# PPL Theory
# Aeronautical Radio Operation (RARO)

CAE Oxford
Aviation Academy

## RARO 5 – Emergency Procedures

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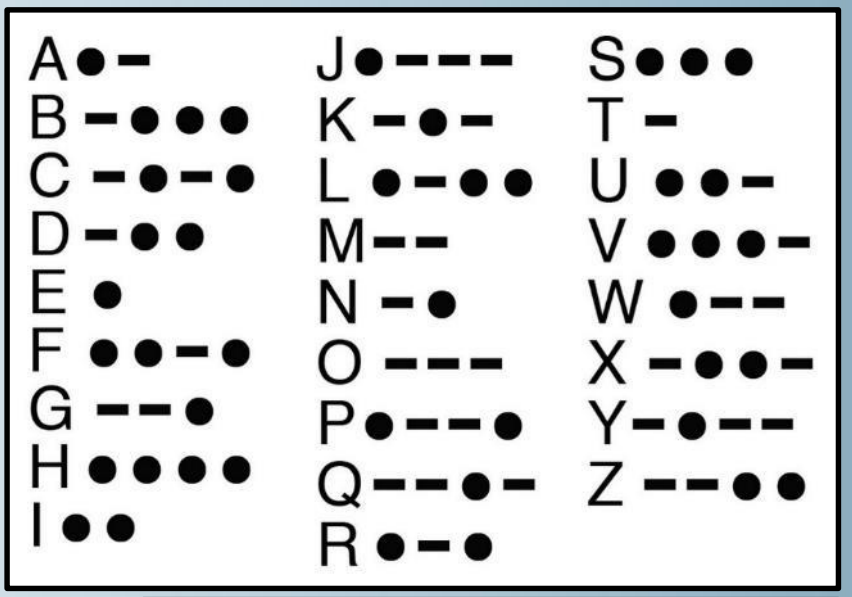
# EMERGENCY SIGNALS

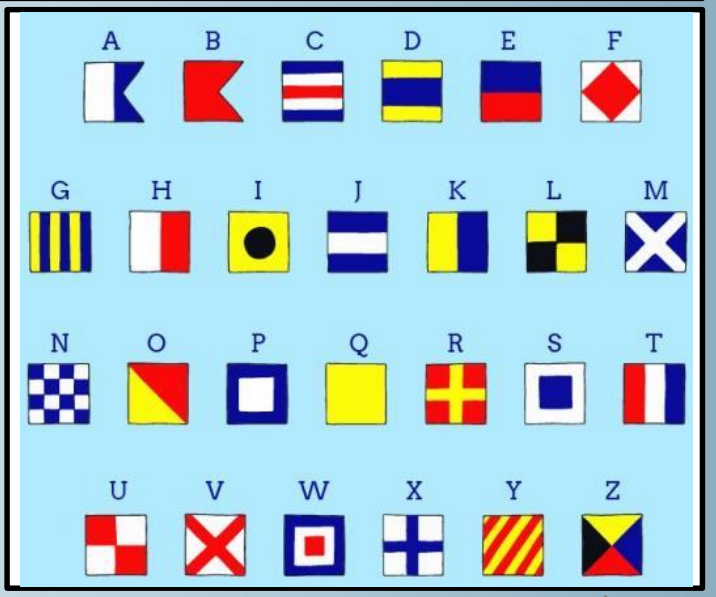
# Emergency Signals

- Aircraft use **emergency signals** to inform ATS and/or other aircraft of **emergencies** and **safety concerns**

- An emergency signal can be sent in many forms, including:
  - **Radio telegraphy (Morse Code)**
  - **Radio telephony**
  - **The International Code of Signals (ICS)**
  - **Pyrotechnic signals (lights or flares)**
  - **The use of aircraft lights**

- Radio telephony is used most commonly today, however, a radio failure may require other forms



# Emergency Signals

**CAR 191**

- Aircraft use **emergency signals** to inform ATS and/or other aircraft of **emergencies** and **safety concerns** – there are 3 emergency signals:
  - **Distress Signal**
  - **Urgency Signal**
  - **Safety Signal**
- The signal that should be used will depend on the degree of the emergency or concern

*A good understanding of English language is essential to properly understand emergency signals*

# Emergency Signals: Distress Signal

**CAR 192 & ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- A Distress Signal must only be used by an aircraft that is in **grave and immediate danger** and **requires immediate assistance**

- It should be used when an **immediate, unplanned forced landing** is required – this could include:

