

## Appendix A: MOS Chapter 26 – Equipment

### Purpose (MOS 26.01)

The requirements for the pilot and the operator in relation to [91.810](#) to the fitting/non-fitting and carriage of equipment on an aircraft are as follows:

**Note:** Requirements in relation to equipment may also be in relation to inoperative equipment.

For this appendix (unless otherwise stated):

- › a reference to a pilot seeing or viewing anything from a pilot's seat means that the thing is seen or viewed from the pilot's normal sitting position in the seat
- › any mention of feet (or ft) in the context of an altitude means feet above mean sea level (AMSL).

### Approval of aircraft equipment (MOS 26.02)

*Relevant aircraft* in this section means any of the following:

- › a light sport aircraft for which a special certificate of airworthiness has been issued and is in force under regulation [21.186](#) of CASR
- › a light sport aircraft for which an experimental certificate has been issued and is in force under paragraph [21.191](#) (j) or (k) of CASR
- › any other aircraft for which an experimental certificate has been issued and is in force under paragraph [21.191](#) (g) or (h) of CASR.

Before an Australian aircraft begins a flight, the equipment that is required to be fitted to or carried on an aircraft other than equipment required under MOS 26.16 must be compliant with the requirements of or approved under CASR Part 21. The following are exceptions to this requirement:

- › equipment used to display the time (noting that a timepiece displays accurate time if it is within a 30 second margin of error AIP ENR)
- › an independent portable light, for example a flashlight or torch
- › a headset

- › a sea anchor and other equipment for mooring
- › survival equipment, including signalling equipment.

**Note:** 1 MOS 26.16 contains requirements for mandatory or optional carriage of surveillance equipment, most of which requires TSO or ETSO authorisation. However, the Division also contains a conditional alleviation. For the relevant equipment, a requirement for Part 21 approval would inappropriately negate this conditional alleviation.

The requirement of CASR Part 21 does not apply to a relevant aircraft if the aircraft is fitted with a radio which provides the pilot with the same radio capability as would be provided if the radio complied with CASR Part 21.

However, if equipment is carried on an aircraft, although not required by this appendix to be fitted or carried, then:

- › the equipment need not be compliant with the requirements of, or approved under, CASR Part 21
- › for a foreign-registered aircraft, the equipment need not have been approved by the NAA of the aircraft's state of registry
- › no information provided by the equipment may be used by a flight crew member to comply with any requirement of this appendix in relation to equipment that is required to be fitted or carried for communications or navigation
- › the equipment, whether functional or otherwise, must not at any time affect the airworthiness of the aircraft.

**Note:** For other requirements in relation to surveillance equipment that is not required to be fitted or carried, see MOS 26.69.

### Foreign-registered aircraft

The equipment required by this appendix to be fitted to, or carried on, a foreign-registered aircraft must have been approved by the NAA of the aircraft's state of registry.

### Visibility and accessibility of pilot-operated equipment (MOS 26.03)

Equipment required to be fitted or carried in an aircraft and which is to be used by the pilot manually or visually from the cockpit, must be usable and visible from the pilot's seat.

Required emergency equipment fitted to, or carried on, an aircraft must be easily accessible for immediate use in the event of an emergency.

## Serviceability of equipment (MOS 26.04)

Any equipment required to be fitted to, or carried on, an aircraft must be operative unless another section of MOS chapter 26 applies or the equipment:

- › is inoperative because of a defect that has been approved as a permissible unserviceability and
- › is fitted or carried in accordance with the permissible unserviceability.

**Note:** A minimum equipment list (an MEL), approved under regulation 91.935, can only permit equipment required to be fitted to, or carried on, an aircraft, to be unserviceable within the limits of the requirements contained in this MOS Chapter 26. For example, MOS26.26 contains an allowable time period of 72 hours related to flights with inoperative altitude alerting equipment. An MEL would not be approved if it contained a maximum time period for altitude alerting equipment to be inoperative that was greater than the time period specified by either a master minimum equipment list (MMEL) or the legislation.



*For aircraft that do not have an MEL or equipment that is permitted to be unserviceable (permissible unserviceability), nothing prevents you from flying with inoperative equipment which is not required to be fitted or carried for the flight.*

## Aeroplane – VFR flight by day (MOS 26.06)

An aeroplane flying by day under the VFR must be fitted with the equipment for measuring and displaying the flight information as shown in the following Table.



*For certain light sport aircraft, experimental aircraft and other certain registered aircraft, there are equipment variations allowable. Refer to MOS 26.13 through to 26.17 in appendix A of this guide.*

**Table 19: Requirements for equipment – aeroplane VFR by day**

Flight information	Requirements
Indicated airspeed	No additional requirements
Mach number	Only for an aeroplane with operating limitations expressed as a Mach number
Pressure altitude	The equipment must: <ul style="list-style-type: none"> <li>› have an adjustable datum scale calibrated in millibars or hPa, and</li> <li>› be calibrated in feet, except:               <ul style="list-style-type: none"> <li>» for flight in a foreign country which measures FL or altitudes in metres, be calibrated in metres, or fitted with a conversion placard or device.</li> </ul> </li> </ul>
Magnetic heading	The equipment must be: <ul style="list-style-type: none"> <li>› a direct reading magnetic compass, or</li> <li>› both a remote indicating compass and a standby direct reading magnetic compass.</li> </ul>
Time	The equipment must display accurate time in hours, minutes and seconds, and be either: <ul style="list-style-type: none"> <li>› fitted to the aircraft, or</li> <li>› worn by, or immediately accessible to, the pilot for the duration of the flight.</li> </ul>
Turn and slip	Only for aerial work operations
Outside air temperature	Only for aerial work operations from an aerodrome at which ambient temperature is not available from ground-based instruments



*During a flight, you must maintain a time reference accurate to within +/- 30 seconds. (AIP ENR)*

## Aeroplane – VFR flight by night (MOS 26.07)

An aeroplane flying under the VFR at night must be fitted with:

- › an approved GNSS, or
- › an automatic direction finder (ADF) or VOR.

If an approved GNSS has automatic barometric aiding options as specified in the standards below, they must be connected:

- › (E)TSO-C129a
- › (E)TSO-C145a
- › (E)TSO-C146a
- › (E)TSO-C196a.

An aeroplane flying under the VFR at night must have equipment for measuring and displaying the flight information, as shown in the following Table.



*For certain light sport aircraft, experimental aircraft and other certain registered aircraft, there are equipment variations allowable. Refer to MOS 26.13 through to 26.17 in appendix A of this guide.*

**Table 20: Requirements for equipment – aeroplane VFR flight by night**

Flight information	Requirements
Indicated airspeed	The equipment must be capable of being connected to: <ul style="list-style-type: none"> <li>› an alternate source of static pressure that:               <ul style="list-style-type: none"> <li>» a pilot can select</li> <li>» includes a selector that can open or block the aeroplane's static source and alternative static source simultaneously, or</li> </ul> </li> <li>› a balanced pair of flush static ports.</li> </ul>
Mach number	Only for an aeroplane with operating limitations expressed as a Mach number

Flight information	Requirements
Pressure altitude	The equipment must: <ul style="list-style-type: none"> <li>› have an adjustable datum scale calibrated in millibars or hPa, and</li> <li>› be calibrated in ft except               <ul style="list-style-type: none"> <li>» if a flight is conducted in a foreign country which measures FLs or altitudes in metres must be calibrated in metres or fitted with a conversion placard or device</li> </ul> </li> <li>› be capable of being connected to:               <ul style="list-style-type: none"> <li>» an alternate source of static pressure that a pilot can select, or</li> <li>» a balanced pair of flush static ports.</li> </ul> </li> </ul>
Magnetic heading	<ul style="list-style-type: none"> <li>› a direct reading magnetic compass, or</li> <li>› both a remote indicating compass and a standby direct reading magnetic compass</li> </ul>
Time	The equipment must display accurate time in hours, minutes and seconds, and be either: <ul style="list-style-type: none"> <li>› fitted to the aircraft, or</li> <li>› worn by, or immediately accessible to, the pilot for the duration of the flight.</li> </ul>
Turn and slip	The equipment must display turn-and-slip information, except when a second independent source of attitude information is available, in which case only the display of slip information is required.
Attitude	No additional requirements
Vertical speed	The equipment must be capable of being connected to: <ul style="list-style-type: none"> <li>› an alternate source of static pressure that a pilot can select, or</li> <li>› a balanced pair of flush static ports.</li> </ul>

Flight information	Requirements
Stabilised heading	The equipment must indicate whether the power supply to the gyroscopic instruments is working satisfactorily. <b>Note:</b> A gyro-magnetic type of remote indicating compass meets this requirement if it has a primary and an alternate power supply.
Outside air temperature	No additional requirements
<b>Note:</b> For gyroscopic instruments (if any), equipment that indicates whether the power supply is adequate must be fitted.	

### Aeroplane – IFR flight (MOS 26.08)

An aeroplane flying under the IFR must be fitted with an approved GNSS.

If an approved GNSS has automatic barometric aiding options as specified in the standards below, they must be connected:

- › (E)TSO-C129a
- › (E)TSO-C145a
- › (E)TSO-C146a
- › (E)TSO-C196a.

**Note:** For aircraft entering oceanic airspace with RNP 2, 4 or 10 navigation specification capability, see MOS 11.03 in relation to long range navigation systems (LRNS) operability requirements.

An aeroplane flying under the IFR must be fitted with a GNSS and systems for measuring and displaying the flight information as shown in the following table.



*For certain light sport aircraft, experimental aircraft and other certain registered aircraft, there are equipment variations allowable. Refer to MOS 26.13 through to 26.17 in appendix A of this guide.*

**Table 21: Requirements for equipment – aeroplane IFR flight**

Flight information	Requirements
Indicated airspeed	The equipment must be capable of being connected to: <ul style="list-style-type: none"> <li>› an alternate source of static pressure that is selectable by a pilot, or</li> <li>› a balanced pair of flush static ports.</li> </ul> At least 1 airspeed indicator must have a means of preventing malfunction due to condensation or icing.
Mach number	Only for an aeroplane with operating limitations expressed as a Mach number
Pressure altitude	The equipment must: <ul style="list-style-type: none"> <li>› have an adjustable datum scale calibrated in millibars or hPa, and</li> <li>› be capable of being connected to an alternate source of static pressure that a pilot can select, or a balanced pair of flush static ports. and</li> <li>› be calibrated in feet, except: <ul style="list-style-type: none"> <li>› if a flight is in a foreign country which measures FL or altitudes in metres, be calibrated in metres or fitted with a conversion placard or device.</li> </ul> </li> </ul>
Magnetic heading	The equipment must be: <ul style="list-style-type: none"> <li>› a direct reading magnetic compass, or</li> <li>› both a remote indicating compass and a standby direct reading magnetic compass.</li> </ul>
Outside air temperature	No additional requirements
Time	The equipment must display accurate time in hours, minutes and seconds, and be either: <ul style="list-style-type: none"> <li>› fitted to the aircraft, or</li> <li>› worn by, or immediately accessible to, you for the duration of the flight.</li> </ul>

Flight information	Requirements
Turn and slip	<p>The equipment must display turn-and-slip information, except where a second independent source of attitude information is available, in which case only slip information is required.</p> <p>The equipment must have both a primary power and alternate power supply:</p> <ul style="list-style-type: none"> <li>› unless the equipment has a source of power independent of the power operating other gyroscopic instruments, or</li> <li>› a second independent source of attitude is available.</li> </ul>
Attitude	<p>The equipment must have both a primary and alternate power supply, unless:</p> <ul style="list-style-type: none"> <li>› the equipment has a power source independent of source of turn-and-slip information, or</li> <li>› a second independent source of attitude information is available.</li> </ul>
Vertical speed	<p>The equipment must be capable of being connected to:</p> <ul style="list-style-type: none"> <li>› an alternate source of static pressure that a pilot can select, or</li> <li>› a balanced pair of flush static ports.</li> </ul>
Stabilised heading	<p>The equipment must have both a primary and alternate power supply, unless:</p> <ul style="list-style-type: none"> <li>› the equipment has a power source independent of that operating the turn-and-slip equipment, or</li> <li>› a second independent source of attitude information is available.</li> </ul> <p><b>Note:</b> A gyro-magnetic remote indicating compass meets this requirement if it has both a primary and an alternate power supply.</p>
<p><b>Note:</b> For gyroscopic instruments (if any), equipment that indicates whether the power supply is adequate must be fitted.</p>	

## Rotorcraft – VFR flight by day (MOS 26.10)

A rotorcraft flying by day under the VFR must be fitted with equipment for measuring and displaying the flight information as shown in the following table.

