby – I must pause for a few seconds or minutes. I will call you.

Wilco – Instructions received, understood, will be complied with

Reference: RIC-21 Appendix B & VFR Phraseology Guide, pg. 6

Air Traffic Services (ATS) units . . .

VFR Phraseology Guide, pg 11

ATS unit	Service	Call Sign (location + …)
Airport Control	Clearance Delivery	… CLEARANCE DELIVERY
	Ground Control	… GROUND
	Tower Control	… TOWER
Terminal Control	Arrival Control	… ARRIVAL
	Departure Control	… DEPARTURE
	Terminal Control	… TERMINAL
Area Control		… CENTRE
Flight Service Station (FSS) & Flight Information Centre (FIC)	Airport Advisory Service (FSS)	… RADIO
	Flight Information Service Enroute – FISE (FIC)	… RADIO
Examples: Ottawa Terminal, Ottawa Tower, Montréal Centre, Québec Radio		

Air Traffic Services (ATS) units . . .

From the VFR Phraseology guide: Aircraft Identification

"On initial contact with any ATS unit you must identify yourself using your full identification (call sign).
Aircraft Manufacturer/Type + Last 4 Characters of Aircraft Registration

If ATS refers to your aircraft using an abbreviated call sign, you may then begin using that abbreviation."
Last 3 Characters of Aircraft Registration

'Helicopters, gliders and ultralights may prefix their call sign with "Helicopter", "Glider" or "Ultralight" instead of the manufacturer name or type.'

Radio reporting procedure

- 4 parts
  1. Who are you calling?
  2. Who are you?
  3. Where are you? (includes altitude & direction)
  4. What are your intentions/future actions?

Who are you calling?

- Kars Traffic, Pendleton Traffic (ATF: Aerodrome Traffic Frequency)
- Golf-Romeo-Victor-Siera (GRVS)
- Delta-Yankee-India (DYI)
- Ottawa Terminal (ATC for clearance)
- Mobile 9 (handheld radio)
- Kars Station (picnic table)
  – Ground is a Controller that authorizes movement on the ground.

Who are you?

- “This is”
- Type of aircraft – A319 Heavy, Glider, Tow Plane, Citabria, Beech 19 Sport
- Registration – Golf-Delta-Yankee-India, Delta-Quebec-Kilo, Foxtrot-Bravo-Oscar-November
  - ❑Initial “Charlie-” not required in Canada but in US ie. Lake Placid
  - ❑Initial “Golf-” not required but “Foxtrot-” or “India-” mandatory (deprecated)

Where are you?

- Location in relation to aeronautical object
  - Airport, Nav Aid ie. VOR, NDB, Intersection
    - Kars (CPL3), Pendleton (CNF3), Smiths Falls (CYSH), Brockville (CNL3), Alexandria (CNS4)
    - avoid local references ie. Bourget, 416 bridge
  - approx. distance in Nautical Miles ie. 5 miles
  - direction ie. South-east, West
  - Left-hand downwind, Runway 26
- Altitude in feet ASL (in Canada)
  - If necessary to use ‘above ground’, specify AGL

What are your intentions / future actions

- Your actions or requested clearances
  - landing Runway 26
    - full stop, touch & go, low & over, stop & go
  - Request 5000’ and below from Kars to Smiths Falls
  - Request 6000’ and below in the CYA remaining south of Kars at all times
  - Unable to maintain over 4000, terminating services with you (Ottawa Terminal)
    - Returning to the CYA, terminating services with you

Misc

- Typical frequencies: CPL3 123.4, CNF3 123.3, YOW Terminal 127.7, enroute 126.7, soaring enroute 123.4 (CYND FBO), CYOW ATIS 121.15
- Typical aerodrome contact zones: 5 Nm, 3000 AGL
- To be avoided:
  - "Conflicting traffic please advise"; implied in your position & intentions
  - "Kars Ground" – there is no controller at the field

Your turn to practice . . .

