CAA Private Pilot's License (A) Reference Memorandums

Memo 5: Communications

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Contents

1. Legal

- To gain a FRTOL, you must:
  - Pass a written exam
  - Pass a practical exam
  - Passes are valid for 12 months alone, or 24 months as part of a PPL
- Valid for the period of your pilot's license (i.e. for life*)
- Can be issued as a 10 year standalone
- Minimum age 14
- Must be renewed by test if not used for more than 10 years as a standalone
- Must be issued by the same state as the A/C is registered
- VHF only (>60MHz), unless you also have an HF radio theory exam pass
- No person may operate an aircraft radio station unless they possess a valid FRTOL
  - unless they are a balloon or glider pilot that does not speak to any ATSU, or;
  - being trained as flight crew.
- The FRTOL doesn't entitle the holder to operate a radio station installed outside of an A/C

2. Radio Basics

- LOS Propogation is roughly: $1.23 \times \left(\sqrt{\text{aircraft altitude (ft)}} + \sqrt{\text{ground antenna altitude (ft)}}\right)$
- Generic range rules:
  - Tower: range 25nm, up to 4000ft
  - Approach: range 25nm, up to 10000ft
  - Other airfields: range 10nm, up to 3000ft, up to 1000ft in immediate area "guaranteed"
  - Though tropospheric ducting can make this further, particularly during high pressure systems (this is not desirable in aviation)

3. Radio Equipment

- Radio Checks
  - Must include frequency and ATSU name
  - Readability ≤ 3, don't fly!
  - Readability Scale:
    Readability 1 Unreadable
    Readability 2 Readable now and then
    Readability 3 Readable but with difficulty
    Readability 4 Readable
    Readability 5 Perfectly readable

4. Message Categories

- There is a defined order of priority for radio messages:
  - Distress
  - Urgency

- Direction Finding
- Flight Safety
- Meteorological
- Flight Regularity

5. Phraseology

- When reporting vertical position, round to the nearest 100ft
- On first report, include the pressure setting
- If you say "climb" or "descend" followed by the word "to", you **MUST** follow it by the word "altitude", "height". "To" is always omitted with flight levels.
- When giving a pressure setting less than 1000 hPa, you **MUST** suffix "hectopascals".
- When giving a heading, if it ends with a "0" (e.g. "230"), you **MUST** suffix it with "degrees".
- For positional information given as clock bearings "10 o'clock", you can use the words "ten", "eleven" and "twelve".
- When given traffic information, the acceptable responses are: "Roger", "Traffic in sight" and "Traffic not sighted".
- Some words and phrases are used for problematic communication:
  I say again Repeating for clarity
  Negative, I say again Readback incorrect, repeating again
  Speak slower Reduce rate of speech
  Words twice The radio is breaking up, please send every word twice (can be a request or as information)
  Correction Correcting an error that was made
  Transmission blocked Multiple stations were talking over each other
- Pilots of single engine A/C can use the phrase "Fanstop" to specify a practice engine failure after takeoff. The response should be "Report climbing away".

6. Message Compilation

- Official position reports (when requested) should contain: position, time, level, next position, ETA.

7. Air Traffic Services

Multiple types:

- Air Traffic Control Service
  - With **or without** radar
  - Prevent collisions between aircraft

  - Maintain a flow of air traffic

- Air Traffic Advisory Service
  - Only in class F airspace (so none in the UK)
  - Provides separation between IFR aircraft

- Flight Information Services
  - Basic information: other traffic, weather, airport availability
  - Inside airspace: approach service, radar service
  - Outside airspace: basic service, traffic service, deconfliction service, procedural service
  - The above only relates to the UK. In the rest of the world, the options are: Flight Information Service (FIS), Radar Information Service (RIS), Radar Advisory Service (RAS)

- Lower Airspace Radar Service (LARS)
  - A collection of available stations to provide various flight information services
  - Available within 30nm of the station, up to FL95
  - Not all are open and available 24/7

- Alerting Service
  - A service that alerts the authorities if an aircraft needs assistance
  - Contractually provided (except with Air/Ground) once radio contact is established between an A/C and an ATSU

> **Note** AGCS *may* also provide an alerting service, but it is not required

7.1. Conditional Clearances

Clearances can be given conditionally, for example “behind the landing 737, behind.” In this case, ATC and the aircraft accepting the clearance MUST be able to see the condition, i.e. the 737 in this example.

7.2. Basic Service

- AFIS can only provide at most a basic service
- Radar not *required*
- Avoidance of traffic is the pilot’s responsibility
- Pilot can deviate at their discretion

7.3. Traffic Service

Basic service, plus:

- Radar required
- Traffic is reported, but no deconfliction advice
- Collision avoidance is the pilot’s responsibility
- Pilots must request deviations
- The ATSU may give specific deviations to follow

7.4. Deconfliction Service

Only available for IFR

Traffic service, plus:

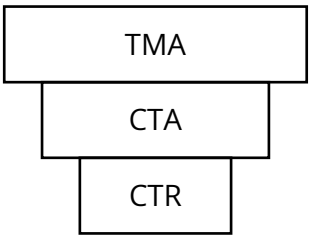
- Deconfliction advise, though avoiding traffic is the pilot's responsibility

7.5. Procedural Service

Only available for IFR

Radar isn't used. Provides the same benefits as deconfliction service.