**Table 22: Requirements for equipment – rotorcraft VFR flight by day**

Flight information	Requirements
Indicated airspeed	No additional requirements
Pressure altitude	<p>The equipment must:</p> <ul style="list-style-type: none"> <li>› have an adjustable datum scale calibrated in millibars or hPa, and</li> <li>› be calibrated in ft except that if a flight is conducted in a foreign country which measures FLs, or altitudes in metres – must be calibrated in metres or fitted with a conversion placard or device.</li> </ul>
Magnetic heading	<p>a direct reading magnetic compass, or both a remote indicating compass and a standby direct reading magnetic compass.</p>
Time	<p>The equipment must display accurate time in hours, minutes and seconds, and be either:</p> <ul style="list-style-type: none"> <li>› fitted to the aircraft, or</li> <li>› worn by, or immediately accessible to, you for the duration of the flight.</li> </ul>
Slip	Only for an aerial work operation
Outside air temperature	Only for aerial work operations from an aerodrome at which ambient temperature is not available from ground-based instruments



*For certain light sport aircraft, experimental aircraft and other certain registered aircraft, there are equipment variations allowable. Refer to MOS 26.13 through to 26.17 in appendix A of this guide.*

### Rotorcraft – VFR flight by night (MOS 26.11)

A rotorcraft flying under the night VFR must have equipment fitted for measuring and displaying the flight information as shown the following table.

A rotorcraft flying under the VFR at night must be fitted with:

- › an approved GNSS, or
- › an ADF or VOR.

If an approved GNSS has automatic barometric aiding options as specified in the standards below, they must be connected:

- › (E)TSO-C129a
- › (E)TSO-C145a
- › (E)TSO-C146a
- › (E)TSO-C196a.

If you are a single pilot, flying a rotorcraft under the VFR by night over land or water you must be able to:

- › maintain attitude by using visual external surface cues from lights on the ground or celestial illumination, or by lighting fitted to the aircraft, or
- › the rotorcraft must be fitted with an automatic pilot system or an automatic stabilisation system.

**Note:** Visual external surface cues can be established by using either unaided sight, or NVIS or other enhanced vision systems where permitted

**Table 23: Requirements for equipment – rotorcraft VFR flight by night**

Flight information	Requirements
Indicated airspeed	No additional requirements
Pressure altitude	The equipment must: <ul style="list-style-type: none"> <li>› have an adjustable datum scale calibrated in millibars or hPa, and</li> <li>› be calibrated in ft except that if a flight is conducted in a foreign country which measures FLs or altitudes in metres – must be calibrated in metres or fitted with a conversion placard or device.</li> </ul>

Flight information	Requirements
Magnetic heading	The equipment must be either a: <ul style="list-style-type: none"> <li>› a direct reading magnetic compass, or</li> <li>› both a remote indicating compass and a standby direct reading magnetic compass.</li> </ul>
Time	The equipment must display accurate time in hours, minutes and seconds, and be either: <ul style="list-style-type: none"> <li>› fitted to the aircraft, or</li> <li>› worn by, or immediately accessible to, you for the duration of the flight.</li> </ul>
Slip	No additional requirements
Attitude	The equipment must have a primary power supply and an alternate power supply.
Standby attitude or turn indicator	Not required for agricultural operations The equipment power supply must be independent of the power source for the attitude information.
Vertical speed	If the rotorcraft operates onto vessels or platforms at sea by night, the equipment must: <ul style="list-style-type: none"> <li>› be an instantaneous vertical speed indicator (IVSI), or</li> <li>› meet performance requirements for acceleration sensitivity equivalent to an IVSI.</li> </ul>
Stabilised heading	Not required for agricultural operations <b>Note:</b> A gyro-magnetic type of remote indicating compass meets this requirement if it has a primary power supply and an alternate power supply.
Outside air temperature	No additional requirements <b>Note:</b> For gyroscopic instruments (if any), equipment that indicates whether the power supply is adequate must be fitted.



*For certain light sport aircraft, experimental aircraft and other certain registered aircraft, there are equipment variations allowable. Refer to MOS 26.13 through to 26.17 in appendix A of this guide.*

## Rotorcraft – IFR flight (MOS 26.12)

A rotorcraft flying under the IFR must be fitted with an approved GNSS.

If an approved GNSS has automatic barometric aiding options as specified in the standards below, they must be connected:

- › (E)TSO-C129a
- › (E)TSO-C145a
- › (E)TSO-C146a
- › (E)TSO-C196a.

**Note:** For aircraft entering oceanic airspace with RNP 2, 4 or 10 navigation specification capability, see MOS 11.03 in relation to long range navigation systems (LRNS) operability requirements.

A rotorcraft flying under the IFR must be fitted with an automatic pilot system or an automatic stabilisation system.

A rotorcraft flying under the IFR must have equipment fitted for measuring and displaying the flight information as shown the following table.

**Table 24: Requirements for equipment – rotorcraft IFR flight**

Flight information	Requirements
Indicated airspeed	<ul style="list-style-type: none"> <li>› The equipment must be capable of being connected to:               <ul style="list-style-type: none"> <li>» an alternate source of static pressure that a pilot can select, and/or</li> <li>» a balanced pair of flush static ports.</li> </ul> </li> <li>› At least 1 airspeed indicator must include a means of preventing malfunction due to condensation or icing</li> <li>› The equipment must operate independently of other sources of indicated airspeed information.</li> </ul>

Flight information	Requirements
Pressure altitude	<p>The equipment must:</p> <ul style="list-style-type: none"> <li>› have an adjustable datum scale calibrated in millibars or hPa, and</li> <li>› be calibrated in ft except that if a flight is conducted in a foreign country which measures FLs or altitudes in metres – must be calibrated in metres or fitted with a conversion placard or device</li> <li>› The system must be capable of being connected to:           <ul style="list-style-type: none"> <li>» an alternate source of static pressure that a pilot can select, or</li> <li>» a balanced pair of flush static ports.</li> </ul> </li> </ul>
Magnetic heading	<p>The equipment must be either:</p> <ul style="list-style-type: none"> <li>› a direct reading magnetic compass, or</li> <li>› both a remote indicating compass and a standby direct reading magnetic compass.</li> </ul>
Outside air temperature	No additional requirements.
Time	<p>The equipment must display accurate time in hours, minutes and seconds, and be either:</p> <ul style="list-style-type: none"> <li>› fitted to the aircraft, or</li> <li>› worn by, or immediately accessible to, the pilot for the duration of the flight.</li> </ul>
Slip	No additional requirements
Attitude	<ul style="list-style-type: none"> <li>› The equipment must have both a primary, and an alternate, power supply.</li> <li>› The system must operate independently of other sources of turn-and-slip information.</li> </ul>

Flight information	Requirements
Standby attitude	<p>The equipment must:</p> <ul style="list-style-type: none"> <li>› have a power source independent of the electrical generating system</li> <li>› operate independently of other sources of attitude information</li> <li>› continue to operate without any action by a flight crew member, for 30 minutes after the electrical power generating system fails.</li> </ul>
Vertical speed	<p>The equipment must be capable of being connected to:</p> <ul style="list-style-type: none"> <li>› an alternate source of static pressure that a pilot can select, or</li> <li>› a balanced pair of flush static ports.</li> </ul> <p>The equipment must:</p> <ul style="list-style-type: none"> <li>› be an instantaneous vertical speed indicator (IVSI), or</li> <li>› meet performance requirements equivalent to an IVSI.</li> </ul>
Stabilised heading	<p>The equipment must have a primary, and an alternate power supply.</p>

**Note 1:** A gyro-magnetic remote indicating compass meets this requirement if it has a primary and an alternate power supply.

**Note 2:** For gyroscopic instruments (if any), equipment that indicates whether the power supply is adequate must be fitted.



*For certain light sport aircraft, experimental aircraft and other certain registered aircraft, there are equipment variations allowable. Refer to MOS 26.13 through to 26.17 in appendix A of this guide.*

Where only 1 pilot, as permitted by the regulations or AFM, conducts an IFR flight the aircraft must be fitted with a second pressure altimeter which is separate from and independent of the first altimeter.

Where 2 pilots are required by the AFM, or the regulations, to conduct an IFR flight, the following equipment must be duplicated, separate from and independent of the other:

- › indicated airspeed
- › pressure altitude
- › slip
- › attitude
- › vertical speed.

#### Application – VFR flight requirements do not apply to certain light sport aircraft (MOS 26.13)

Light sport aircraft for which a special certificate of airworthiness has been issued and is in force under CASR 21.186, or for which an experimental certificate has been issued and is in force under CASR 21.191, the equipment standards listed in Table 19 and Table 20 do not apply if the aircraft is fitted with equipment which provides a pilot with the same flight and navigation information.

#### Application – VFR and IFR flight requirements do not apply to certain experimental aeroplanes (MOS 26.14)

For experimental aeroplanes with an experimental certificate that has been issued and is in force under CASR 21.191, the equipment standards listed in Table 14, Table 15 and Table 16 do not apply if it is fitted with equipment which provides a pilot the same flight and navigation information.

**Note:** For a flight under the IFR an experimental aeroplane must be fitted with an approved GNSS (see [26.08](#)).



### Application – VFR and IFR flight requirements do not apply to certain experimental rotorcraft (MOS 26.15)

For experimental rotorcraft with an experimental certificate that has been issued and is in force under CASR 21.191, the equipment standards listed in Table 17, Table 18 and Table 19 do not apply if it is fitted with equipment which provides a pilot with the same flight and navigation information.

**Note 1:** A VFR flight by night conducted by a single pilot in an experimental rotorcraft must be fitted with an autopilot or automatic stabilisation system.

**Note 2:** An IFR flight in an experimental rotorcraft must be fitted with an approved GNSS and an autopilot or automatic stabilisation system.

### Application – VFR and IFR flight requirements do not apply to certain registered aircraft (MOS 26.16)

For a registered aircraft, equipment listed under the Table 19, Table 20 and Table 21 (aeroplanes) and Table 22, Table 23 and Table 24 (rotorcraft) do not apply if, it is fitted with equipment, that the type certificating authority of a recognised country determines will achieve, for the intended operation, an equivalent level of safety.