- Recite your name to your partner using the phonetic alphabet
- You are glider G-ABC. Call tow plane DYI requesting radio check.
    - DYI pilot replies, saying . . . "Read you 5." VFR Phrase Guide, pg 19
    - "Strength 5, Readability 5" deprecated
- You are Pendleton Station. You have a student waiting for the next instructional flight. Call glider G-CDE in-flight requesting their estimated return time.
    - G-CDE replies: 3 miles west of the field, inbound at 3,300 feet, estimating 10 minutes to landing.
- Practice for exam night. Use the phonetic alphabet with friends' names, license plate numbers, pizza toppings . . . whatever.

Your turn to practice . . .

Volunteers to say the following aircraft registrations:

1) C-GQIH
2) C-FGPH
3) C-GDYI
4) C-GIFX
5) C-GJCZ
6) C-FBQN
7) C-GGHC
10) C-GRVS
11) C-GGDK
12) C-GDQK
13) C-FUYE
14) C-GIAK
15) C-FBON
16) C-FDUZ
20) CF-ERD
21) C-GVXQ
22) C-GVVM
23) C-GDUO
24) C-FNKI
25) C-GLTU
26) C-FITD

Emergency Communications - - - Distress

MAYDAY

“Condition of being threatened with grave and/or imminent danger requiring immediate assistance.”

(RIC-21 6.)

MayDay

Emergency Communications (RIC-21 6.3)

Frequencies:

- First transmission should be on local operating frequency
- If that does not work use 121.5 – International Standard
- If that does not work use 126.7 – Cross country monitor

MAYDAY Distress Message (RIC-21 6.7, 6.8)

1. “MAYDAY” – 3 times
2. Call Sign – 3 times
3. Position: altitude, heading, airspeed
4. Nature of distress condition
5. Your intentions
6. S.O.B. = Souls on Board
7. Anything that can help locating you
8. Call sign

Example . . .

“MAYDAY - MAYDAY – MAYDAY”

“Glider Golf Alpha Bravo Charlie

Alpha Bravo Charlie

Alpha Bravo Charlie

MAYDAY

25 miles north of Gatineau, 2400 feet, Heading 180

Control failure

Doing forced landing

One person on board

Alpha Bravo Charlie”

Acknowledgement of Distress Call (RIC-21 6.14)

Call sign of station in distress

Call sign of acknowledging station

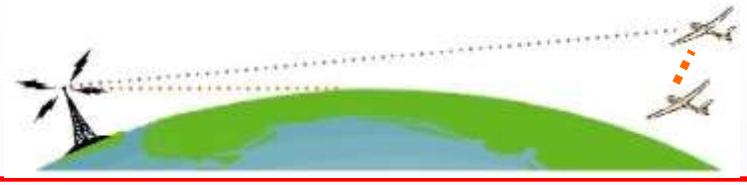
Received MAYDAY

“Alpha Bravo Charlie

Ottawa Terminal – Ottawa Terminal – Ottawa Terminal

Received MAYDAY”

MAYDAY RELAY



Used when the station in distress is not in a position to transmit the message or the PiC of the station that intervenes believes further help is needed.

(RIC-21 6.16)

"MAYDAY RELAY" – three times

1. Call sign of the relaying station
2. "MAYDAY" – once
3. Call sign of the station in distress
4. Information/Details
5. Call sign of the relaying station

Example . . .

“MAYDAY RELAY – MAYDAY RELAY – MAYDAY RELAY

This is Glider Golf Delta Echo Foxtrot

MAYDAY

Glider Golf Alpha Bravo Charlie is

25 miles north of Gatineau, 2400 feet, Heading 180

Control Failure

Doing forced landing

One person on Board

Delta Echo Foxtrot”

Action by Receiving Station (RIC-21 6.15)

1. Forward info immediately to appropriate SAR agency
2. Guard the frequency on which the distress call was received
3. Notify any station with direction finding or radar facilities
4. Cease all transmissions which may interfere

Imposition of Silence (RIC-21 6.17)

The station in distress or the station in control of the distress traffic may impose silence on all stations in the area or on any station which interferes with the distress traffic.