8. En-route Communications



- CTA (Control Area) transits must be requested and can be done VFR or IFR.
  - Call up to 25 nm away
  - Call up to 10000 ft
- CTR (Control Zone) transits must be requested and can be done VFR, SVFR or IFR.
  - Call up to 25 nm away
  - Call up to 10000 ft
- ATZ (Aerodrome Traffic Zone) transits must be requested if ATC exists, or information must be gained from the ATSU in order for the safe conduct of the flight
  - Recall that ATZs are 2nm* in radius and go up to 2000 ft agl

> **Note** * or 2.5nm in radius to allow at least 1.5km from each runway threshold

  - Call when in the immediate vicinity, up to 1000 ft, and in any event within 10nm and 3000ft
  - Not always open
- MATZ (Military Aerodrome Traffic Zone) transits are recommended to call the controlling authority.

> 🚨 **Caution** MATZs normally have an ATZ within them!

  - Unless otherwise stated, 3000 ft agl, 5nm radius. Additional 4nm wide stubs extend from 1000ft agl to 10nm for each runway.
  - Call 15nm or 5 minutes before entering

A/C: Wattisham Approach, G-BXJB, request MATZ penetration and basic service

ATC: G-BXJB Wattisham Approach, squawk 4501, pass your message

A/C: Squawk 4501, G-BXJB, Cessna 152, Earls Colne to Tibenham, 10 miles north Earls Colne, altitude 2000 feet, QNH 1001, tracking to Tibenham

ATC: G-JB MATZ penetration approved not below height 2000 feet QFE 999 hectopascals

A/C: MATZ penetration approved not below height 2000 feet QFE 999 hectopascals, G-JB

- TMZ (Transponder Mandatory Zone) transits require permission if you do not have a Mode S (outside UK: or Mode A+C) transponder

9. Direction Finding

Some airfields provide VHF direction finding (VDF) equipment and can give you your direction:

QDM magnetic heading to station
QDR magnetic heading from station
QUJ true bearing to station
QTE true bearing from station

QDM and QTE are the most common for to and from the ground station.

Bearing classification:

Class A $\pm 2°$
Class B $\pm 5°$, assumed the default if not specified
Class C $\pm 10°$
Class D $> 10°$

10. Emergencies

Always call on your current frequency first, retaining your squawk. If there is no reply, then set the appropriate emergency squawk and try 121.5 MHz.

⚠ **Warning** Coverage below 2000ft agl can be patchy for London Centre (121.5 MHz)

If you hear another station calling mayday, take notes in case you need to relay details.

10.1. MAYDAY call

Mayday calls only apply to your own aircraft or the people within it.

- Station being addressed
- Callsign
- Type (of a/c)
- Emergency
- Action (your intentions)
- Position
- Altitude
- Heading
- Qualifications (are you instrument rated? which license do you hold?)
- Information (POB, endurance, a/c markings, lifesaving equipment, etc.)

This makes the (rather humerously stupid) mnenomic: SCTEAPAHQI.

Mayday calls can be cancelled if the situation genuinely resolves.

10.1.1. Relaying

If you hear a MAYDAY call but the ATSU cannot hear it, it is your obligation to relay it. In this case, you can use the "MAYDAY" call format, but specify clearly your callsign and the relayed callsign.

10.2. PAN call

Start with "pan pan, pan pan, pan pan", follow with the same information as for a MAYDAY call.

You can cancel a PAN call:

A/C: PAN PAN [your call sign] cancel PAN PAN [reason]

10.3. Radio Failure

Transmit blind in case it's only a partial failure. Prefix the message with "Transmitting blind".

Outside airspace:

- do not enter airspace, unless clearance (except SVFR) was already given
- land at the nearest suitable airfield
- expect light signals

Inside airspace:

- continue as cleared
- land at the nearest suitable airfield
- expect light signals

10.3.1. Transmitter Failure

In the event of the transmitter failure, you could communicate with the speechless code:

.... Initiation of the code
. Yes
.. No
... Say again
-...- I have another emergency

This could be communicated via transponder on/off or carrier wave (PTT switch without voice).

10.3.2. Shepherding Aircraft

To request a shepherding aircraft to lead you to safety, fly a triangle with 2 minute legs. Fly clockwise if your radio recieve is working, fly anti-clockwise if nothing is.

10.4. Fuel Emergencies

- Minimum Fuel
  - Call “Minimum Fuel” if you calculate that you’ll land with the minimum legal fuel remaining, i.e. 30 minutes by day VFR, 45 minutes by night or IFR.
- Fuel emergency
  - A MAYDAY call
  - For when you calculate less than required minimum fuel on landing

11. Traffic Calls

- Where an ATSU isn’t available, make traffic calls on the airfield frequency.
- Air-to-air communication isn’t allowed, but informational messages can be given to avoid a conflict.

11.1. SAFETYCOM

- A dedicated airfield traffic frequency available across the UK where another frequency isn’t provided
- **135.480 MHz**
- Only make transmissions:
  - within 10nm of the airfield
  - Below 2000ft QFE, or
  - less than 1000ft above circuit height
- Prefix **every** message with the airfield name and “Traffic”.