### Electronic flight information systems (MOS 26.17)

Light sport aircraft (MOS 26.13), experimental aeroplanes (MOS 26.14) and experimental rotorcraft (MOS 26.15) must be fitted with one of the following:

- › an electronic flight information system (EFIS)
- › an electronic display indicator (EDI)
- › another system for displaying flight information electronically.

The system must have a battery-powered back-up, or a power source independent of the aircraft's primary electrical system.

The battery-powered back-up must be fully charged before flight and have enough capacity to power the EFIS panel or other display for at least 60 minutes.

### Radiocommunication systems (MOS 26.18)

In any class of airspace, whether controlled or uncontrolled, the aircraft must be fitted with radios capable of communicating:

- › two-way, by voice
- › on all frequencies necessary to meet the reporting, broadcast and listening watch requirements under regulations 91.630, 91.635, 91.640 and 91.675 of CASR, from any point on the route of the flight, including in the event of any diversions
- › on the aeronautical emergency frequency 121.5 MHz.

**Exception:** *For other than an aircraft flying within or intending to enter an MBA, an aircraft is not required to be fitted with a radio when flying under the VFR by day, in Class G airspace, at or below 5,000 ft AMSL. However, when you do not have 1,000 ft vertical or 1,500 m horizontal separation from cloud, below the higher of 3,000 ft AMSL or 1,000 ft AGL, the aircraft must be fitted with a radio.*

**Note 1:** Certain light sport aircraft and experimental aircraft do not have to comply with the requirement for this equipment to be approved under CASR Part 21 (see [MOS 26.02](#)).

**Note 2:** Regulation [91.400](#) places certain requirements on aircraft without a radio at certain non-controlled aerodromes.

**Note:** Certain operational requirements for an MBA are contained in MOS 11.10A. Radio broadcast requirements for an MBA are contained in MOS 21.09.

### When aircraft may begin a flight with inoperative radio communications (MOS 26.19)

An aircraft required to carry a radio may only fly with it inoperative if:

- › the flight is from an aerodrome with no facility for the radio to be repaired or replaced
- › the flight is to the nearest facility where the radio can be repaired or replaced
- › for the portions of the flight conducted in controlled airspace:
  - » ATS is informed, before the flight begins, of the inoperative radio
  - » clearance is obtained from ATS for the flight
- › for the portions of the flight conducted in Class G airspace above 5 000 ft AMSL, or conducted in an MBA:
  - » the flight is conducted during the day in VMC

- » the flight is conducted in-company with another aircraft
- » the other aircraft is carrying an operative radio and:
  - the pilot of the other aircraft ensures that all the required broadcasts and reports required by regulation 91.630 are made for both aircraft
  - the pilot of the other aircraft is qualified to use the radio.
- » is adjustable, so that the intensity of the lighting for the light conditions can be varied
- › a cabin lighting system that enables each occupant of the aircraft to see and use:
  - » their seatbelt and oxygen facilities (if any)
  - » the normal and emergency exit
- › for each FCM, an independent portable light accessible to the FCM from their normal sitting position
- › for each other crew member (if any), an independent portable light accessible to the crew member at their crew station.

**Note 1:** For continuation of a flight with an inoperative radio, see sections [11.10](#) and [11.18](#).

**Note 2:** Regulation [91.400](#) places certain requirements on aircraft without an operative radio at certain non-controlled aerodromes.

### Equipment to measure and record cosmic radiation (MOS 26.20)

An aeroplane flying under the IFR above FL 490, must be fitted with equipment to measure and display the total cosmic radiation received in the cabin. The equipment must continuously measure and display:

- › the dose rate of total cosmic radiation being received
- › the cumulative dose of total cosmic radiation received on each flight.

Total cosmic radiation means the sum of ionising or neutron radiation of galactic and solar origin.

### Cockpit and cabin lighting requirement (MOS 26.21)

#### Night

An aircraft flying at night must be fitted with, or carry:

- › a cockpit lighting system that:
  - » illuminates each item of equipment including checklists and flight documents a flight crew member may use
  - » is compatible with each item of equipment a pilot may use
  - » is arranged in a way that:
    - each pilot from their normal sitting position can read all placards and instrument markings and
    - their eyes are shielded from direct and reflected light

#### Day

Cockpit lighting and cabin lighting is also required if, by day, natural light does not adequately illuminate the items of equipment and documents mentioned above.



*An independent portable light is most commonly a flashlight or torch. A torch carried by a flight crew member meets the definition as an independent portable light if it is serviceable and can produce sufficient light to properly illuminate any switch control or display that the pilot may be required to use or view in normal abnormal and emergency situations.*

### Anti-collision lights (MOS 26.22)

An aircraft operating by day or night must be fitted with the number of anti-collision lights required by the aircraft type design, that is at least:

- › 1 red beacon, or
- › 2 white strobes, or
- › a combination of these lights.

Where anti-collision light equipment is comprised of red beacons only, or white strobes only, the lights must be displayed as follows:

- › turbine-engine aircraft – from immediately *before* the engines are started until the engines are shut down at the end of the flight
- › any other aircraft – from immediately *after* the engines are started until the engines are shut down at the end of the flight.

Where anti-collision light equipment is comprised of a combination of red beacons and white strobes, the lights must be displayed as follows:

- › for red beacons as above
- › for white strobe lights – any time the aircraft crosses a runway in use for take-offs or landings (an active runway) – while the aircraft is crossing the active runway
- › from the time the aircraft enters the runway to take-off until the time the aircraft leaves the runway after landing.

**Exception:** *Anti-collision lights do not need to be displayed (on) if:*

- › *you reasonably believe that in the circumstances, reflection or glare from the lights may cause a hazard to the aircraft, or*
- › *permitted by another MOS provision such as MOS 12.09 of the Part 138 MOS: display of exterior lighting in an NVIS operation that is an aerial work operation. See also MOS 3.08 of the Part 91 MOS.*



*It is recommended for piston-engine aircraft where practicable that you switch anti-collision lights on prior to starting the aircraft's engines unless doing so might deplete the battery and prevent the engine from starting.*

### Landing lights (MOS 26.23)

An aircraft operating by night must be fitted with at least 1 landing light.

### Navigation lights (MOS 26.24)

An aircraft operating by night must be fitted with navigation lights.

Navigation lights, where required to be fitted, must be displayed on the aerodrome movement area.

**Exception:** *Navigation lights do not need to be displayed if permitted by another MOS provision such as MOS 12.09 of the Part 138 MOS: display of exterior lighting in an NVIS operation that is an aerial work operation. See also MOS 3.08 of the Part 91 MOS.*

### Altitude alerting system and assigned altitude indicator – IFR flights (MOS 26.25)

For flight under the IFR, the following aircraft must have an altitude alerting system:

- › piston-engine aircraft, operating in controlled airspace above FL150
- › unpressurised turbine-engine aircraft, operating in controlled airspace above FL150
- › pressurised turbine-engine aircraft operating in any controlled airspace.

The altitude alerting system must include an assigned altitude indicator and include an aural or visual warning to alert the flight crew if the aircraft approaches a selected altitude, or if the aircraft deviates from a selected altitude.

If an aircraft other than one referred to above is flying under the IFR in controlled airspace, it must be fitted with altitude alerting which at least includes an assigned altitude indicator.

### Aircraft flown with inoperative altitude alerting equipment – IFR flights (MOS 26.26)

Despite MOS 26.25, altitude alerting equipment may be inoperative at the beginning of a flight only if the flight begins within 72 hours of the time the equipment was found to be inoperative and is from an aerodrome at which there is no facility for the equipment to be repaired or replaced.

### Aeroplane airborne collision avoidance system – ACAS II (MOS 26.27)

Reserved

### ACAS II requirements for use (MOS 26.28)

Reserved

### Flight with inoperative ACAS (MOS 26.29)

Reserved

### Flight recorders – definition (MOS 26.30)

*Combination recorder* means a single recording system combining the capabilities and the functions of a flight data recorder (FDR) and a cockpit voice recorder (CVR).

*Recorder* means a combination recorder, an FDR or a CVR.

### Aeroplane flight data recorder (MOS 26.31)

One (1) FDR must be fitted to a turbine-powered aeroplane that has a MTOW of more than 5,700 kg, or is of a type first certificated in its country of manufacture on or after 1 July 1965.

**Exception:** *MOS 26.31 does not apply to an agricultural or restricted category aeroplane.*

### Aeroplane cockpit voice recorder (MOS 26.32)

One (1) CVR must be fitted to:

- › an aeroplane that has a MTOW of more than 5,700 kg which:
  - » is turbine powered or
  - » is of a type first certificated in its country of manufacture on or after 1 July 1965
- › a multi-engine turbine-powered aeroplane that:
  - » is pressurised
  - » has a MTOW of 5,700 kg or less
  - » is type certified in its country of manufacture for operation with more than 11 seats (including seats specifically designed for the use of crew members)
  - » was first issued with a certificate of airworthiness after 1 January 1988.

**Exception:** *MOS 26.32 does not apply to an agricultural or restricted category aeroplane.*

### Rotorcraft flight data recorder (MOS 26.33)

One (1) FDR must be fitted to a turbine-powered rotorcraft that has a MTOW of more than 5,700 kg, or is of a type first certificated in its country of manufacture on or after 1 July 1965.

**Exception:** *MOS 26.33 does not apply to an agricultural or restricted category rotorcraft.*

### Rotorcraft cockpit voice recorder (MOS 26.34)

One (1) CVR must be fitted to the following rotorcraft:

- › a turbine-powered rotorcraft that:
  - » has a MTOW of more than 5,700 kg, or is of a type first certificated in its country of manufacture on or after 1 July 1965.
- › a multi-engine turbine-powered rotorcraft that:
  - » is pressurised
  - » has a MTOW of 5,700 kg or less
  - » is type certified in its country of manufacture for operation with more than 11 seats (including seats specifically designed for the use of crew members)
  - » was first issued with a certificate of airworthiness after 1 January 1988.

**Exception:** *MOS 26.34 does not apply to an agricultural or restricted category rotorcraft.*

### Combination recorders – for aeroplane or rotorcraft (MOS 26.35)

Where an aircraft is required to be fitted with a CVR and an FDR the requirement may be met by the following fitting:

#### For aeroplanes:

- › 2 combination recorders, or
- › 1 FDR and 1 combination recorder, or
- › 1 CVR and 1 combination recorder.

#### For rotorcraft:

- › 1 combination recorder, or
- › 1 FDR and 1 combination recorder, or
- › 1 CVR and 1 combination recorder.

**Exception:** *MOS 26.35 does not apply to an agricultural or restricted category aeroplane or rotorcraft.*

### FDR, CVR and combination recorder technical requirements (MOS 26.36)

An FDR, or a combination recorder must comply with either the requirements of CAO 103.19 or (E) TSO-C124a.

A CVR or a combination recorder must comply with either the requirements of CAO 103.20 or (E) TSO-C123a.

**Note:** The standards referred to above include the minimum recording time requirements.

The operator of an aircraft that is required to be equipped with any of the following must ensure:

- › for an FDR or combination recorder – the recorder retains its last 25 hours of flight data recording
- › for an FDR or combination recorder – data from the last 2 occasions on which the flight data recording was calibrated are preserved

**Note:** This is to enable a determination of the accuracy of the recorded data

- › for a CVR or a combination recorder – the recorder retains its last 30 minutes of cockpit voice recording.

### Use of FDR, CVR and combination recorders (MOS 26.37)

An FDR must record continuously from the time the aircraft first begins moving under its own power, until the time the flight is terminated, and the aircraft can no longer move under its own power.

