SOP

Aircraft Operations 2.2.1

The ACT Rural Fire Service Chief Officer has issued this SOP under Section 38(1) of the *Emergencies Act 2004* – A Chief Officer may determine standards and protocols.

Purpose

This procedure establishes the practices to be followed for the allocation, prioritisation and acceptable use of RFS contracted aircraft, and to ensure safety in aircraft operations at incidents and during other RFS activities.

It ensures that the RFS prioritises and reports all requests for aircraft use in a timely manner.

Scope

This Standard Operating Procedure (SOP) is applicable to personnel engaging in firefighting operations within the ACT, which includes personnel from ACT Rural Fire Service (RFS), ACT Fire & Rescue Service (ACTF&R), ACT Parks and Conservation Service or under contract to the ACT RFS.

It includes the use of contracted aerial resources and provides instructions on how to deal with unauthorised or illegal use of remotely piloted aircraft at or near emergency sites.

Aviation operations are described in the NSW and ACT Aviation Standard Operating Procedures.

Note: Refuelling of aircraft is the responsibility of the contractor.

Background

Contracted aircraft

ESA contracts use of aerial resources for firefighting and fire detection activities. These aircraft include helicopters, single engine air tankers (SEAT), small fixed wing aircraft, large aerial tankers (LAT) and the Specialist Intelligence Gathering (SIG) helicopter.

Remotely piloted aircraft

Remotely piloted aircraft, commonly known as drones, are becoming increasingly popular, particularly when fitted with camera equipment. While these may be approved for use in assisting firefighting operations, (with IC approval) there is an increasing risk of their illegal and unauthorised used use. This use poses a risk to persons and property and may impact adversely on emergency response operations and manned aircraft response operations. Air operations should cease when an unidentified RPA is flying within the flight path of incident aircraft.

Responsibilities

RFS Duty Officer (RFS DO)/ IMT Air Operations Manager or Aircraft Manager	• Assesses and prioritises requests for use of aerial resources, including interstate or interagency requests. • Completes NSW/ACT ARENA request and forwards it to the National Aerial Firefighting Centre within 24 hours. • Contacts ESA Spatial Operations Officer if spatial data collection and information dissemination is required (typically SIG activation).
RFS Chief Officer (RFS CO)	• Determines priorities for allocation of aerial resources. • Assesses and approves non-incident and training use of aerial resources. • Approves inclusion of personnel on flights.
RFS Operations Manager	• Determines aircraft contract start dates and extensions. • Assesses and prioritises requests for non-incident use of aerial resources.
Pilot	• Completes Aircraft Flight Operation Return (FOR) and submits it to the authorising officer within 7 days.

Applicability of this SOP

This SOP applies to the use of all aerial resources within in the ACT or on request from interstate for their use.

Aircraft operation procedures

Authorising air assistance for an incident

All requests for aircraft use within the ESA (other than Toll) must be referred to the appropriate authorising officer:

- RFS Duty Officer (RFS DO)
- Designated Air Operations Manager or Aircraft Officer in the Incident Management Team (IMT) (Level 2 or 3 incident)
- RFS Chief Officer (non-incident related activities).

The authorising officer may approve the flight verbally or in writing, however written confirmation of the approval must be supplied through ARENA within 24 hours.

Additional aircraft for an incident is to be requested and tasked using ARENA or the ACT/NSW SAD

Where the SIG aircraft is being deployed, the authorising officer should notify the on-call Spatial Operations Officer to request spatial data collection and information dissemination.

Authorising an air operation for non-incident use

1. All requests for non-incident aircraft use within the ESA (other than Toll) requires assessment by the RFS Operations Manager and approval by the RFS CO.
2. The RFS Operations Manager will determine priorities for allocation of the aircraft as described below.
3. The RFS CO or delegate must supply approval for the flight in writing and submit it to ARENA.
4. Requirements for personnel to be taken on flights are described below.
5. Upon authorisation, the requesting officer will be given a time and location to meet the pilot and will be given instructions to ensure appropriate safety briefings are provided for all persons on the flight.

Prioritising aircraft use

If there are conflicts for the use of the same aircraft, the authorising officer will determine the sequencing of aircraft according to the following priorities:

1. Hazards to life
2. Project time for a mission assessed against the available time
3. Flight time limits for pilots and aircraft
4. Aircraft configuration
5. Other priorities as determined by the RFS Chief Officer.

Personnel on flights

Under no circumstances are personnel to be taken on any flight unless essential for conducting the task. Only authorised passengers that are incident/task related may travel on service-tasked aircraft. Any deviation to this must be authorised by the RFS Chief Officer or delegate.

All passengers are to be listed on a manifest, a copy of which is to be provided to the RFS DO or the authorised officer.

Record keeping

On completion of the flight, the pilot must complete the NSW/ACT State Aircraft Flight Operation Return (FOR) form and submit it to the RFS Operations Manager for approval within 7 days.

Use of aerial resources for non-ESA activities

Aerial resources for non-ESA activities must be approved as described above. An emergency incident use must be approved by the RFS DO or authorised officer; non-incident related use must be approved by the RFS Operations Manager or RFS CO.

If approval is given to an external agency to access any aircraft contracted to the ESA, for tasking for non-ESA activities, the following conditions must be met:

All costs must be met by the agency external to ESA.

1. all contractual obligations of the ESA must still be met.
2. the aircraft can be recalled with no notice by the ESA.
3. Any information or reporting required by the RFS DO or RFS CO in relation to this tasking must be supplied.

Additional safety considerations

Prohibited or unauthorised air operations

Unauthorised remotely piloted aircraft are not permitted to be flown within 5 Nm (9 kilometres) of a fire.

If it is deemed to be unsafe to operate an aerial resource due to the presence of unauthorised remotely piloted aircraft, the planned aerial operation should be stopped or modified to ensure air safety as specified by CASA.

Air operations near windfarms

Turbine towers, meteorological monitoring towers and power transmission infrastructure pose risks for aerial firefighting operations. Meteorological monitoring towers and power transmission infrastructure are generally difficult for aerial personnel to see, if they are not marked appropriately. If wind turbines are not shut down, moving blades and wake turbulence may create significant hazards for low-flying aircraft.

Where possible, blades should be sopped in the 'Y' or 'rabbit ear' position to allow for maximum airspace for aircraft to manoeuvre underneath the blades.