  - **Engine failure**
  - **Structural failure**
  - **Fire on board**
  - **Fuel exhaustion**
  - **Decompression**
  - **Hazardous weather**

*Singapore Airlines Flight 368*
*Engine Fire In-Flight, June 2016*

# Emergency Signals: Distress Signal

**CAR 192 & ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- The correct format for the transmission of a Distress Signal using radio telephony is:

| | |
|---|---|
| **MAYDAY, MAYDAY, MAYDAY** | ***MAYDAY, MAYDAY, MAYDAY*** |
| **THIS IS *(Callsign, Callsign, Callsign)*** | ***THIS IS EOK, EOK, EOK*** |
| ***(Type of aircraft)*** | ***Cessna 172*** |
| ***(Nature of emergency)*** | ***Engine failure*** |
| ***(Intention of PIC)*** | ***Forced landing in a field*** |
| ***(Present or last known position)*** | ***5 miles east of Carrum*** |
| ***(Flight Level/Altitude)*** | ***4000 ft*** |
| ***(Heading)*** | ***Heading 090*** |
| ***(Any other useful information)*** | ***2 persons on board*** |

- Note that in an emergency, the pilot's main focus should be flying the aircraft – you may only have time to transmit an abbreviated MAYDAY

# Emergency Signals: Urgency Signal

**CAR 193 & ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- An Urgency Signal is used by an aircraft that is experiencing **difficulties or problems that require it to land** – however, the aircraft **does not require immediate assistance**

- Situations that may require the use of an Urgency Signal include:
  - **Partial engine failure where controlled flight is still possible**
  - **Pilot unsure of position**
  - **An ill or injured person on-board**

*Asymmetric Flight*
*(engine failure in a multi-engine aircraft)*
*may require the transmission of a PAN PAN*

# Emergency Signals: Urgency Signal

**CAR 193 & ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- The correct format for the transmission of an Urgency Signal using radio telephony is:

**PAN PAN, PAN PAN, PAN PAN**

***(Name of station you are addressing)***

**THIS IS *(Callsign, Callsign, Callsign)***

***(Type of aircraft)***

***(Nature of urgency condition)***

***(Intention of PIC)***

***(Present position)***

***(Flight Level/Altitude)***

***(Heading)***

***(Any other useful information)***

*Note #1:*
*A MAYDAY can be amended to a PAN PAN and vice-versa*

*Note #2:*
*An aircraft may cancel a MAYDAY or PAN PAN*
*"Melbourne Centre, this is EOK, CANCEL MAYDAY, the engine has re-started and I am returning to Moorabbin"*

*Note #3:*
*Aircraft who receive a MAYDAY or PAN PAN should wait until there is no immediate reply from the addressed station (or another station in a better position to assist)*

# Emergency Signals: Urgency Signal

**CAR 193 & ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- If the transmission of an Urgency Signal using radio telephony is unavailable or impractical, the following forms may also be used together or separately:
  - **Intermittent use of the landing lights**
  - **Intermittent use of the navigation lights**
- Intermittent use refers to the repeated switching on and off of the lights

*Hawker 800XP flashing landing lights*

# Emergency Signals: Urgency Signal

**CAR 193 & ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- Note that an Urgency Signal may be sent by an aircraft for other purposes, including:

  - **An emergency change of level in CTA**
  - **The PIC has a safety concern for another ship, aircraft, vehicle or person that may be in distress**
  - **Relaying a MAYDAY call from another aircraft or station that is out of range**

***PAN PAN, PAN PAN, PAN PAN***

***Melbourne Centre***
***THIS IS EOK, EOK, EOK***
***Cessna 172***

***Reporting an incident where a boat is sinking in the bay***

***I will remain circling the area until 0700 after which I will return to Moorabbin***

***Currently 7 miles west of Carrum***
***3000 ft***

***Please respond emergency services***

# Emergency Signals: Safety Signal

**CAR 194 OR VFRG Section 5**

- A Safety Signal is used by an aircraft to send a message about safety, including **hazards to navigation** and **meteorological warnings**

- This may include an encounter with:
  - **A group of birds**
  - **An inoperative or malfunctioning ground facility or navigation aid**
  - **Unexpected meteorological hazards**

- Using radio telephony, a Safety Signal should be transmitted in plain English with the prefix **"SECURITY"** prior to the message