Subject to the exception below a CVR must:

- › start to record before the aircraft first begins moving under its own power
- › as far as practicable if electrical power is available, start to record as early as possible during the cockpit checks before the engines are started at the beginning of the flight
- › record continuously until the termination of the flight when the aircraft is no longer capable of moving under its own power and the engines have been shut down
- › as far as practicable if electrical power is available, continue recording until as close as possible to the conclusion of the cockpit checks immediately following engine shutdown at the end of the flight.

The FDR and the CVR within a combination recorder must record continuously during the same periods as an FDR and a CVR as described above.

#### **Exception:** *If:*

- › *there is no auxiliary power unit (APU) or other alternative power source for the aircraft*
- › *it is reasonably necessary to preserve the aircraft's primary power source to start the aircraft's engines*
- › *the FDR is operated continuously during the period beginning just before the engines are started for take-off and ending when the final checklist is completed at the end of the flight*
- › *then a CVR must record continuously from immediately after the engines are started, to after the final checklist is completed by you at the end of the flight.*

An FDR or combination recorder must not be operated during maintenance of the aircraft or of an aeronautical product fitted to the aircraft, except if the maintenance is to the recorder or an aircraft engine. An APU fitted to the aircraft is not an aircraft engine unless it can propel the aircraft.

### Flight with inoperative FDR, CVR or combination flight recording equipment (MOS 26.38)

An FDR, a CVR, or a combination recorder may only be inoperative at the beginning of a flight if:

- › the departure aerodrome has no facility to repair or replace the recorder
- › for an aircraft that is only required to be fitted with 1 CVR or 1 FDR – the inoperative recorder has not been inoperative for more than 21 days
- › for an aircraft required to be fitted with 1 CVR and 1 FDR:
  - › the inoperative recorder has not been inoperative for more than 21 days, and
  - › the other recorder is operative
- › for an aircraft fitted with 1 combination recorder – the inoperative recorder has not been inoperative for more than 3 days
- › for an aircraft fitted with more than 1 combination recorder
  - › the inoperative combination recorder has not been inoperative for more than 21 days, and
  - › the other combination recorder is operative.

### Data link recorder (MOS 26.39)

Reserved

### Flight crew intercommunications system – VFR flights (MOS 26.40)

An aircraft flown under the VFR that is required by the regulations or AFM to be flown by at least 2 pilots, and whose cockpit noise levels at any stage of the flight prevent pilots from communicating with each other in speech at a normal conversation level, must be fitted with an intercommunication system which includes a headset with a combined microphone.

### Flight crew intercommunications system – IFR flights (MOS 26.41)

An aircraft flown under the IFR with 1 pilot permitted under the regulation or AFM, must be fitted with, or carry:

- › 2 headsets with combined microphones, or
- › 1 headset with a combined microphone, and 1 hand-held microphone with a loudspeaker.

An aircraft flown under the IFR that is required by the regulations or the AFM to be flown by at least 2 pilots must be fitted with:

- › 3 headsets with combined microphones, or
- › 2 headsets with combined microphones, and 1 hand-held microphone with a loudspeaker.

### Public address system (MOS 26.42)

An aircraft that has a maximum operational passenger seating configuration of 20 or more, and at least 1 passenger is onboard, must be fitted with a public address system to enable you to address the passengers.

### Supplemental oxygen (MOS 26.43)

An aircraft must carry sufficient supplemental oxygen as described in Table 25.

Fitted or carried supplemental oxygen, must be able to be stored and dispensed to the crew and passengers.

Flight crew members must use supplemental oxygen in accordance with the supply requirements set out in Table 25.



*Pilots should consider whether supplemental oxygen should be carried even if it is not required since hypoxia is insidious, and its onset is determined by many variables.*

*Electronic oximeters are available for personal use and may be useful for those who have not been trained in the hypoxia symptom awareness, for example by entering a hyperbaric chamber and experiencing hypoxia in a controlled setting.*

**Table 25: Supplemental oxygen requirements**

Person	Supplemental oxygen supply requirements
Flight crew member or cabin crew member	<p>For any period exceeding 30 minutes when the cabin pressure altitude is continuously at least FL 125 but less than FL 140, there must be supply for <i>the entire period</i>.</p> <p>For any period when the cabin pressure altitude is at least FL 140, there must be supply for <i>the entire period</i>.</p> <p>Without otherwise affecting the above, when a pressurised aircraft is flown at an altitude of FL 250 or more, there must be at least 10 minutes supply even if <i>the entire period</i> is less than 10 minutes.</p>
Passengers	<p>For any period when the cabin pressure altitude is at least FL 150, there must be supply for <i>the entire period</i>.</p> <p>Without otherwise affecting the above, when a pressurised aircraft is flown at an altitude of FL 250 or more, there must be at least 10 minutes supply after descending below FL 250 even if <i>the entire period</i> is less than 10 minutes.</p>

### Oxygen masks usage requirement – pressurised aircraft above FL250 (MOS 26.44)

When flying above FL250 in a pressurised aircraft, at all times at least 1 seated pilot, must wear securely, a sealed oxygen mask which is being supplied with supplemental oxygen, or

- › which automatically supplies supplemental oxygen when the cabin pressure altitude is at or above FL140, or
- › have access to a quick-donning mask supplied with supplemental oxygen when the mask is donned or worn.

**Note:** A quick-donning mask means one for personal use which within 5 seconds of it being deployed and ready for use, can be, placed, secured and sealed on the FCM's face, using one hand.

### Protective breathing equipment – flight crew members (MOS 26.45)

When a pressurised aircraft is required by either the regulations or the AFM to have at least 2 pilots, it must carry protective breathing equipment (PBE) for each pilot which must protect the wearer's eyes, nose and mouth.

For the wearer's eyes, it must not adversely affect vision in any noticeable way and must allow corrective glasses to be worn in a normal position.

The oxygen supply must be continuously available for at least 15 minutes.

**Note:** The oxygen supply for the PBE for each flight crew member can be provided by the supplemental oxygen required under MOS 26.43.

The PBE for a flight crew member must be accessible for immediate use at their crew station and not prevent, or be likely to prevent, effective use of any crew intercommunications or radio equipment fitted to or carried on the aircraft.

### Portable protective breathing equipment (MOS 26.46)

A pressurised aircraft which is required by the regulations or AFM to be flown by at least 2 pilots must carry portable protective breathing equipment (*portable PBE units*) for each pilot to protect the wearers eyes, nose and mouth.

For the wearer's eyes, it must not adversely affect vision in any noticeable way and must allow corrective glasses to be worn in a normal position.

The oxygen supply must be continuously available for at least 15 minutes.

The portable PBE units must be located as follows:

- › where no crew members other than the minimum flight crew members are carried – 1 portable PBE unit must be located in, or as close as practicable to, the flight crew compartment
- › as far as practicable – 1 portable PBE unit must be located adjacent to each of the hand-held fire extinguishers required to be carried
- › if this is not practicable to carry the PBE adjacent to the fire extinguishers – 1 portable PBE unit must be located adjacent to each individual cabin crew member crew station that is being used by a cabin crew member.

Portable PBE units must not prevent, or be likely to prevent, a crew member from effectively using any crew intercommunications or radio equipment that is fitted to or carried on the aircraft.

### First aid oxygen equipment – pressurised aircraft (MOS 26.47)

In this section:

- › *BTPD* means body temperature and pressure dry.
- › *BTPS* means body temperature and pressure saturated.
- › *first aid oxygen* means a supply of undiluted oxygen for any passengers who, for physiological reasons, may still require oxygen when:
  - › there has been a cabin depressurisation
  - › the amounts of supplemental oxygen supply otherwise required have been exhausted
- › *standard temperature and pressure* mean 0 degrees Celsius at a pressure of 760 mm Hg
- › *STPD* means standard temperature and pressure dry.

A pressurised aircraft must be fitted with or carry first aid oxygen in accordance with this section.

The aircraft must carry, for use in first aid, enough first aid oxygen that will provide an average oxygen gas flow rate, calculated assuming dry oxygen gas at standard temperature and pressure, of 3 litres per minute per person for:

- › whichever of the following is the greater:
  - › 2% of the passengers carried on the flight, or
  - › 1 passenger, and
- › for the period after a cabin depressurisation where the cabin pressure altitude is above 8,000 ft but is not above FL150.

The aircraft must also carry enough first aid oxygen dispensing units (masks) but in no case less than 2 units.

An oxygen dispensing unit must be capable of generating a flow rate, calculated assuming dry oxygen gas at standard temperature and pressure, of at least 4 litres per minute per person STPD, and that may have a means of reducing the flow to not less than 2 litres per minute per person STPD at any altitude.

## Carriage of emergency locator transmitter (ELT) (MOS 26.48)

### All aircraft

As a minimum, all aircraft must be fitted with an automatic ELT or carry a survival ELT.

**Exception:** *This requirement does not apply to:*

- › a single seat aircraft, or
- › an aircraft flown not more than 50 NM from the place of departure or
- › a flight for the purposes of:
  - » the aircraft's manufacture
  - » the preparation or delivery of the aircraft following the purchase or transfer of the operator
  - » the positioning of an Australian aircraft from a location outside Australia to any place at which any ELTs required to be fitted to the aircraft will be registered with AMSA

### Single-engine aircraft over water

For a single engine aircraft, you must always carry a survival (portable) ELT if you fly over water further than the distance the aircraft could reach an area of land suitable for a forced landing if the engine fails.

Exception: This requirement does not apply to:

- › single seat aircraft
- › a flight for:
  - » the aircraft's manufacture
  - » preparing or delivering the aircraft following the purchase or transfer of the operator
  - » positioning an Australian aircraft from a location outside Australia to a place where any ELTs required to be fitted to the aircraft will be registered with AMSA
- › an aircraft fitted with a radio (or equivalent) to alert and continuously communicate to an appropriate person relating to the emergency on the ground during the flight.

### Aircraft required to carry more than one life raft

For a flight where more than one life raft is required to be carried an aircraft must be:

- › fitted with an automatic ELT and carry a survival ELT, or
- › carry at least 2 survival ELTs.

**Exception:** *The requirement that a transmitter which is carried or fitted needs to be registered with either AMSA or the authority in the aircraft's state of registry responsible for providing SAR services does not apply to a flight for a purpose related to:*

- › the aircraft's manufacture
- › the preparation or delivery of the aircraft following its purchase or transfer of operator
- › the positioning of an Australian aircraft from a location outside Australia to the place at which any ELTs required to be fitted to the aircraft will be registered with AMSA.

### ELT switches

If the ELT carried is an automatic ELT that has a switch marked (however described) as 'armed,' then you must ensure that the switch is set to this position at the time the flight begins.

### Location of carriage

If the ELT carried is a survival ELT, you must ensure that the ELT is carried in one of the following locations on the aircraft:

- › on the person of a crew member, or
- › in, or adjacent to, a life raft, or
- › adjacent to an emergency exit used for evacuation of the aircraft in an emergency.

### ELT – basic technical requirements (MOS 26.49)

An ELT is a transmitter that must:

- › when activated, transmit simultaneously on 121.5 MHz and 406 MHz
- › when fitted to, or carried on, an Australian aircraft, be registered, solely, with AMSA
- › when fitted to, or carried on, a foreign-registered aircraft, be registered with the authority of the aircraft's state of registry responsible for search and rescue services, and not with AMSA
- › for identification purposes, be coded in accordance with the requirements for the transmitter in Appendix 1 to Chapter 5 of Part II, Voice Communications, in Volume III of ICAO Annex 10, Aeronautical Telecommunications
- › where fitted with a lithium-sulphur dioxide battery, the battery must be authorised by the FAA or EASA in accordance with (E) TSO-C142a.