Restricted air space in the Canberra region

All aircraft operating on behalf of the ESA must be informed of the Special Restricted and Restricted airspace over the ACT. Each zone has specific entry and flight path requirements, Pilot in Command (PIC) **MUST** seek relevant approvals from Air Traffic Control (ATC) prior to approaching these zones.

- R430 (A, B, C) Tidbinbilla Deep Space Tracking Station
- D457 & D 458 Majura Firing Range
- R424 Hoskinstown Radio Telescope

ACT regional map displaying restricted flight zones within the Canberra region

Additional agency involvement

This SOP applies to the use of ESA-contracted and call when needed (CWN) aerial resources both within the ACT and interstate.

Document information

Version history

Author	Version	Version Approval Date	Summary of Changes
Andrew Stark	1.0	15/2/2011	Version 1.0
Carmel Summers	2.0 Draft	28/11/2019	Reviewed and updated

Approved by

Name	Title/Role	Signature	Date
Rohan Scott	A/g CO ACT RFS		28/11/2019

Document Owner

Position	Section
Manager	Operations

Next review due: 28/11/2021

Related documents

Document name	Version
NSW and ACT Aviation Standard Operating Procedures 2018 – Version 4.1	
SOP 2.2.2 Use of Air Observers	
LAT documents - TBA	
AFAC Wind Farms and Bushfire Operations	
AFAC Unauthorised of Illegal Use of Remotely Piloted Aircraft at or near Emergencies	
Civil Aviation Safety Authority (CASA) Drone safety rules	

Signed documents will be scanned and filed in TRIM.

Trigger points for the Activation of the Special Intelligence Gathering Aircraft

- Fires in the Rural Area of the ACT where
    - Elevated fire dangers are forecast or being experienced
    - Fire tower reports indicate an increasing volume of smoke, with no ground assets on scene
    - Multiple fires in the rural area, where the Incident Management Team require quality intelligence to support rapid decision making on resourcing and public messaging
- Significant lightning within/surrounding the ACT
- Request from ground commander for aerial observation
- Flood or Storm Intelligence gathering
- Major Industrial fire intelligence
- Other incidents at the request of Chief Officers of ESA
- Missing Persons search (cost recovery AFP or NSW Police)
- Request from local NSW regions (Fires or Lightning detection) released on immediate return to the ACT if required. (cost recovery)

Trigger points for the Activation of medium firebombing Aircraft or Single Engine Air Tanker (SEAT)

- Immediate launch to interface fires where a large volume of '000" or other intelligence indicating property or assets at risk, is being received from the ground.
- Watering bombing of remote fires, where SIG/air Observer has recommended water bombing as containment strategy
- Insertion of remote area firefighters to remote fires, where vehicle access is beyond a reasonable distance to walk firefighter in.
- Incident controller requests aerial support for direct suppression firefighting
- Senior Officer requests the RFS Duty Officer or Aircraft Officer to dispatch to incident

Trigger points for the Activation of Large Air Tanker (LAT)

- Major fire threat to built assets or infrastructure
- Rural/remote area Risk analysis on cost of aircraft v cost of suppression/containment – including large scale backburning, machinery, firefighter or other aircraft costs, containment of a larger fire or containment prior to expected bad fire weather.
- Duty Officer or Incident Controller must seek approval from the Chief Officer or Commissioner

  See LAT Considerations for interstate deployment for additional supporting information

Large and very large airtankers

Considerations for interstate deployment

DRAFT v005 Nov 2015

NAFC
National Aerial Firefighting Centre

DRAFT

Avro RJ85 airtanker

Type 1 Airtanker

Primary role: Firebombing

Two pilots when firebombing

Conair constant flow firebombing system

11,350 litre retardant capacity

Cruise speed (loaded) 680 km/h

Typical cruise altitude (loaded) 18,000 feet

Typical runway required 1,650m

Max runway required (full load hot day) 1,950m

28.6 length, 26.3m wingspan

42,200 kg gross weight

4 x Honeywell LF507-1F turbo fan engines

Fuel consumption 3200 litres/h of Jet-A1

2+ fire agency radios, Satellite tracking

The Avro RJ85 airtanker is a modification of an Avro RJ85 passenger jet. In its airliner configuration the RJ85 carries up to 100 passengers typically on short haul routes. The RJ85 is a modernised, more powerful upgrade of the well-known BAe-146 line of passenger jets.

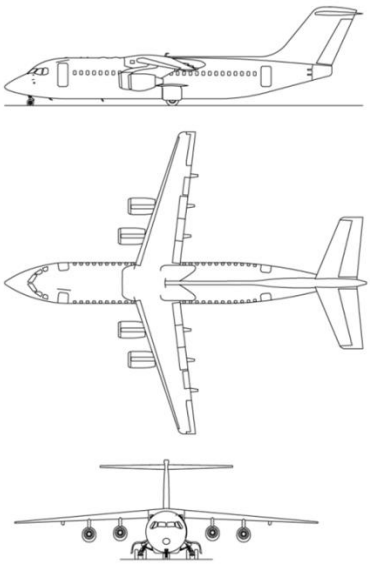
Conair have designed and certified a modification to the RJ85 to integrate a 3,100 US gallon firebombing system. This system installs an external saddle tank around the centre of the aircraft fuselage. An 11,350 litre load of fire retardant solution can be carried on board the aircraft. The computerised firebombing system delivers a constant flow of fire retardant or suppressant to the target area

The RJ85 is used by fire agencies in North America and Australia primarily for firebombing. It can be utilised for both initial attack of new fires with fire suppressant solutions and line building with fire retardant on larger fires. Its flexibility enables the RJ85 to work in both the urban interface and remote areas such as parks and forests.

The RJ85 can operate from many airfields across Australia. With a full retardant load on a 45 degree Celsius day the aircraft requires a 1,950m runway. Shorter runways can be utilised with a slightly lighter load or on cooler days. The RJ85 was specifically designed as a short haul airliner to use short runways with steep approaches.

The Avro RJ85 airtanker operates alongside other fire fighting aircraft to support fire fighting crews on the ground. Carried on board the aircraft are sophisticated communication and tracking equipment that keep the aircraft in constant contact with other aircraft and the fire agency crews managing fires on the ground.

The Victorian Government has contracted, through NAFC, one Avro RJ85 airtanker for the 2015-16 fire season. Aircraft in the national aerial fire fighting fleet are available for use across all states and territories of Australia.