“ALL STATIONS – ALL STATIONS – ALL STATIONS

This is Ottawa Terminal

Seelonce Distress

Out”

Cancellation of Distress (RIC-21 6.18)

“MAYDAY

HELLO ALL STATIONS, HELLO ALL STATIONS, HELLO ALL STATIONS

This is Ottawa Terminal

Time 1630 Zulu

Glider Golf Alpha Bravo Charlie

Seelonce Feenee

Out”

Emergency Communications - - - Urgency

PAN PAN (RIC-21 7.)

The station calling has an urgent message concerning the safety of an aircraft or the safety of a person but which does not require immediate assistance.

<u>Same procedures apply as for MAYDAY</u>

See pages 20-22 in RIC-21.

Pan Pan

When will radio be used?

Ground operations . . . flight line movements, facilities, runways in use

Pre-flight radio check . . . between glider and tow pilot or ground station

Take-off and tow . . . between glider and tow pilot

In-flight between aircraft . . . position report, conditions & PDM

Air-to-ground and ground-to-air . . . position reporting, circuit entry for landing, pilot & public service

Glider to Ottawa Terminal . . . position report, requesting clearance to altitude, leaving airspace, going off frequency

Distress or Urgency

"Oops"

Preparing for the Exam

70% passing grade

Multiple choice questions plus phonetic communication.

Exam - in person - scheduled for March 11; TBD

For the examiner, how many folx:

- Don’t need the exam (already licenced)
- Definitely want the exam ie. already close to solo this summer
- Not sure/undecided ie. not a member yet

Radiotelephone Operator's Restricted Certificate (Aeronautical)

Based on RIC-21 Study Guide

Eligibility: no age restriction, no impairments

Identity: Government issued Photo ID

Written Exam (COVID-19) + Interview

Operating Regulations and Procedures

see 20 samples in RIC-20 - Appendix C

Practical Test

From the Examiner . . .

- Proof of identity is required: passport, driver's licence or other government issued photo identification showing required information

- Candidates must show originals (not copies) of identification with legal name and birth date. Applications will not be accepted without proof of identity.

- Examiner has some discretion to accept ID’s in combination, for instance, a current student card together with a birth certificate (birth certificates typically do not show a picture, but student cards do).

ROC-A Sample Questions

56. Pilots flying VFR in uncontrolled airspace should monitor
    1. 121.5 MHz.
    2. 126.7 MHz.
    3. 122.2 MHz.
    4. 123.2 MHz.

157. The emergency VHF frequency is
    1. 122.1 MHz.
    2. 118.3 MHz.
    3. 121.5 MHz.
    4. 5280 MHz.

158. An airplane has an engine on fire over a remote area. What radiotelephony call-up signal would the pilot transmit three times?
    1. Mayday.
    2. Pan.
    3. Urgent.
    4. S.O.S.

References . . .

Study Guide for Restricted Operator Certificate (RIC-21) - 2010

http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01397.html

Guide for Examiners (RIC-20) – 2014 **See Sample Questions Appendix C**

http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01018.html#aC

VFR Phraseology (NavCanada)

https://www.navcanada.ca/en/aeronautical-information/operational-guides.aspx
https://www.navcanada.ca/en/vfr-phraseology.pdf

Radiocommunication Act - 2015
http://laws.justice.gc.ca/eng/acts/R-2/FullText.html

Radiocommunication Regulations

https://laws-lois.justice.gc.ca/eng/regulations/sor-96-484/index.html

CARs Sections 602.133 – 602.138
https://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/page-63.html#h-994499

Ottawa Terminal Live . . . https://www.liveatc.net/hlisten.php?icao=cyow&mount=cyow3