### Automatic ELT (MOS 26.50)

An *automatic ELT* is one that meets the criteria of MOS 26.49 above and must automatically activate on impact and be one of the following types:

- › authorised by the FAA or EASA in accordance with (E)TSO-C126, or
- › authorised by EASA in accordance with:
  - » ETSO-2C91a for operation on 121.5 MHz
  - » ETSO-2C126 for operation on 406 MHz, or
- › approved under CASR Part 21 as having a level of performance equivalent to a type of transmitter mentioned above.

### Survival ELT (MOS 26.51)

A *survival ELT* is one that meets the criteria of MOS 26.49 and can be removed from the aircraft, and is 1 of the following types:

- › an emergency position-indicating radio beacon that meets the requirements of AS/NZS 4280.1:2003, or
- › a personal locator beacon that meets the requirements of AS/NZS 4280.2:2003, or
- › authorised by the FAA or EASA in accordance with (E)TSO-C126, or
- › authorised by EASA in accordance with:
  - » ETSO-2C91a for operation on 121.5 MHz
  - » ETSO-2C126 for operation on 406 MHz, or
- › approved under CASR Part 21 as having a level of performance equivalent to a type mentioned above.

### Aircraft flown with inoperative ELT (MOS 26.52)

An aircraft required to carry either an automatic ELT, or a survival ELT but which is not required to carry a life raft, may begin a flight with either being inoperative if the purpose of the flight is to ferry the aircraft to have the ELT repaired or maintained.

An aircraft may be flown without an automatic or survival ELT if:

- › the ELT has been temporarily removed for maintenance and there is an entry in the aircraft's flight technical log, stating:
  - » the ELT make, model and serial number

- » the date on which the ELT was removed from the aircraft
  - » the reason for the removal of the ELT.
- › a placard stating 'Emergency locator transmitter not installed or carried' has been placed in the aircraft in a position where you can see it
  - › no more than 90 days have passed since the ELT was temporarily removed for maintenance.

For a period not exceeding 90 days, an aircraft with an inoperative automatic ELT that has been removed is not required to carry a survival ELT. Conversely an aircraft with an inoperative survival ELT that has been removed, is not required to carry an automatic ELT.

### Hand-held fire extinguishers – aeroplanes (MOS 26.53)

An aeroplane with a MTOW above 5,700 kg, must at least carry the following hand-held fire extinguishers:

- › 1 in the flight crew compartment
- › 1 in each galley or 1 readily accessible for use in each galley, being a galley that is not in a passenger, crew or cargo compartment
- › 1 that is accessible to the crew members, conveniently located for use, for the following compartment classes as defined under the Federal Aviation Regulation (FAR) 25.857:
  - » a Class A cargo or baggage compartment
  - » a Class B cargo or baggage compartment
  - » a Class E cargo or baggage compartment
- › for an aircraft with the maximum certified passenger seating capacity as set out in the following table.

**Table 26: Requirements for number of hand-held fire extinguishers**

Maximum certified passenger seating capacity	Number of extinguishers
7-30	1
31-60	2
61-200	3
201-300	4
301-400	5
401-500	6
501-600	7
601 or more	8

**Exception:** For an aeroplane with a maximum certified passenger seating capacity of not more than 9, in which the flight crew members and the passengers occupy the same compartment only 1 hand held fire extinguisher that is readily available to the pilot is required.

**Exception:** For an aeroplane with a maximum certified passenger seating capacity of more than 9, in which the flight crew members and the passengers occupy the same compartment only 1 hand held fire extinguisher that is readily available to the pilot and 1 readily available to the passengers is required.



It is recommended that operators consider the number and type of handheld fire extinguishers as appropriate to their needs and not simply with a view to compliance. Refer to AWB Airframes 26- Fire protection- further information for fire protection and the Part 91.

### Hand-held fire extinguishers – rotorcraft (MOS 26.54)

A rotorcraft that is *type certified in the transport category* must carry the following minimum number of hand-held fire extinguishers:

- › 1 in the cockpit
- › for an aircraft with a maximum certified passenger seating capacity of 7 or more, 1 in the passenger compartment.

**Exception:** a rotorcraft with a maximum certified passenger seating capacity of not more than 9, in which the flight crew members and the passengers occupy the same compartment – 1 hand-held fire extinguisher, must be readily available to the pilot.

**Exception:** a rotorcraft with a maximum certified passenger seating capacity of more than 9, in which the flight crew members and the passengers occupy the same compartment – 1 hand-held fire extinguisher, must be readily available to the pilot and 1 readily available to the passengers.



It is recommended that operators consider the number and type of handheld fire extinguishers as appropriate to their needs and not simply with a view to compliance. Refer to AWB Airframes 26- Fire protection- further information for fire protection and the Part 91.

### Sea anchors etc and sound signals – seaplanes and amphibians and certain rotorcraft (MOS 26.55)

A seaplane, amphibian or a rotorcraft designed to take off or land on either land or water must carry a sea anchor and other equipment for mooring when a flight involves taking off or landing on water.

If the flight is on or over water to which international regulations apply, the aircraft must carry equipment for making the sound signals required by the international regulations for the flight.



Flights over water to which international regulations apply are those beyond 12 NM from the Australian coastline even though they may be within the Australian flight information region boundary.

### Life jackets – carriage requirements (MOS 26.56)

For an aircraft that is a:

- › seaplane or amphibian, or
- › single-engine aircraft which is not a seaplane or amphibian that flies over water beyond the distance from which it could reach an area of land suitable as a forced landing area if the engine failed, or
- › multi-engine aircraft which is not a seaplane or amphibian that is flown more than 50 NM from an area of land suitable as a forced landing area must carry:
  - » for each infant onboard – a life jacket or another equally effective flotation device that may have a whistle
  - » for each other person onboard – a life jacket that must have a whistle.

**Exception:** *An aircraft does not have to carry life jackets if it flies over water in the normal course of climbing after take-off, or descending to land, or in accordance with a navigational procedure that is normal for climbing from or descending at the aerodrome.*

### Stowage of life jackets (MOS 26.57)

For aircraft required to carry a life jacket or flotation device, unless being worn:

- › each infant's life jacket or flotation device must be stowed where it is readily accessible by an adult responsible for the infant
- › each other person's life jacket must be stowed where it is readily accessible from the person's seat.

### Wearing life jackets – aircraft generally (MOS26.58)

A person other than an infant:

- › onboard a single-engine aircraft must wear a life jacket if it is flown over water beyond the distance from which it could reach land if the engine failed
- › onboard a rotorcraft must wear a life jacket if the flight is over water to or from a helideck.

A person is wearing a life jacket if it is secured in a way that allows the person to put it on quickly and easily in an emergency.

**Exception:** *In an aeroplane, a person does not have to wear a life jacket if the flight is higher than 2,000 ft above the water.*

**Exception:** *A person does not have to wear a lifejacket if the aircraft flies over water while climbing after take-off or descending to land during normal navigational procedure for the aerodrome.*

### Wearing life jackets – rotorcraft – special provision (MOS 26.59)

When a rotorcraft is taking off or landing at an aerodrome in a populous area, and an area of water is the only reasonably available forced landing area, each person (other than an infant) must wear a life jacket, while the rotorcraft, after take-off or on descent, is below the minimum height at which the rotorcraft is required to be flown under [91.265](#).



*Determination of the minimum height is set out in 91.265 and in most circumstances, outside access lanes, will be 1,000 ft above the highest obstacle.*

### Life rafts – carriage requirements (MOS 26.60)

An aircraft must carry enough life rafts for each person being carried whenever the aircraft is operated at a distance greater than:

- › for a jet-driven multi-engine aeroplane with a MTOW of more than 2,722 kg – the shorter of:
  - » the distance the aeroplane would fly in 2 hours at its normal cruising speed in still air, or
  - » 400 NM
- › for a turbine-engine propeller-driven aeroplane with a MTOW of more than 5,700 kg – the shorter of:
  - » the distance the aeroplane would fly in 2 hours at its normal cruising speed in still air, or
  - » 400 NM
- › for any other aircraft – the shorter of:
  - » the distance the aircraft would fly in 30 minutes at its normal cruising speed in still air, or
  - » 100 NM.

When calculating the number of life rafts required to be carried on the aircraft, the life raft rated capacity excluding any overload capacity-must be used. Infants onboard need not be considered in the calculation.

**Stowage of life rafts (MOS 26.61)**

A life raft must be stowed and secured so that it can be readily deployed, and the compartment or container used to stow the life raft marked in a clearly visible way.

**Overwater survival equipment (MOS 26.62)**

An aircraft that is required to carry a life raft (MOS 26.60) must carry survival equipment that is appropriate for sustaining life in the overwater area in which it is flying and signalling equipment that can make the distress signals set out in Appendix 1 to ICAO Annex 2 – ‘Rules of the Air’ if required.



*Electronic Visual Distress Signals - it is recommended that operators consider whether EVDS (lasers) meet the requirements of the MOS and whether they can be used within the limits of the CAA 1988, AS 2092-2004, other State and Territory legislation and indeed whether they would be recognised as a distress signal at all since they are not internationally approved distress signals.*

**Remote area – definitions (MOS 26.63)**

A remote area means one of the following:

- › Central Australia remote area
- › Snowy Mountains remote area
- › Tasmania remote area.

**Remote area survival equipment (MOS 26.64)**

An aircraft that is flying over a remote area is required to carry appropriate survival equipment for sustaining life for the area that is being overflown.

**Meaning of remote area (MOS 26.65)**

Remote areas are the areas of Australia illustrated by shading in Figure 25, Figure 26 and Figure 27 and described as follows:

‘Central Australia remote area’ is the area enclosed within the boundary of a line from Kalgoorlie to Leigh Creek, to Bourke, to Mt Isa, to Townsville, to Cairns, then following the coast north to Cape Horn, then along the coastline of the Gulf of Carpentaria and on to Darwin, then following the coastline to Anna Plains, then to Wiluna, to Laverton, and back to Kalgoorlie, and

- › includes Australian-administered islands adjacent to the remote area between Cairns and Ana Plains
- › excludes the area within a 50 NM radius of Darwin
- › excludes the flight corridors within sight of, and not more than, 5 NM from the following:
  - › the Stuart Highway between Alice Springs and Darwin
  - › the Barkly Highway between Tenant Creek and Mt Isa
  - › the Bruce Highway between Townsville and Cairns.

‘Snowy Mountains remote area’ is the area enclosed within the boundary of a line from Mt Franklin to Tharwa, to Berridale, to Delegate, to Mt Baw, to Jamieson, to Khancoban, and back to Mt Franklin.

‘Tasmania remote area’ is the area enclosed within the boundary of a line from West Point to Black Bluff, then to 15 NM beyond Cape Bruny, then back to West Point at a distance of 15 NM off the coastline (disregarding bays and inlets).

**Exception:** A line to or from a named town is taken to come no closer than 5 NM from the town centre on the side of the town adjacent to the remote area.