DRAFT

Coulson C130Q airtanker

Type 1 Airtanker

Primary role: Firebombing

Other roles: Transport

Two pilots and one flight engineer

RADS-XXL constant flow firebombing system

15,450 litre retardant capacity

Cruise speed (loaded) 545 km/h

Typical cruise altitude (loaded) 12,500 feet

Typical runway required 1,600m

Max runway required (full load hot day) 1,950m

30.3m length, 40.4m wingspan

68,000 kg gross weight

4 x 4,500HP Allison T56-A-16 turbo prop engines

Fuel consumption 2,650 litres/h of Jet-A1

2+ fire agency radios, Satellite tracking

The Coulson C130Q airtanker is a modification of the ubiquitous Lockheed Martin C130 military transport aircraft. In its original configuration as an EC-C130Q, the aircraft was used by the US Navy in the TACAMO role where it operated as a communication relay in the event of a crisis. Subsequently, it was operated by NASA before being purchased by Coulson Aviation.

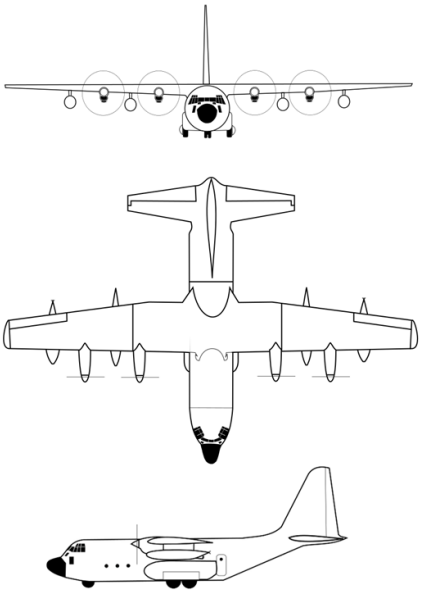
Coulson Aviation have designed and certified a modification to the C130 to integrate a 4,300 US gallon firebombing system. This system is a derivative of the well regarded Aero Union RADS 1 firebombing tank. A 15,450 litre load of fire retardant solution can be carried on board the aircraft. The GPS linked computer controlled firebombing system delivers a constant flow of fire retardant or suppressant to the target area.

The C130Q is used by fire agencies in North America and Australia primarily for firebombing. It can be utilised for both initial attack of new fires with fire suppressant solutions and line building with fire retardant on larger fires. Its flexibility enables the C130Q to work in both the urban interface and remote areas such as parks and forests.

The C130Q can operate from many airfields across Australia. With a full retardant load on a 45 degree Celsius day the aircraft requires a 1,950m runway. Shorter runways can be utilised with a slightly lighter load or on cooler days. The C130 was designed as a tactical airlifter and is ideally suited to operating at low level around fires.

The C130Q airtanker operates alongside other fire fighting aircraft to support fire fighting crews on the ground. Carried on board the aircraft are sophisticated communication and tracking equipment that keep the aircraft in constant contact with other aircraft and the fire agency crews managing fires on the ground.

The Victorian Government has contracted, through NAFC, one Coulson C130Q airtanker for the 2015-16 fire season. A similar Lockheed L100-30 airtanker is based in NSW. Aircraft in the national aerial fire fighting fleet are available for use across all states and territories of Australia.



DRAFT

Lockheed L100-30 airtanker

Type 1 Airtanker

Primary role: Firebombing

Other roles: Transport

Two pilots and one flight engineer

RADS-XXL constant flow firebombing system

15,450 litre retardant capacity

Cruise speed (loaded) 545 km/h

Typical cruise altitude (loaded) 12,500 feet

Typical runway required 1,600m

Max runway required (full load hot day) 1,950m

34.4m length, 40.4m wingspan

68,000 kg gross weight

4 x 4,500HP Allison 501-D22A turbo prop engines

Fuel consumption 2,650 litres/h of Jet-A1

2+ fire agency radios, Satellite tracking

The Lockheed L100 airtanker is a modification of a Lockheed Martin L100-30 (382G) cargo transport aircraft. The L100 is the civilian version of the ubiquitous Lockheed Martin C130 Hercules military transport aircraft. In its transport configuration, the L100 is used by the cargo transport airlines around the world, often operating in and out of remote airfields from Africa to the Antarctic.

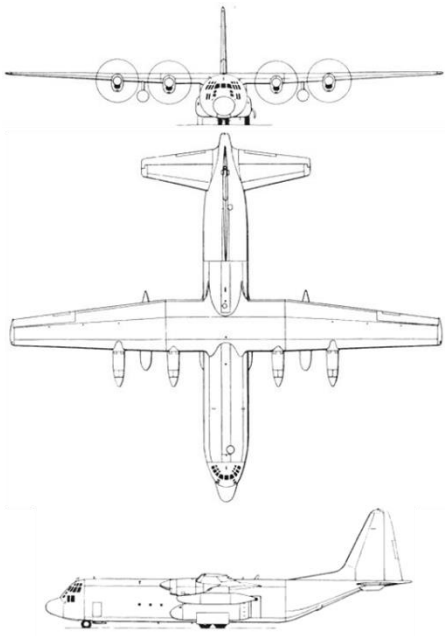
Coulson Aviation have designed and certified a modification to the L100 to integrate a 4,300 US gallon firebombing system. This system is a derivative of the well regarded Aero Union RADS 1 firebombing tank. A 15,450 litre load of fire retardant solution can be carried on board the aircraft. The GPS linked computer controlled firebombing system delivers a constant flow of fire retardant or suppressant to the target area. The L100 can carry an on-board system for mixing fire suppressant solutions so it can operate from remote airfields where only water is available.

The L100 airtanker is used by fire agencies in North America and Australia primarily for firebombing. It can be utilised for both initial attack of new fires with fire suppressant solutions and line building with fire retardant on larger fires. Its flexibility enables the L100 to work in both the urban interface and remote areas such as parks and forests.

The L100 can operate from many airfields across Australia. With a full retardant load on a 45 degree Celsius day the aircraft requires a 1,950m runway. Shorter runways can be utilised with a slightly lighter load or on cooler days. The L100/C130 aircraft were designed as a tactical airlifter and is ideally suited to operating at low level around fires.

The L100 airtanker operates alongside other fire fighting aircraft to support fire fighting crews on the ground. Carried on board the aircraft are sophisticated communication and tracking equipment that keep the aircraft in constant contact with other aircraft and the fire agency crews managing fires on the ground.