# Emergency Signals: Radio Telephony

**ERSA EMERG OR JEPPS EMERG**

- Note that a Distress Signal transmitted via radio is a **broadcast** – it should be made available for any and all stations to hear and provide assistance

- An Urgency or Safety Signal transmitted via radio is a **report** – it is usually addressed specifically to an ATS unit

- It is also important that pilots transmit on a frequency that is **likely to be heard** – for example, transmitting on an ATS frequency would be better than a CTAF

- The designated international emergency frequencies may also be used:

  - **121.5 MHz (civilian)**

  - **243.0 MHz (military)**


*Aeronautical radio with the Civil International Air Distress (IAD) Frequency on standby*

# RADIO FAILURE

# Radio Failure

**ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- When an aircraft experiences a radio failure, the PIC should follow the procedures contained in the **ERSA/JEPPS**

- These procedures are designed to keep aircraft safe – they also allow ATS and other traffic to anticipate your actions

- The radio failure procedures depend on whether the aircraft is:
  - **Operating under the VFR or IFR**
  - **In CTA/RA or OCTA**

- In this lesson, we will focus on the procedures for VFR aircraft

*Remember that even if the radio has failed, the aeroplane is still flying!*


*Concentrate on controlling the aircraft and maintaining terrain clearance*

# Radio Failure: VFR and OCTA

**ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- For VFR aircraft in Class G Airspace (OCTA), the radio failure procedures are:

- **Remain in VMC**
- **Broadcast intentions with the prefix "TRANSMITTING BLIND"**
- **Remain VFR in Class G Airspace and land at the nearest suitable aerodrome**
- **If operating under a SARTIME, report arrival to ATS via telephone with CENSAR on 1800 815 257**

*Ensure you carry out troubleshoot checks:*

- *Radio switch ON*
- *Correct frequency selected*
- *Headset plugged in*
- *Radio volume turned up*

# Radio Failure: VFR in CTA/RA

**ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- For VFR aircraft in Controlled Airspace (CTA) or Restricted Airspace (RA), the radio failure procedures are:
  - **Squawk 7600**
  - **Listen out on ATIS and/or voice-modulated NAVAIDs**
  - **Transmit intentions and make normal position reports with the prefix "TRANSMITTING BLIND"**

**ATS COMMUNICATIONS FACILITIES**

| | | |
|---|---|---|
| FIA | MELBOURNE CENTRE | 135.7 |
| SMC | MOORABBIN GROUND | 119.9 |
| ATIS | MOORABBIN ATIS | 120.9 398 |
| TWR | MOORABBIN TOWER | 118.1 123.0 |

**RADIO NAVIGATION AND LANDING AIDS**

| | | | | | |
|---|---|---|---|---|---|
| NDB | MB | 398 | S 37 58.6 | E 145 05.4 | Range 65 (HN 65) |

*ERSA Extract: Moorabbin (YMMB)*
*The NDB (398 KHz) is voice-modulated – it can be used to obtain the ATIS or messages from the tower in the event of a radio failure*

- If the aircraft is in VMC and the PIC is certain that VMC can be maintained, **stay in VMC and land at the most suitable aerodrome (note special procedures for Class D)**

# Radio Failure: VFR in CTA/RA

**ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- However, if the PIC is uncertain that VMC can be maintained, then additional procedures in the ERSA/JEPPS must be followed
- Note that it is impossible to establish procedures for all radio failure circumstances
- Following the procedures contained in the ERSA/JEPPS allow ATS and other aircraft to have **some idea** of your **most likely** actions
- However, your actions may also depend on the situation at the time, considering:
  - **Knowledge of the area**
  - **Weather**
  - **Airspace**
  - **Air traffic**

# Radio Failure: Light Signals from Control Tower

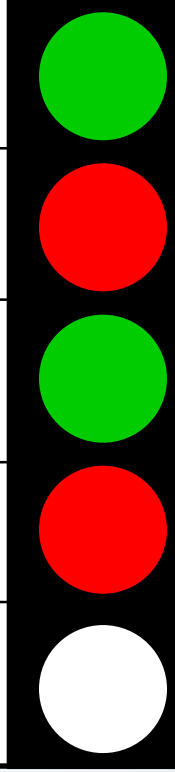
**ERSA EMERG OR JEPPS ATC AU-300 Series OR VFRG Section 1 & Section 6**

- An aircraft that has suffered a radio failure may be directed around an aerodrome using light signals from the control tower