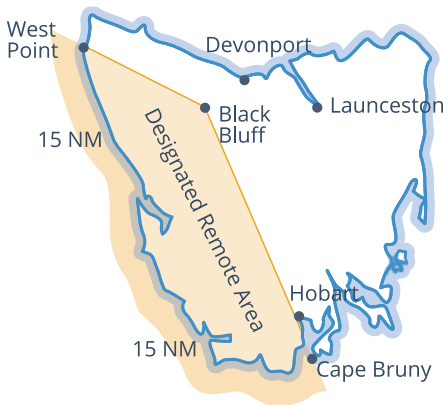
**Figure 25: Central Australia remote area**



**Figure 26: Snowy Mountains remote area**



**Figure 27: Tasmania remote area**



**Surveillance equipment exceptions to (E) TSO or NAA requirements (MOS 26.66)**

Relevant aircraft in this section means any of the following:

- > a light sport aircraft for which a special certificate of airworthiness has been issued and is in force under regulation 21.186 of CASR
- > a light sport aircraft for which an experimental certificate has been issued and is in force under 21.191 of CASR
- > any other aircraft for which an experimental certificate has been issued and is in force under 21.191 of CASR

An item of equipment, or element of an item of equipment, required and authorised in accordance with a particular TSO or ETSO, does not apply to a relevant aircraft in respect of any surveillance equipment if:

- > the configuration of surveillance equipment that is fitted or carried provides the pilot, other aircraft and ATS with the same surveillance capability as would be provided if the equipment had complied with the TSO or ETSO and
- > the pilot or the operator has a statement of conformance (however described) from the equipment manufacturer stating the standard or standards of the TSO or ETSO with which the equipment conforms.

The MOS 26.75 requirement below, that an approved integrated TABS device be authorised by the relevant NAA of the equipment manufacturer, does not apply to a relevant aircraft if:

- > the configuration of the Integrated TABS device that is fitted or carried provides the pilot, other aircraft and ATS with the same surveillance capability as would be provided if the equipment had been expressly authorised by the relevant NAA and
- > the pilot or the operator has a statement of conformance (however described) from the Integrated TABS device manufacturer stating the equipment meets the requirements of this Division for the equipment.

## Surveillance equipment – definitions (MOS 26.67)

Definitions for this section are as follows:

*14 CFR 91.225* means regulation 91.225 of the United States Title 14 Code of Federal Regulations (CFR) titled *Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment and use*.

*ADS-B* means automatic dependent surveillance – broadcast.

*ADS-B OUT* means the functional capability of an aircraft or vehicle to periodically broadcast its state vector (position and velocity) and other information derived from onboard systems in a format suitable for ADS-B IN capable receivers.

*ADS-B test flight* means a flight to prove ADS-B transmitting equipment that is newly installed on the aircraft undertaking the flight.

*aircraft address* means a unique combination of 24 bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.

*alternate ADS-B OUT* equipment configuration: see paragraph (b) of the definition of approved ADS-B OUT equipment configuration.

*approved ADS-B OUT* means an equipment configuration capable of ADS-B OUT operation on the ground and in flight, and that is 1 of the following:

- a) an approved Mode S transponder with ADS-B capability connected to an approved GNSS position source
- b) an alternate ADS-B OUT equipment configuration meeting the requirements mentioned in MOS 26.72
- c) another system approved under CASR Part 21 as having a level of performance equivalent to a system mentioned in paragraph (a) or (b).

*approved GNSS position source* means a GNSS position source that is:

- a) authorised by the FAA or EASA in accordance with one of the following:
  - i. (E)TSO-C145a
  - ii. (E)TSO-C146a
  - iii. (E)TSO-C196a, or

- b) an alternate GNSS position source meeting the requirements mentioned in MOS 26.71, or
- c) another system approved under CASR Part 21 as having a level of performance equivalent to performance in accordance with paragraph (a) or (b).

*approved Mode A/C transponder* means a Mode A transponder or a Mode C transponder that is authorised:

- a) by CASA or the NAA of a recognised country in accordance with TSO- C74c (E)TSOC74d, or
- b) by CASA in accordance with TSO-1C74c.

*approved EC device configuration* means an equipment configuration meeting the requirements mentioned in section 26.72C.

*approved integrated TABS configuration* means an equipment configuration meeting the requirements mentioned in section 26.72B.

*approved Mode S transponder* means a Mode S transponder that is:

- a) authorised by CASA or the NAA of a recognised country in accordance with (E) TSO-C112, or
- b) another system approved under CASR Part 21 as having a level of performance equivalent to a system mentioned in paragraph (a).

*Approved Mode S transponder with ADS-B capability* means an approved Mode S transponder that is:

- a) authorised by CASA or the NAA of a recognised country in accordance with (E) TSO-C166, or
- b) another system approved under CASR Part 21 as having a level of performance equivalent to a system mentioned in paragraph (a).

*approved Mode S transponder with Class B TABS position source device configuration* means an equipment configuration meeting the requirements mentioned in section 26.72.

*approved transponder* means an approved Mode A/C transponder or an approved Mode S transponder.

*Class A TABS* means TABS functionality relating to transponder function, altitude source function, and ADS-B OUT function, in accordance with (E) TSO C199.

*Class B TABS* means TABS functionality relating to position source function, in accordance with (E) TSO C199.

*Class B TABS position source device* means a device with a Class B TABS functionality.

*DAPs* mean Mode S enhanced surveillance (EHS) downlink aircraft parameters.

EASA AMC 20-24 means Annex II to ED Decision 2008/004/R titled Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter, dated 2 May 2008, of EASA, as in force or existing from time to time.

EASA CS-ACNS means Annex I to ED Decision 2013/031/R titled Certification Specifications and Acceptable Means of Compliance for Airborne Communications, Navigation and Surveillance CS-ACNS, dated 17 December 2013, of EASA, or any later version.

*GPS* means Global Positioning System.

*HPL* means the horizontal protection level of the GNSS position of an aircraft as an output of the GNSS receiver or system.

*integrated TABS device* means a device with integrated Class A TABS and Class B TABS functionality.

*Mode A* is a transponder function that transmits a 4-digit octal identification code for an aircraft's identity when interrogated by a secondary surveillance radar (SSR).

*Mode A code* is the 4-digit octal identification code transmitted by a Mode A transponder function.

*Mode C* is a transponder function that transmits a 4-digit octal identification code for an aircraft's pressure altitude when interrogated by an SSR.

*Mode S* is a transponder function that uses a unique aircraft address to selectively call individual aircraft and supports advanced surveillance using Mode S EHS, Mode S ELS, or Mode S extended squitter (ES) capabilities.

*Mode S EHS* means Mode S enhanced surveillance, which is a data transmission capability of a Mode S transponder.

*Mode S ELS* means Mode S elementary surveillance, which is a data transmission capability of a Mode S transponder.

*Mode S ES* means Mode S extended squitter, which is a data transmission capability of a Mode S transponder used to transmit ADS-B OUT information.



Image | CASA

*NACp* means Navigation Accuracy Category – Position as specified in paragraph 2.2.3.2.7.1.3.8 of RTCA/DO-260B.

*NIC* means Navigation Integrity Category as specified in paragraph 2.2.3.2.7.1.3.10 of RTCA/DO-260B.

*NUCp* means Navigation Uncertainty Category – Position as specified in paragraph 2.2.8.1.5 of RTCA/DO-260.

*RTCA/DO-229D* means document RTCA/DO-229D titled *Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment*, dated 13 December 2006, of the RTCA Inc. of Washington D.C. USA.

*RTCA/DO-260* means RTCA Inc. document RTCA/DO-260 titled *Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B)*, dated 13 September 2000.

*RTCA/DO-260B* means RTCA Inc. document RTCA/DO-260B titled *Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)*, dated 2 December 2009 unless a later version is expressly referred to.

*SA* means Selective Availability and is a function of the GPS that has the effect of degrading the accuracy of the computed GPS position of a GNSS equipped aircraft.

*SDA* means System Design Assurance as specified in section 2.2.3.2.7.2.4.6 of RTCA/DO-260B.

*surveillance equipment means* equipment that broadcasts data as a means to identify an aircraft, determine its three-dimensional position or obtain other information (such as, but not limited to, velocity and selected altitude or flight level).

*SSR or secondary surveillance radar* means a surveillance radar system which uses transmitters/receivers (interrogators) and transponders.

*SIL* means Source Integrity Level as specified in paragraph 2.2.3.2.7.1.3.10 of RTCA/DO-260B.

*surveillance radar* means radar equipment used to determine the position of an aircraft in range and azimuth.

*TABS* means traffic awareness beacon system.

*transponder* means an aircraft's SSR transponder.

*UK CAP 1391* means Civil Aviation Authority of the United Kingdom document number CAP 1391 titled *Electronic conspicuity devices*, latest edition.

### Required surveillance equipment (MOS 26.68)

Surveillance equipment required to be fitted to an aircraft must be approved and meet the relevant operational and airspace requirements set out in Table 27.

An aircraft operating at Brisbane, Sydney, Melbourne or Perth aerodrome must be fitted with, or carry, at least 1 approved Mode S transponder with ADS-B capability.

**Note:** An approved Mode S transponder with ADS-B capability is not required to transmit ADS-B OUT for a VFR flight.



*Pilots should refer to AC 91-23 for guidance on electronic conspicuity devices (ADS-B) for operations under the VFR.*



## Carriage of transponders and surveillance equipment (MOS 26.68)

A transponder required to be fitted to an aircraft must be approved and meet the relevant operational and airspace requirements set out in the following table.

**Table 27: Surveillance equipment – requirements**

Operation	Class of airspace	Aircraft requirements
IFR	A, B, C, D, E, or G	At least 1 ADS-B OUT equipment configuration.
VFR	Any from FL290 and above	At least 1 approved ADS-B OUT equipment configuration.
VFR	A, B, C, below FL 290	At least 1 of the following: <ul style="list-style-type: none"> <li>(a) approved ADS-B OUT configuration</li> <li>(b) approved Mode S transponder with Class B TABS position source device configuration</li> <li>(c) approved transponder being:               <ul style="list-style-type: none"> <li>(i) for an aircraft manufactured on or after 6 February 2014 or modified by having its transponder installation replaced on or after 6 February 2014 – an approved Mode S transponder with ADS-B capability</li> <li>(ii) for any other aircraft – approved transponder.</li> </ul> </li> </ul> <p><b>Note:</b> An approved Mode S transponder with ADS-B capability is not required to transmit ADS-B OUT for a VFR flight.</p>
VFR	G from 10,000 ft to not above FL 290 E not above FL 290	At least 1 of the following: <ul style="list-style-type: none"> <li>(a) approved ADS-B OUT configuration</li> <li>(b) approved equipment configuration of a Mode S transponder with Class B TABS position source device</li> <li>(c) approved transponder being:               <ul style="list-style-type: none"> <li>(i) for an aircraft manufactured on or after 6 February 2014 or modified by having its transponder installation replaced on or after 6 February 2014 – a Mode S transponder with ADS-B capability</li> <li>(ii) for any other aircraft – an approved transponder</li> </ul> </li> <li>(d) an approved integrated TABS device.</li> </ul> <p><b>Note:</b> An approved Mode S transponder with ADS-B capability is not required to transmit ADS-B OUT for a VFR flight.</p>

**Note:** Australia does not currently have Class B airspace

**Requirements for other surveillance equipment for VFR aircraft (MOS 26.68A)**

For surveillance equipment in addition to that required or not required by MOS 26.68 any surveillance equipment fitted to or carried on the aircraft must meet the requirements in the table below.