The NSW Government has contracted, through NAFC, one Lockheed L100-30 airtanker for the 2015-16 fire season. A similar Coulson C130Q airtanker is based in Victoria. Aircraft in the national aerial fire fighting fleet are available for use across all states and territories of Australia.



DRAFT

DC-10 very large airtanker

Type 1 VLAT airtanker

Primary role: Firebombing

Crew of two pilots and one flight engineer

5 tank, underslung, constant flow firebombing system

43,900 litre retardant capacity

Drop speed approximately 280 km/h

Typical cruise speed 650 km/h (loaded), 830 km/h (empty)

Typical cruise altitude 12,500 ft (loaded), 27,000 ft (empty)

Typical runway required 2,000+m

55.5m length, 50.4m wingspan

190,500kg Maximum takeoff weight

3x General Electric CF6-50C2 turbo fan engines

Fuel consumption 9,650 litres/h of Jet-A1

2+ fire agency radios, Satellite tracking

The DC-10 VLAT is a modification of a McDonnell Douglas DC-10-30 airliner. In its original configuration the DC-10 aircraft was used by airlines around the world as a wide bodied long haul passenger airliner. The DC-10 is still in widespread use as a cargo transport aircraft.

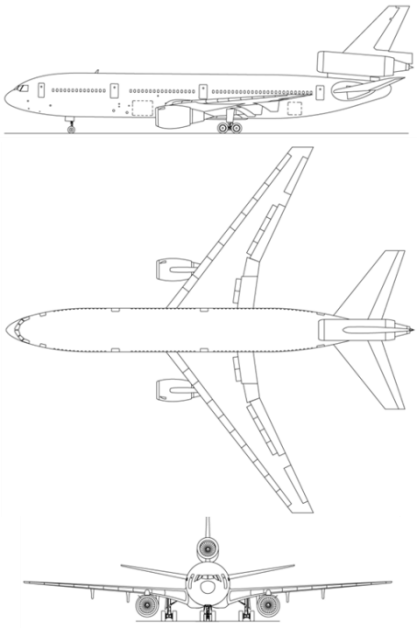
10 Tanker Air Carrier, LLC have designed and certified a modification to the DC-10-30 to integrate an 11,600 US gallon firebombing system. This firebombing system is a derivative of Erickson Aircrane helicopter tank specially modified to suit the DC-10. A 43,900 litre load of fire retardant solution can be carried in five tanks mounted below the aircraft fuselage. The computer controlled firebombing system delivers a constant flow of fire retardant to the target area.

The DC-10 airtanker has been used by fire agencies in North America and Australia. It is primarily used for line building with fire retardant on larger fires. Increasingly the DC-10 is used in other airtanker roles including supporting direct attack on smaller fires. The DC-10 airtanker typically operates with a 'lead plane' that flies ahead of the DC-10 during the firebombing drops and directs where the load is to be placed. The lead plane is usually a twin turbine aircraft such as a Rockwell Turbo Commander or Beechcraft Kingair.

The DC-10 can only operate from a limited number of larger airports across Australia. With a full retardant load on a 45 degree Celsius day the aircraft requires a runway length in excess of 2,000m. The DC-10 requires more consideration of runway and taxiway pavement strengths and clearances than other fire fighting aircraft.

The DC-10 airtanker operates alongside other fire fighting aircraft to support fire fighting crews on the ground. Carried on board the aircraft are sophisticated communication and tracking equipment that keep the aircraft in constant contact with other aircraft and the fire agency crews managing fires on the ground.

The NSW Government has contracted, through NAFC, one DC10 Airtanker for the 2015-16 fire season. Aircraft in the national aerial fire fighting fleet are available for use across all states and territories of Australia.



DRAFT

Turbo Commander 690B

Call sign “Birddog”

Primary role: air attack supervision

Other roles: reconnaissance / utility aircraft.

Twin engine, turbo prop, high wing

Single pilot, 5 passengers

4650 kg gross weight

Typical cruise speed 500 km/h

Typical cruise altitude 18,000 feet

13.5 m length, 14.2 m wingspan

2 x 717 HP Garrett TPE 331-10 engines

Fuel consumption 300 litres/h of JetA1

Day, night and instrument flight

More than 3.5 hours endurance

2+ fire agency radios & satellite tracking

Smoke trail generator

The Rockwell Turbo Commander 690B is a twin engine, high wing, passenger transport aircraft. The Turbo Commander is used by fire agencies primarily for aerial supervision of airtanker operations. Other roles include supervision of fire operations, fire detection, reconnaissance and utility missions carrying the pilot and up to five passengers or crew depending on the mission.

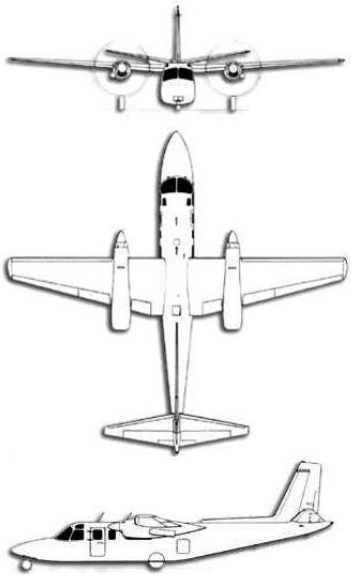
The Turbo Commander is particularly well suited to aerial supervision with its high wing offering excellent visibility from the front seats, and the ability to slow down and loiter in the fire area. When working as a ‘Birddog’ the main responsibility for the crew is to supervise aerial fire fighting operations and to collect intelligence information about a fire and pass it on to the incident management team.

The Turbo Commander is used to supervise airtanker operations. An on board air attack supervisor will direct air tankers where and how to drop their load on the fire. The aircraft can be used to fly the drop profile to show the airtanker where to fly and to identify hazards and landmarks. In some circumstances the Turbo Commander can be used to lead the airtanker through its drop pattern and generate a smoke marker trail at the required drop location.

The Turbo Commanders speed, range and climb performance make it ideal for supporting fire operations in regional locations. It can quickly climb to altitude cruise at high speed, then descend and slow down in the fire area. It can readily match the speed of large air tankers when operating in the fire area.

The Rockwell Turbo Commander aircraft operates alongside other fire fighting aircraft to support fire fighting crews on the ground. Carried on board the aircraft are sophisticated communication and tracking equipment that keep the aircraft in constant contact with other aircraft and the fire agency crews managing fires on the ground.