# Radio Failure: Light Signals from Control Tower

**ERSA EMERG OR JEPPS ATC AU-300 Series OR VFRG Section 1 & Section 6**

- Different light signals are used to convey different instructions to aircraft in-flight and on the ground:

| | | To Aircraft In-Flight | To Aircraft on Ground |
|---|---|---|---|
| **Steady Green** |  | *Cleared to land if pilot is satisfied of no collision risk* | *Cleared to take-off if pilot is satisfied of no collision risk* |
| **Steady Red** | | *Give way to other aircraft – continue circling* | *Stop* |
| **Flashing Green** | | *Return for landing* | *Cleared to taxi if pilot is satisfied of no collision risk* |
| **Flashing Red** | | *Do not land – aerodrome unsafe* | *Taxi clear of the landing area in use* |
| **Flashing White** | | *No meaning (is not used)* | *Return to starting point on the aerodrome* |

# Radio Failure: Indications by an Aircraft

**ERSA EMERG OR JEPPS EMERG OR VFRG Section 5**

- An aircraft may indicate its radio has failed or acknowledge a light signal by:

**In Flight:**

- During the hours of daylight, rocking the aircraft's wings
- During the hours of darkness, flashing the landing or navigation lights on and off **twice**

**On the Ground:**

- During the hours of daylight, waggling the aircraft's ailerons or rudder
- During the hours of darkness, flashing the landing or navigation lights on and off **twice**

*Note that rocking of the aircraft's wings should be avoided on the base and final legs of an approach*

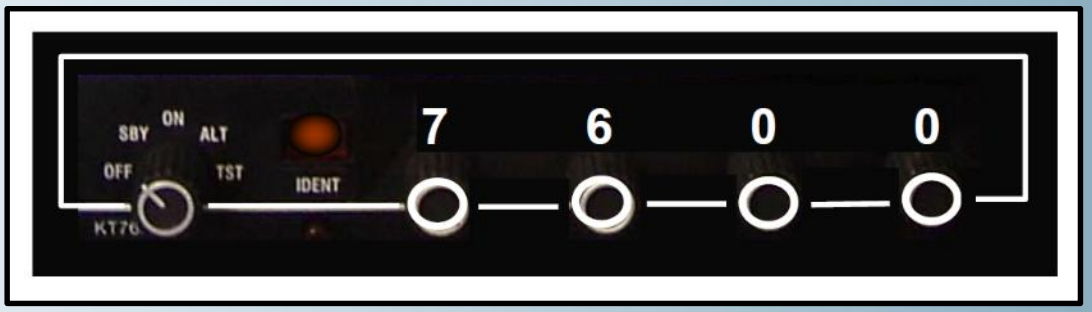
# Radio Failure: Class D Procedures

**ERSA FAC OR JEPPS APT DIR OR Melbourne Basin VPG**

- Class D aerodromes often have specific procedures that allow aircraft suffering a radio failure to enter the CTR and land

- For Moorabbin Airport (YMMB), the no-radio arrival procedure is:

  - **If possible, land at a nearby aerodrome and contact Moorabbin Tower on 9586 6180**
  - **Squawk 7600**
  - **Make normal radio calls with the prefix "TRANSMITTING BLIND"**
  - **Listen out on YMMB ATIS 120.9 or NDB 398**




*Melbourne Centre should see your squawk and will notify Moorabbin Tower that an aircraft is inbound to YMMB with a radio failure (they will not know your callsign)*

# Radio Failure: Class D Procedures

**ERSA FAC OR JEPPS APT DIR OR Melbourne Basin VPG**

- Class D aerodromes often have specific procedures that allow aircraft suffering a radio failure to enter the CTR and land

- For Moorabbin Airport (YMMB), the no-radio arrival procedure is:

  - **Track via the appropriate VFR approach point**
  - **Enter CTR at 1500 ft and maintain that altitude until overhead the aerodrome**
  - **Determine the runways in use and join the western circuit**


*Moorabbin CTR & VFR Approach Points*

# Radio Failure: Class D Procedures

**ERSA FAC OR JEPPS APT DIR OR Melbourne Basin VPG**

- Class D aerodromes often have specific procedures that allow aircraft suffering a radio failure to enter the CTR and land

- For Moorabbin Airport (YMMB), the no-radio arrival procedure is:

  - **When ready, descend to circuit altitude (usually on crosswind)**
  - **Maintain separation from other circuit and aircraft**
  - **Proceed with a normal circuit and landing**
  - **Watch for light signals from the control tower**

*Light signals from control tower at Salt Lake City, Utah, USA*