**Table 27A: Optional surveillance equipment – requirements**

Operation	Class of airspace	Aircraft requirements
VFR	Classes A, B, C or E below FL 290 Class G from 10 000 ft but not above FL290.	An approved EC device configuration. <b>Note:</b> An EC device may be operated concurrently with a Mode A/C, or a Mode S transponder (other than one that is transmitting ADS-B – see section 26.72C).
VFR	Class G below 10,000 ft	Any of the following: (a) approved ADS-B OUT configuration (b) approved equipment configuration of a Mode S transponder with Class B TABS position source device (c) approved transponder being: (i) for an aircraft manufactured on or after 6 February 2014 or modified by having its transponder installation replaced on or after 6 February 2014 – a Mode S transponder with ADS-B capability (ii) for any other aircraft – an approved transponder (d) an approved integrated TABS device (e) an approved EC device configuration. <b>Note:</b> An approved Mode S transponder with ADS-B capability is not required to transmit ADS-B OUT for a VFR flight. <b>Note:</b> An EC device may be operated concurrently with a Mode A/C, or a Mode S transponder (other than one that is transmitting ADS-B).

## Operation of surveillance equipment – general requirements (MOS 26.69)

Subject to the requirements governing inoperative surveillance equipment set out in MOS 26.73 and unless ATC has issued an instruction otherwise:

- › surveillance equipment required to be fitted or carried on an aircraft must be continuously operated in the circumstances set out in MOS 26.68

**Note:** Continuous operation for a transponder means that the equipment must be operated in a mode that enables an SSR response to be transmitted and, where an altitude reporting capability is available, that this capability is also activated.

- › surveillance equipment (other than approved transponders) fitted or carried on an aircraft in the circumstances set out in MOS 26.68 must be operated continuously.

Unless otherwise required by ATC, an aircraft that is flying in formation with, or is in-company with, other aircraft, is not required to operate surveillance equipment if serviceable surveillance equipment is always operated by another aircraft while the aircraft are flying in formation or are in-company.

If an aircraft is fitted with more than 1 approved transponder, only 1 transponder is to be operated at any time.

If an approved transponder is fitted to an aircraft the Mode A code must be set:

- › to the transponder code assigned by ATC or
- › if no transponder code is so assigned – to the relevant standard code in Table 28 below.

The emergency codes 7500, 7600 and 7700 do not need to be set if it would be safer to retain an existing code.

Pressure altitude information reported by an approved transponder or approved ADS-B OUT configuration must be determined by:

- › a barometric encoder of a type authorised by CASA or the NAA of a recognised country in accordance with (E)TSO-C88a or
- › another system approved under Part 21 of CASR as having an equivalent level of performance.

**Table 28: Transponders – Mode A standard codes**

Situation	Mode A Code
Flights in Class A, C or D airspace, and IFR flights in Class E airspace	3000
IFR flights in Class G airspace	2000
VFR flights in Class E or Class G airspace	1200
Flights in Class G over water at a distance greater than 15 NM from shore	4000
Flights engaged in coastal surveillance	7615
Ground testing by aircraft maintenance staff	2100
Unlawful interference	7500
Loss of radio communication	7600
In-flight emergency (unless ATC instructs otherwise)	7700

## Mode S transponders, ADS-B-OUT and electronic conspicuity equipment – specific requirements (MOS 26.70)

In this section *DAP* means downlink aircraft parameter in the context of Mode S EHS.

When configuring a Mode S transponder, the following must be entered:

- › the assigned aircraft address, and
- › as far as practicable for the equipment, the aircraft flight identification for:
  - » if flight notification is filed with ATS – the aircraft identification mentioned on the flight notification
  - » if flight notification is not filed with ATS – the aircraft registration mark.

When configuring approved ADS-B OUT equipment, approved integrated TABS equipment or an approved EC device, the following must be entered:

- › the assigned aircraft address, and
- › one of the following aircraft flight identification for:
  - » if a flight plan is filed with ATS – the aircraft identification mentioned on the flight plan
  - » if no flight plan is filed with ATS – the aircraft registration mark.

A Mode S transponder must transmit each of the following when interrogated on the manoeuvring area of an aerodrome or in flight:

- › the assigned aircraft address
- › the Mode A code
- › the Mode C code
- › the aircraft flight identification.

Transmission of the aircraft flight identification by a Mode S transponder is optional for an aircraft that was first certificated in its country of manufacture before 9 February 2012.

If an approved Mode S transponder transmits any Mode S EHS DAPs, the transmitted DAPs must comply with the standards set out in paragraph 3.1.2.10.5.2.3 and Table 3-10 of Volume IV, 'Surveillance and Collision Avoidance Systems', of ICAO Annex 10.

**Note 1:** Paragraph 3.1.2.10.5.2.3 includes 3.1.2.10.5.2.3.1, 3.1.2.10.5.2.3.2 and 3.1.2.10.5.2.3.3.

**Note 2:** Australian Mode S SSR supports EHS DAPs. Transmission of Mode S EHS DAPs that are not in accordance with the ICAO standards may provide misleading information to ATS. Operators must ensure that EHS DAPs are being transmitted.

For a Mode S transponder fitted to an aircraft, first certificated in its country of manufacture before 9 February 2012, and the certified MTOW is above 5,700 kg, or which is capable of normal operation at a maximum cruising true air speed above 250 knots, the transponder's receiving and transmitting antennae must:

- › be located on the upper and lower fuselage
- › operate in diversity, as specified in paragraphs 3.1.2.10.4 to 3.1.2.10.4.5 (inclusive) of Volume IV, 'Surveillance and Collision Avoidance Systems', of ICAO Annex 10.

**Note 3:** Compliance with paragraph 3.1.2.10.4.2.1, only, is recommended.

An aircraft must not fly in Australian territory if it is fitted with or carrying unapproved ADS-B OUT equipment, approved EC device configuration, approved integrated TABS configuration or approved Mode S transponder with Class B TABS position source information configuration, unless the equipment is:

- › deactivated, or
- › set to transmit only a value of zero for the NUCp, NACp, NIC or SIL, as this is considered equivalent to deactivation.

**Exception:** *The previous paragraph does not apply to an aircraft if it is undertaking an ADS-B test flight in airspace below FL290 in VMC.*

### Alternate GNSS position source for ADS-B OUT – requirements (MOS 26.71)

For an aircraft first certificated in its country of manufacture on or after 8 December 2016, an alternate GNSS position source is acceptable if:

- › the source is certified by the NAA of a recognised country for use in a flight under the IFR
- › its specification and operation include the following:
  - › GNSS-FDE, computed in accordance with the definition at paragraph 1.7.3 of RTCA/DO-229D
  - › the output function HPL, computed in accordance with the definition at paragraph 1.7.2 of RTCA/DO-229D
  - › functionality that, for the purpose of HPL computation, accounts for the absence of the SA of the GNSS in accordance with paragraph 1.8.1.1 of RTCA/DO-229D.

For an aircraft first certificated in its country of manufacture' before 8 December 2016, an alternate GNSS position source is acceptable if it meets the above requirements except that it does not require functionality that, for the purpose of HPL computation, accounts for the absence of the SA of the GNSS in accordance with paragraph 1.8.1.1 of RTCA/DO-229D.

### Alternate ADS-B OUT equipment configuration – requirements (MOS 26.72)

An alternate ADS-B OUT equipment configuration is acceptable if:

- › it has been approved or accepted by:
  - » the NAA of a recognised country as meeting the standards of EASA AMC 20-24 or EASA CS-ACNS, or
  - » the FAA, as meeting the standards of 14 CFR 91.225 for 1090 Megahertz (MHz) Extended Squitter ADS-B, and
- › the AFM or flight manual supplement attests to the certification, and
- › the GNSS system meets the performance requirements mentioned in MOS 26.71.

### Approved Mode S transponder with Class B TABS position source device equipment configuration – requirements (MOS 26.72A)

- › the Mode S transponder must be of a type that is:
  - » authorised in accordance with (E)TSO C166B, or
  - » approved under Part 21 of CASR as having a level of performance equivalent to (E)TSO C166B
- › when required to be operated, the Mode S transponder must transmit NACp, NIC, SIL and SDA values in accordance with the authorised capability of the GNSS position source
- › the geographical position transmitted by the Mode S transponder must be determined by:
  - » a Class B TABS position source device that is authorised in accordance with (E)TSO C199, or
  - » another source approved under Part 21 of CASR as having a level of performance equivalent to (E)TSO C166B
- › if a Mode S transponder with Class B TABS position source device transmits a SIL value of less than 2, the aircraft must not enter controlled airspace where the aircraft must be fitted with, or carry, equipment that is of an approved ADS-B OUT equipment configuration.

### Approved integrated traffic awareness beacon system (TABS) device – requirements (MOS 26.72B)

A TABS device must:

- › only be operated in transmitting mode if the flight is conducted:
  - » under the VFR
  - » below FL290, and
  - » in Class D, E or G airspace
- › be authorised by the equipment manufacturers' NAA as meeting:
  - » the requirement to transmit a SIL value of 1
  - » the technical specifications in (E)TSO C199 for devices with integrated Class A TABS and Class B TABS functionality.

**Note:** MOS 26.6 provides for an exception to the relevant NAA authorisation requirement for certain kinds of light sport, experimental and other aircraft.

### Approved electronic conspicuity (EC) device – requirements (MOS 26.72C)

An EC device must:

- › only be operated in transmitting mode if the flight is conducted:
  - » under the VFR, and
  - » below FL290
- › not be operated in transmitting mode concurrently with a Mode S transponder that is also transmitting ADS-B.

**Note:** An EC device may be operated concurrently with a Mode A/C, or a Mode S transponder (other than one that is transmitting ADS-B) but it is not a substitute for mandatory carriage of a transponder in relevant airspace.

- › use a Class B TABS position source that complies with the performance standards specified in (E)TSO-C199
- › meet the technical specifications in UK CAP 1391 and:
  - » be capable of transmitting a SIL value of 1, in accordance with the standards in UK CAP 1391 for an EC device that uses a Class B TABS position source, and
  - » transmit that SIL value of 1
  - » meet the requirements described in paragraph 2.2.3.2.7.2.4.6 of RTCA/DO 260B for transmitting an SDA of 1, and
  - » transmit an SDA value of 1

- › use a barometric encoder for altitude information
- › be mounted in accordance with the manufacturer's instructions
- › when mounted in accordance with the manufacturer's instructions, not:
  - » interfere with aircraft controls, or
  - » otherwise affect the safe operation of the aircraft.

The following administrative standards for the EC device must be complied with:

- › an EC device must have a statement of compliance (however described) from the EC device manufacturer certifying that the device meets the following requirements. *(a declaration of capability and conformance or declaration)*
  - » if the declaration was made before 2 December 2021 – clauses 1 to 5 of Part B of Appendix XIV of Civil Aviation Order 20.18 as in force immediately before 2 December 2021
  - » otherwise the requirements in this section (MOS 27.72)
- › the pilot that uses the device must carry the declaration, or a copy of it, on board the aircraft
- › an EC device model must not be operated in a transmit mode anywhere in Australia unless it is listed on the CASA website as an EC device model for which the manufacturer has made a valid declaration
- › the manufacturer of an EC device model may apply in writing to CASA:
  - » for a statement that CASA considers that the manufacturer has made a valid declaration of capability and conformance, and
  - » for inclusion of the EC device model on the CASA website.

CASA may remove an EC device model from the CASA website if the manufacturer requests its removal in writing, or if CASA is satisfied that removal is required in the interests of aviation safety.