The NSW and Victorian Governments have contracted, through NAFC, three Rockwell Turbo Commander aircraft for the 2015-16 fire season. Aircraft in the national aerial fire fighting fleet are available for use across all states and territories.



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Airfields Considerations

For 2015/16 Summer fire Season large airtankers contracted to be are based at **RAAF Richmond** in NSW and **Avalon Airport** in Victoria

Aircraft	Base	Host	Dispatch
L100	**RAAF Richmond**	NSW RFS	NSW Airdesk
DC10	**RAAF Richmond**	NSW RFS	NSW Airdesk
C130Q	**Avalon Airport**	DELWP Victoria	Vic Airdesk
RJ85	**Avalon Airport**	DELWP Victoria	Vic Airdesk

Runway length

Candidate airfields for large airtanker use are initially selected based on having a long enough runway to cater for large airtanker operations. The runway length required by an airtanker depends on a number of factors, mainly around aircraft performance and regulatory requirements.

On hot days aircraft will need longer runways to lift the same load as engine performance and aerodynamic lift typically decline with temperature.

Aviation regulations, in some circumstances, require the take-off distance and the accelerate-stop distance for large aircraft to be less than or equal to the available runway length, both with and without the failure of a critical engine assumed. The calculation of these distances is called balanced field take-off.

The C130Q, L100 and RJ85 airtankers require a balanced field length of approximately 1950 metres when operating with a full load of retardant, and 2.5 hours of fuel on board, on a 40 degree day from a sea level runway. In this balanced field length calculation no allowance has been made for the ability of these airtankers to jettison their load in the event of the failure of a critical engine during take-off. With the ability to jettison their load, lower temperatures, and the ability to refuel whilst reloading and therefore carry less fuel per sortie all taken into account these aircraft would typically be able to utilise most 1600m or longer runways. The C130, L100 and RJ85 can use runways as short as 1400 metres. However runways this short may require the airtankers only taking a partial load of retardant or taking less fuel than optimal for maintaining high tempo operations (ie require more refuelling interruptions).

The DC10 has a longer runway requirement than other large airtankers. Typically the DC10 VLAT requires a minimum runway length of 2000 metres and this length may require a downloading of fuel, retardant or acceptance of an unbalanced take-off on a hot day. Being three engined the DC-10 loses a greater proportion of its available thrust with the failure of an engine on take-off than for the four engined tankers. On the other hand the DC-10 usually operates well below its maximum take-off weight so has performance to spare in these circumstances.

Pavement

A detailed assessment of any proposed airport for LAT operations would have to be done to determine if the pavement strength is suitable and if airport infrastructure is suitable for taxi, turning, loading, refuelling and parking large airtankers. Also to be considered would be airport accessibility – especially so for busy capital city airports and military airports, and the location of the airport relative to areas of likely airtanker operations.

Each runway has a published aircraft classification number. This ACN is a number expressing the relative effect of an aircraft on the runway pavement. The heavier the aircraft and the higher its tyre pressures the stronger a runway needs to be. The RJ85, C130 and L100 can operate on most capital city, military, and larger regional airports. The DC-10 is effectively restricted to large capital city and military airports by its impact on runways and wingtip taxiway clearance requirements.

Dimensions (under typical operating conditions)

	C130Q	L100-30	RJ85	DC10-30
Max MTOW	68,364 kg	70,306 kg	43,998 kg	190,500 kg
Estimated Operating weight	63,000 kg	63,000 kg	43,100kg	177,000 kg
ACN-PCN	24	24	28	44
Tyre pressure	0.67-0.74 Mpa	0.86 Mpa	0.85 Mpa	1.14 Mpa
Wingspan	40.4 m	40.4 m	26.3 m	50.4 m
Length	30.3 m	34.4 m	28.6 m	55.5 m
Turn radius	26.82 m	27.43 m	18.34 m	46.0 m

(ACN-PCN at MTOW with flex pavement, class C subgrade)

Load Jettison Area

In the event of an aborted mission the C130 and L100 can in most circumstances land with a full load on board the aircraft. However the RJ85 can only land with tanks approximately ¾ full and will have to jettison part of its load prior to landing, or in some circumstances may be able to burn off fuel to reduce weight. The DC10 must jettison its entire load before landing.

In some operational circumstances any airtanker may need to jettison all or part of their load. A predefined jettison area where the load can be safely dropped with little environmental impact near the airbase would be beneficial.

Infrastructure

The C130, L100 and RJ 85 can operate with little or no airport infrastructure for short times. However for extended operations an airport tug an suitable towbar may be required, the airtanker may be able to deploy with its tow bar in some circumstances. Scissor lifts or similar elevated platforms to allow engineers to access engines and other high areas of the aircraft may be also be required. The DC10 requires air stairs and ground power at all times.

Weather

Weather conditions at an airbase may restrict Airtanker operations. Significant cross winds or low visibility are the most likely issues. As the primary airtanker bases are all single runway airports planning for relocating aircraft may need to be considered if strong cross wind conditions are forecast. All airtankers are capable of operating under Instrument Flight Rules (IFR) and as such can take off and land in low visibility and at night. Operating under IFR conditions may impose additional regulations that require the aircraft to operate at lower weights (= less load), with more fuel reserves (= less load) and/or via non direct routes (slower).

Candidate Airports

Based primarily on length, known facilities, and previous operations – all subject to Agency confirmation
Airports listed in **bold text** are considered the most likely for Airtanker operations in each area.

STATE	ICAO	AIRPORT	LENGTH	TYPE	NOTES
New South Wales / ACT	**YSSY**	**Mascot**	**3962**	**LAT/VLAT**	Major RPT Airport **Emergency divert location**
	YSCB	**Canberra**	**2682**	**LAT**	Major RPT Airport – RAAF **Forward operating base**
	YWLM	**Williamtown**	**2438**	**LAT/VLAT**	RAAF Williamtown - RPT airport **Backup airtanker base**
	YORG	Orange	2214*		
	YSTW	**Tamworth**	**2200**	**LAT**	**Forward operating base**
	YSRI	**Richmond**	**2133**	**LAT/VLAT**	RAAF **Primary airtanker base**
	YCOM	Cooma	2120		
	YSCH	Coffs Harbour	2080		
	YSNW	Nowra	2046	**LAT**	HMAS Albatross **Airtanker training base**
	YMAY	**Albury**	**1900**	**LAT**	RPT Airport – **Forward operating base**
	YBNA	Ballina	1900		
	YCOR	Corowa	1827		
	YWOL	Wollongong	1827		
	YSWG	Wagga Wagga	1768		
	YMDG	Mudgee	1739		
	YARM	Armidale	1738		
	YGFN	Grafton	1709		
	YSDU	**Dubbo**	**1708**	**LAT**	RPT Airport – **Forward operating base**
	YBTH	Bathurst	1705		
Victoria	**YMAV**	**Avalon**	**3048**	**LAT/VLAT**	**Primary airtanker base**
	YMES	**East Sale**	**2436**	**LAT**	RAAF – **Planned Forward operating base**
	YMNG	Mangalore	2027		
	YHML	Hamilton	1404		
South Australia	**YPED**	**Edinburgh**	**2560**	**LAT**	RAAF Edinburgh - **Previous LAT temporary base**
	YPAD	Adelaide	2528		Major RPT Airport
	YCDU	Ceduna	1748		
	YREN	Renmark	1740		
Tasmania	**YMHB**	**Hobart**	**2251**	**LAT**	Major RPT Airport - **Possible forward operating base**
	YMLT	Launceston	1981		RPT Airport
Queensland	YBBN	Brisbane	3500		Major RPT Airport
	YAMB	**Amberley**	**3048**	**LAT/VLAT**	RAAF Amberley **Possible forward operating base**
	YBWW	**Wellcamp**	**2870**	**LAT/VLAT**	New RPT airport **Possible forward operating base**
	YBCG	Coolangatta	2042		Major RPT Airport
Western Australia	YPPH	Perth	3444		Major RPT Airport
	YPEA	**Pearce**	**2438**	**LAT/VLAT**	RAAF Pearce - **Previous LAT temporary base**
	YPKG	Kalgoorlie	2000		Major RPT Airport
	YGEL	Geraldton	1981		
	YBLN	**Busselton**	**1800**	**LAT**	**Previous LAT forward operating base**
	YABA	Albany	1800		

* = when works complete

Dispatch considerations

Approval

The dispatch time for an airtanker is dependent on a lot of factors over and above the time taken to fly from one place to another. It is likely that the longest time taken in any interstate deployment would be the time to request and approve the deployment. Once an interstate deployment is considered likely this time can be gainfully used to prepare the aircraft, aircraft and receiving location.

Loading

Loading of these aircraft with retardant and extra fuel at their NOB should take approximately 15 minutes. Start up and taxi could add another 5 to 10 minutes, so aircraft should be able to get off the ground 20 to 30 minutes from approval of a request to dispatch interstate. Where aircraft are pre-positioned loaded or partially loaded these times can be significantly reduced.

Pressurisation

The C130Q, L100 and DC10 cannot pressurise when loaded, this requires the aircraft to operate at lower altitudes when loaded, which reduces its top speed. Depending on the distance to be travelled and the ability to immediately load the aircraft at the receiving end it may be best to deploy the C130Q, L100 and DC10 unloaded to an airfield closer to the interstate fire and load it with retardant or suppressant there.

Supervision aircraft

The TC690 supervision aircraft's transit speed is slower than all of the air tankers. As such if the supervision aircraft is required to be onsite before or at the same time as the tankers than it can be the deciding factor in dispatch time for distant locations. Where it is possible to get the supervision aircraft airborne before the tankers, for example while they are loading, then any delay, waiting for the supervision aircraft, can be minimised. Alternatively if a local supervision aircraft with suitably qualified Air Attack Supervisor is available then this issue goes away.

Endurance

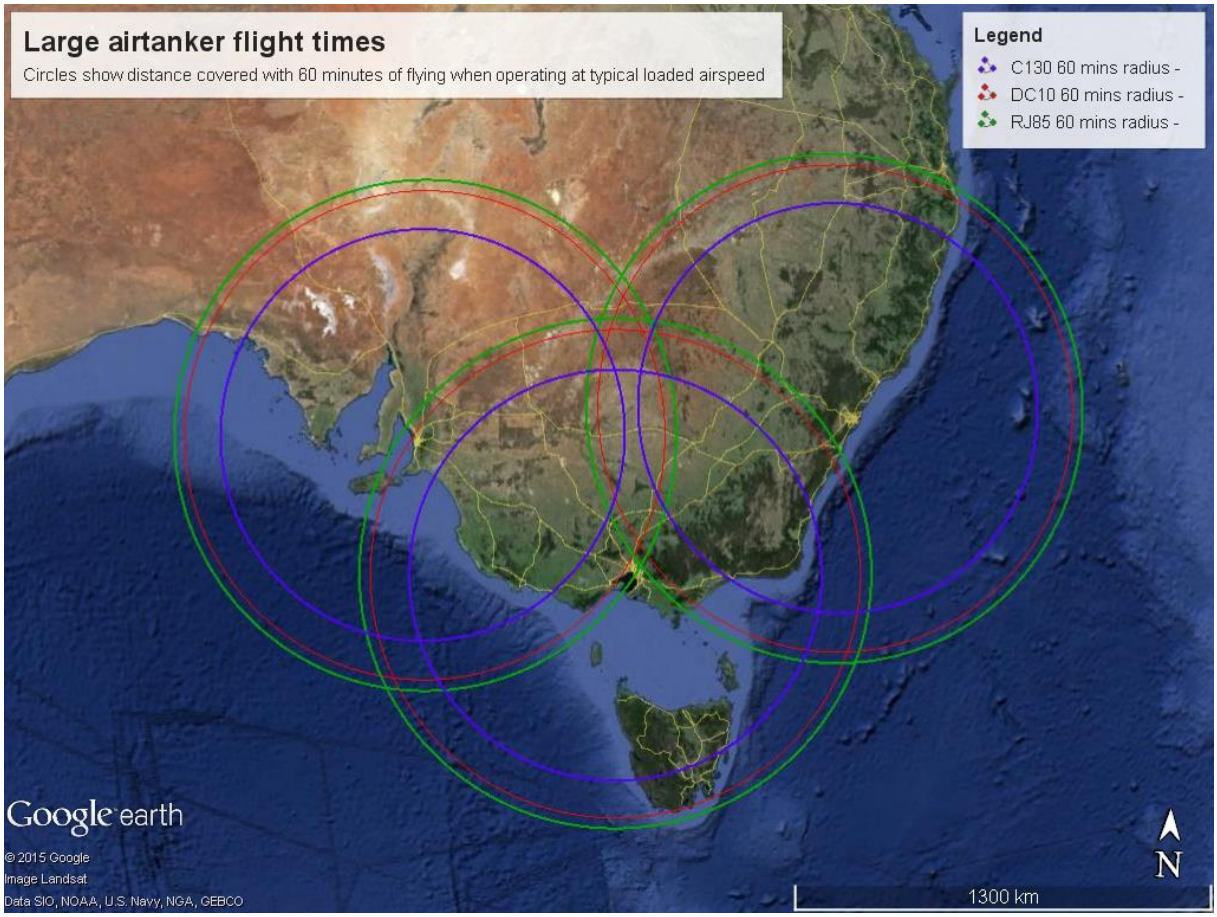
Longer ferry flights for example to and from Perth from the east coast bases, may require air tankers to refuel on route. This depends on the prevailing winds at altitude and the aircraft selected. Experience has shown the RJ85 has needed a refuelling stop in Adelaide to safely get to Perth from Avalon.