## Aircraft flown with inoperative surveillance equipment (MOS 26.73)

Surveillance equipment required under MOS 26.68 may only be inoperative at the beginning of the flight for a maximum of 72 hours from the time it was found to be inoperative, provided there is no facility for it to be repaired or replaced at the aerodrome of departure and you inform ATC about the unserviceability before flight.

**Note:** See also MOS 26.04 for additional requirements related to flight with inoperative equipment. For a flight with inoperative surveillance equipment, within controlled airspace or at a controlled aerodrome (refer MOS 11.11 to 11.18) relating to air traffic control clearances. Whether a clearance is issued, or when a clearance may be issued, could be affected by the flight's operative equipment.

## Equipment for NVIS flights (MOS 26.74)

The following prescribes the requirements relating to:

- › the fitment and non-fitment of NVIS equipment to an aircraft
- › the carrying of NVIS equipment on an aircraft
- › NVIS equipment that is fitted to, or carried on, an aircraft.



*Part 91 NVIS equipment rules apply to all Part 91 and Part 138 NVIS flights but do not apply to CASR Part 133 NVIS flights (see section 11.62 of the Part 133 MOS for Part 133 NVIS equipment requirements).*

## Application (MOS 26.74A)

The following applies in relation to the use of NVIS by a flight crew member of an aircraft in an NVIS flight.

It does not apply in relation to the use of NVIS by a person on an NVIS flight who is not a flight crew member unless the person is involved in air navigation or terrain avoidance functions.

## Definitions (MOS 26.75)

**adverse event** means any event or incident in which life or property is:

- › lost, injured, or damaged in, on or by an aircraft in which NVIS is used or
- › at significant risk of loss or damage in, on or by an aircraft.

**Note:** The following are some examples of significant risks:

- › a near miss
- › NVIS equipment failure
- › malfunction or abnormal operation
- › the failure, malfunction or abnormal operation of NVIS-related or affected equipment
- › unintentional IMC penetration
- › inadvertent loss of visibility
- › abnormal degree or accelerated onset of fatigue.

**NVIS certified** means that an aircraft has been modified for NVIS flight by one of the following:

- › an approval under Part 21 of CASR
- › the type certificate holder under the type certificate
- › a supplemental type certificate.

**NVIS compatible lighting** means aircraft interior or exterior lighting:

- › with spectral wavelength, colour, luminance level and uniformity, that has been modified, or designed, for use with NVIS and
- › that does not degrade or interfere with the image intensification capability performance of the NVIS beyond acceptable standards (see MOS 26.76).

## Aircraft general and lighting standards for NVIS flights (MOS 26.76)

An aircraft for an NVIS flight must be NVIS certified.

**Note:** NVIS certification means that the aircraft also has NVIS compatible lighting.

The design of a required aircraft lighting system modification for an NVIS flight must be based on the requirements of:

- › RTCA/DO-275, as in force from time to time or
- › MIL-STD-3009, Lighting, Aircraft, NVIS Compatible, of the US Department of Defense, as in force from time to time.

## Performance and other specifications for NVG image intensifier tubes (MOS 26.77)

NVG image intensifier tubes for an NVIS flight must meet the minimum operational performance specification that is:

- › defined in RTCA/DO 275, as in force from time to time, modified as shown in Table 29 Modifications of RTCA/DO 275 following, or
- › a system performance regarding tube resolution, system resolution, system luminance gain, photosensitivity and signal to noise ratio approved in writing by CASA as being the equivalent of that stipulated above.

Each NVG image intensifier tube and associated NVIS equipment (the NVG tubes and equipment) must be:

- › certified by its manufacturer as being for aviation use
- › identified by the manufacturer’s unique serial number
- › acquired (with or without valuable consideration) by the aircraft operator directly from:
  - » the manufacturer or the manufacturer’s official supplier (an official source) or
  - » a person who acquired it directly from an official source (the initial acquirer) or
  - » a person who acquired it as the first or later acquirer in a line of direct and provable acquisitions originating from the initial acquirer (a subsequent acquirer) and

**Note 1** In this subsection, “acquired (with or without valuable consideration)” refers to, for example, an acquisition through a purchase or a donation or in any other way.

**Note 2** CASA considers the source of second-hand NVG tubes and equipment to be a matter that may affect safety.

- › in the case of replacement of NVG image intensifier tubes with tubes that are sourced from other than an official source as follows:
  - » replaced as a pair
  - » of the same form, fit and function as the tubes being replaced
  - » such that the replacement does not involve modification of the NVIS mounting frame or optical components
  - » compliant with the operational performance RTCA/DO 275 set out in Table 29 following modification.

**Note 3** For guidance only, US AN/AVS 9 NVIS, although manufactured by different manufacturers, are produced to the same US Department of Defense specification and, therefore, these tubes are interchangeable.

If 2 or more NVIS pilots on an NVIS flight use dissimilar NVG image intensifier tubes and equipment, the pilot in command must use the highest level of NVIS tubes and equipment in terms of resolution, gain and acuity.

**Note 4** Use of dissimilar NVIS does not remove the requirement that each set must meet the minimum operational performance requirements described above.

An NVIS pilot who occupies a control seat of an aircraft during an NVIS flight must use the NVIS manufacturer’s approved helmet mounted attachment device for the NVIS.



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## Performance and other specifications for NVG image intensifier tubes (MOS 26.77)

Document RTCA/DO-275 specifies the operational performance for NVG image intensifier tubes as described in the table below:

**Table 29: Modifications of RTCA/DO 275**

Paragraph reference to document: RTCA/DO-275 (as in force from time to time)	Summary	Amended performance requirement
Para 2.2.1.1 System resolution	1.0 cycles per milliradian (cy/mr). At 14° off axis = 0.81 cy/mr With a variable focus @ through infinity = 0.49 cy/mr	1.3 cy/mr
Para 2.2.1.2 System luminance gain – filmed non-autogating	= 2,500 foot-Lamberts (fL) per fL at an input light level of $1 \times 10^{-4}$ fL	= 5,500 foot-Lamberts (fL) per fL at an input light level of $1 \times 10^{-4}$ fL = 1,750 cd/m <sup>2</sup> /lx at an input light level of $1.1 \times 10^{-3}$ lx
System luminance gain – filmless autogating		=16,000 cd/m <sup>2</sup> /lx at an input light level of $2 \times 10^{-5}$ lx
Para 2.2.1.3 Fieldofview	38° vertical and horizontal	40°
Para 2.2.1.4 Magnification	1:1 +/- 2%	1:1
Para 2.2.1.7.1 Spectral transmission	Meet Class B filter requirements	Class B filter
Para 2.2.1.10 Eyepiece diopter range	Adjustable +1.0 to -2.0, or Fixed -0.5 and -1.0	+2 to -6
Para 2.2.1.12 Objective focus range	Adjustable from beyond infinity to no greater than 45 cm close range	25 cm close
Para 2.2.13 Exit pupil / eye relief	Type I – 25 mm Type II – 20 mm	25 mm
Para 2.2.2.3 Flip-up / flip down	Required capability	Push button
Para 2.2.2.4 Foreandaft adjustment	Sufficient to align with users' eyes	27 mm total
Para 2.2.2.4 Tilt adjustment	Sufficient to align with users' eyes	10°
Para 2.2.2.5 Interpupillary adjustment	Desired but not required. If not installed, exit pupil must be large enough to see full FOV	51 to 72 mm
Para 2.2.2.6 Voltage required	2.7 – 3.0 V DC 50mA nominal Backup power supply required	2.7 – 3.0 V DC 50 mA nominal Backup available
Technology	Intensifier tubes not specified	Not specified
Photosensitivity filmed non-autogating	Not specified	1,800 µA/lm
Photosensitivity filmless autogating		800 µA/lm
Tube resolution	Not specified	64 line pairs per millimetre (lp/mm)
Signal to noise ratio filmed non-autogating	Not specified	21:1
Signal to noise ratio filmless autogating		25:1

## Maintenance of the NVIS and its components (MOS 26.78)

**Manufacturer** means the person who is:

- › the original manufacturer of the NVIS or
- › the original manufacturer of the NVG image intensification tubes fitted to the NVIS or
- › the person who makes the final assembly of the part into the NVIS if parts of the NVIS are manufactured by different persons.

For an NVIS flight, the NVIS equipment must be maintained, stored, and checked for serviceability, in accordance with the manufacturer's requirements and procedures.

NVIS equipment must have a documented maintenance program to ensure that:

- › maintenance, inspection, and serviceability standards for the NVIS are met
- › a biennial assessment is made to identify and rectify any degradation in the compatibility of the aircraft lighting systems with the NVIS.

**Note:** RTCA/DO-275 (as in force from time to time) provides guidance for the ongoing maintenance of installed NVIS compatible systems.

The maintenance program must include a method for assessing NVIS compatibility with any subsequent aircraft modification, equipment introduction or repair that may have an effect on the aircraft's NVIS compatibility.

Any item of equipment other than NVIS equipment, that is fitted to, or carried on, the aircraft must not adversely affect the safe operation of the aircraft in an NVIS flight.

Maintenance of NVIS must be carried out by an organisation that:

- › complies with regulation 30 of CAR or Part 145 of CASR as if the regulation or the Part applied to the organisation for the maintenance of NVIS and its related equipment
- › is endorsed in writing by the manufacturer of the NVIS as an appropriate organisation to carry out maintenance on the NVIS.

To avoid doubt, maintenance as referred to above includes routine scheduled servicing of NVIS.

An organisation endorsed by a manufacturer as an appropriate maintenance organisation for any particular NVIS manufactured in the United States (the US) that complies with the specification of RTCA/DO 275 (MOS 26.77) is taken to be endorsed for any other NVIS that:

- › is manufactured in the US and is available in Australia
- › complies with the specification of RTCA/DO 275 (MOS 26.77).

The operator must, within 28 days of the failure, report the failure to CASA through the service difficulty reporting system using ATA Code 2590 if:

- › one or more image intensification tubes (tubes) fail for any reason during an NVIS flight or
- › one or more tubes fail at any time as a result of a suspected error in maintenance.



### Minimum aircraft equipment for NVIS flight (MOS 26.79)

Before an NVIS flight, the aircraft must be fitted with a serviceable radio altimeter that:

- › conforms to the following requirements:
  - » it has a display presentation that requires minimal interpretation for both an instantaneous impression of absolute height and rate of change of height
  - » it is positioned to be instantly visible and discernible to each NVIS crew member from the person's station in the cockpit (Note: this dot point does not take effect until 2 December 2023)
  - » it has an integral audio and visual low height warning that operates at a height selectable by the pilot
  - » it provides unambiguous warning to each NVIS crew member of radio altimeter failure
- › has a visual warning system that provides clear visual warning at each cockpit crew station of height below the pilot-selectable height
- › has an audio warning system that:
  - » is unambiguous and readily cancellable
  - » does not extinguish any visual low height warnings when cancelled
  - » operates at the same pilot-selectable height as the visual warning.

A rotorcraft for an NVIS operation must be fitted with a serviceable pilot-steerable searchlight, adjustable in both pitch and azimuth from the flight controls.

Before an NVIS operation, the operator and the pilot must be satisfied that:

- › in an NVIS operation below 500 ft AGL or
- › in an NVIS operation from an HLS-NVIS basic using a searchlight with an NVIS compatible infra-red (IR) filter

the risk of an adverse event because of NVIS failure below 500 ft AGL is controlled by:

- › the aircraft's capacity to revert immediately to a non-filtered search or landing light or
- › the presence of 2 pilots, each of whom:
  - » is NVIS qualified and NVIS equipped
  - » has access to dual flight controls.