Approximate flying times (loaded)

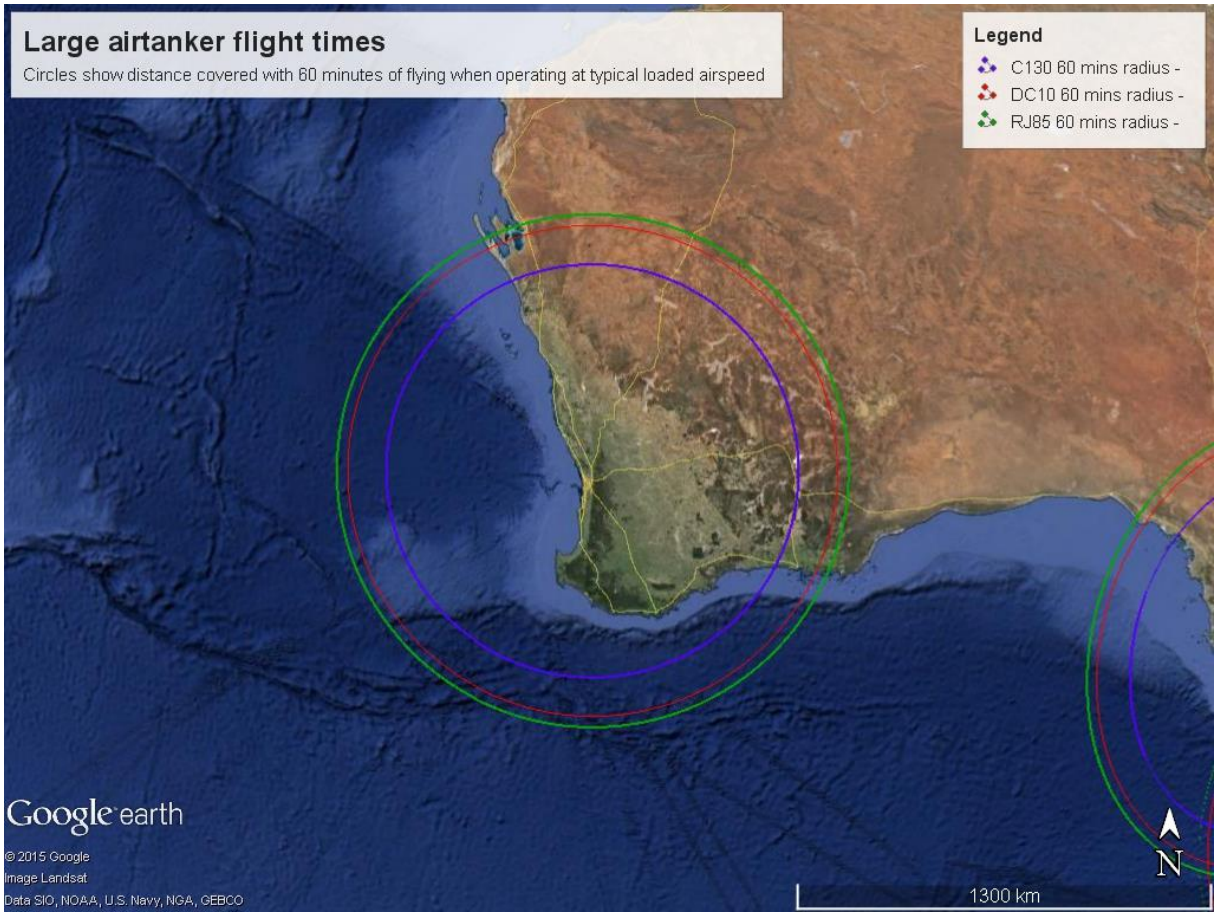
	C130	L100	DC10	RJ85
Avalon to:	mins	mins	mins	mins
Albury	34	34	28	27
Canberra	55	55	46	44
Sydney	83	83	69	66
Brisbane	154	154	129	124
Hobart	66	66	55	53
Adelaide	72	72	60	57
Perth	297	297	249	238
RAAF Richmond to:				
Albury	49	49	41	39
Canberra	26	26	22	21
Avalon	83	83	69	66
Brisbane	80	80	67	64
Hobart	117	117	98	94
Adelaide	124	124	104	99
Perth	358	358	300	287

These times are typical given the aircraft are operating fully loaded with no special dispensation to operate faster than normally permitted or at altitudes higher than normal when unpressurised.

One hour flying times from RAAF Richmond, Avalon and RAAF Edinburgh for DC10 (red), C130Q (purple) and RJ85 (green)



One hour flying times from RAAF Pearce for DC10 (red), C130Q (purple) and RJ85 (green)



DRAFT

Consumables

Large airtankers are can be considered as 'just another aircraft' in some respects. They use the same retardant or suppressants as a Single Engined Air Tankers such as the Air Tractor 802. They use the same Jet A1 fuel. They just consume a *lot* more of both. In the case of the DC10 VLAT it consumes a heck of a lot more. An example of this is that the DC10 burns more litres of Jet-A1 fuel per hour that you would typically load into an AT-802 in litres of retardant per hour working the same fire.

Fuel consumption is affected by a number of factors – operating altitude is most significant. If the RJ85 is forced to operate lower due to proximity of the fire or airspace restrictions it can burn significantly more fuel than if able to climb to 18000+ft plus where it is more efficient.

All airtankers are designed to be pressure refuelled from a regular airport tanker or airport underground supply. It would not be effective to attempt to over-wing refuel either aircraft during a fire bombing operation. Smaller airfields and regional airports may not have the fuel supply or tanker capable of sustaining these aircraft.

A fire nearby the airbase would mean the aircraft would spend a greater proportion of their available time on the ground being loaded than for a distant fire where they would spend more of their time en route to and returning from the fire. So the figures below need to be read with this in mind.

Planning Fuel Consumption (per hour of flying)

C130Q	2,650 l/hr
L100	2,650 l/hr
RJ85	3,200 l/hr
DC10	9,650 l/hr
AT-802	280 l/hr

Planning Retardant Consumption (assuming nearby fire with a 30 min turnaround time)

C130Q	30,900 l/hr
L100	30,900 l/hr
RJ85	22,700 l/hr
DC10	87,800 l/hr
AT-802	6,400 l/hr

The airtankers are loaded via one or more 3 inch Camlock fittings located towards the rear of the aircraft (three fittings on tank sides for DC10). Airtankers normally require the shutdown of the engines on the loading side whilst loading. If refuelling whilst loading then normally all engines would be shut down.

Most airtankers have a sophisticated indicator system to link the cockpit to the loaders and to indicate how much load is required and when the tank is full. In cases when the loader is unfamiliar with the aircraft and has not been briefed the aircraft would normally be shut down and one of the pilots would brief the loaders on how the system works.

Retardant line lengths

The length of retardant line delivered by each aircraft is highly variable and depends on a number of factors. Most critical is the coverage level selected by the pilot of the air tanker. For planning purposes the following numbers have been extracted from scenario data provided by the airtanker operators. All numbers are approximate and local conditions will affect them.

Aircraft	Coverage Level 6	Coverage Level 8
C130Q	Approx. 400 metres	Approx. 300 meters
L100	Approx. 400 metres	Approx. 300 meters
RJ85	Approx. 350 metres	Approx. 250 meters
DC10	Approx. 800 metres	Approx. 600 metres
AT-802	Approx. 50 metres	Not available

Retardants & Suppressants.
The airtankers can all load Water, Foam, Gel and Retardant solutions. Only products qualified on the USDA qualified products list (or formally qualified in the case of D75R retardant) may be used in these aircraft. Each jurisdiction has its own list of products that are approved for dropping in the jurisdiction. Gel solutions may not be permitted for regular use in some jurisdictions. When loading for interstate deployments ensure that the product selected is appropriate for the drop location.

Some gels solutions may affect instrumentation on-board the aircraft – particularly the RJ85. Seek advice from the operators before requesting the use of Gel. Each Airtanker may have a requirement to wash down its tanks and plumbing before switching from one product type to another. Seek advice from the Operator for what is required for wash down.

The C130 and L100 airtankers can deploy with an on board Gel mixing capability where the aircraft carries a 1000 litre 'tote' of Gel concentrate on-board and can inject this into the tank as water is pumped on board. This capability allows the L100 and C130 to operate for a short time from airstrips where only a water supply is available. Seek advice from the operator before requesting on-board Gel capability.

DC10 VLAT considerations
DC10 VLAT operations differ from the other LATs in two important ways. First is that the DC10 normally will require the supervision aircraft to act as a 'lead plane' where it 'leads' the DC10 into each and every drop run marking the drop location with smoke. The other LATs do not require the supervision aircraft to lead them in such a fashion but the supervision aircraft may be used to perform a 'show me' run with smoke marking the requested drop location. Second is that the DC10 has the potential to create significant wake turbulence. This wake turbulence will require other aircraft to remain clear of the DC10's path for 3 to 5 minutes after the drop run to allow time for the turbulence to dissipate.

Communications
The Airtankers are all fitted with aeronautical radios, agency radios suitable for their base locations and cellular and/or satellite telephones. When they operate interstate airtankers may not be able to communicate directly with agency personnel on the ground. The TC690B Supervision aircraft may be fitted with additional agency radios that span more than one jurisdiction but this cannot be guaranteed. Receiving agencies need to plan for communicating instructions clearly with the Airtankers and supervision aircraft either via aeronautical radios or telephones. Contact details for cellular and satellite phones should be maintained by operators in ARENA.

Tracking & event logging
Each airtanker is fitted with satellite tracking and event logging equipment. The tracking and event logging data is integrated through TracPlus. Agencies should be able to see the position of the Tankers using TracPlus software on their PC, TracPlus app on their phone or tablet, or via the TracPlus web site. A TracPlus user account is required to access this data. Agencies should ensure they have this access well before they may need it. The Event logging capability is still developing across the aircraft fleet – including in the airtankers. As it matures event data for take-off , landing , fill and drop should become visible in TracPlus, however initially Agencies may need to log in to airtanker specific data systems to view the Event data. Seek advice from the airtanker operator as to how to access all event data for each aircraft.

AAS & Airbase manager
Some airtanker operations may require additional training or induction of Agency personnel. Specifically Air Attack Supervisors and Airbase Managers working with airtankers may require extra skills before being able to perform all aspects of airtanker operations. The Airtanker host Agencies in NSW and Victoria have developed induction and training packages for these roles.

Crew
The Airtankers are all multi crew aircraft with a minimum of three flight crew on-board. When deployed interstate they may be accompanied with additional engineering and management support crew. The supervision aircraft are single pilot plus any Agency air attack supervision personnel on-board. Receiving states may be required to provide logistical support for feeding, transporting and accommodating these crew.

Administration
It is important to be clear about administrative arrangements for any interstate deployments of the LAT and VLAT aircraft before they deploy. NAFC Standard "**OPS-005 Procedure for temporary redeployment of firefighting aircraft**" outlines a process for administering an interstate deployment and includes a 'request' form and an 'agreement' form. When complete these include a definition of what is to be supplied, who is liable to pay and what the schedule of costs are. The NAFC office is available to assist Members with advice, communications and administration support during redeployments.

Operational procedures
The responsibility for setting for operating procedures for LATs and VLATs rest with the agencies operating them. When LATs travel interstate it is important that it is clearly understood and accepted which jurisdictions procedures will apply to their operation while interstate. Victoria and NSW as primary operators of these aircraft both have comprehensive procedures and accompanying documentation for LAT/VLAT operations. Nothing in this document should be taken as precedence over these documents or any other existing procedures in any state or territory.