



Standard OPS-014

Tracking, Event Reporting & Messaging

The purpose of this standard is to outline the requirements for tracking, event reporting and messaging systems on aircraft and other vehicles utilised by NAFC and the Members for fire and emergency operations.

Real-time resource tracking technology has been used by NAFC and the Members over more than ten years to support flight following, search and rescue and aircraft resource management. Over recent years NAFC and the Members have worked with the tracking and aviation industries to expand the use of this technology to include flight and firebombing event reporting to support situational awareness, performance measurements and automatic flight time collection.

NAFC and the Members are currently developing the use of tracking equipment to send and receive short messages from aircraft including aircraft dispatch information and pre-formed message responses from aircraft. It is recommended that aircraft operators consider the adoption of tracking system hardware that will accommodate expansion for any event reporting and messaging requirements that arise in the future.

In this standard the term 'tracking' is used to describe the transmission of position reports from a vehicle through to a ground based receiver where the position data is then stored and made available to others. The terms 'GPS' and 'GPS / GNSS' are used interchangeably as common terms to describe GNSS systems that include GPS receivers.

Tracking, event reporting and messaging may be achieved with a single device or a set of independent devices or a combination of interconnected devices

As fire and emergency aircraft often operate in remote locations with little notice terrestrial data communications systems are not normally considered sufficient to meet the requirements of this standard. A data communication system that includes both satellite and terrestrial modes may however offer redundancy in the event of failure and economy in data transmission charges.

This standard requires that the operator participate in the Australian Fire Aircraft Monitoring System (AFAMS). This requires the operator to have an account with the data integrator and organise for data to be forwarded from their equipment through the integrator to NAFC. The NAFC designated data integrator is currently TracPlus Global Ltd. <https://www.tracplus.com/>. More information on AFAMS may be found at www.nafc.org.au.

A tracking device may collect information related to the flight, engine and firebombing events that is additional the requirement of this standard. Where practical, this information should also be passed to the tracking integrator for future use.

Where this standard requires data to be supplied in particular units (e.g. metres) it is acceptable for equipment to collect data in other units (e.g. feet) so long as there is a reliable conversion of units performed before the data is made available to users at the data integrator (TracPlus).

When a contract refers to this standard the term "operator" in this standard also includes the "Contractor" as defined in the contract.

Document Control

Version	Author	Amendment	Approved
011	NAFC	Initial draft	
012	NAFC	Added references to ground vehicles	
013	NAFC	Update to refer to AFAC and Members	Sept 18

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Operators providing aircraft services must ensure that aircraft and other vehicles provided meet the requirements of this standard.

Requirements of any contract take precedence over requirements of this standard. Any exceptions to this standard will be made at the absolute discretion of NAFC or a Member.

Where required by NAFC or a Member, aircraft and other vehicles must be fitted with position reporting, event reporting, and messaging equipment that meets the following requirements.

1. Reporting – all position and event reports

All position and event reports must be transmitted within 60 seconds of collection regardless of the location of the aircraft or vehicle.

All position and event reports must be passed through to the NAFC designated data integrator within two minutes of collection.

All position and event reports must include the following minimum data derived from a GPS / GNSS receiver:

Element	Units	Precision	reference
Time	Date / time	1 second, or better	UTC time
Latitude	Degrees	0.0001 degrees, or better	WGS84
Longitude	Degrees	0.0001 degrees, or better	WGS84
Altitude	Metres	1 metre, or better	WGS84
Speed	Kilometres per hour	1 km/h, or better	
Track	Degrees	1 degree, or better	Grid north

Where possible the GPS receiver used for determining position will utilise an external antenna suitably positioned to avoid airframe obstructions. Where the fitting of an external antenna is not practical the GPS receiver must have a clear view of the sky and must produce reliable and accurate position reports acceptable to NAFC.

Some contracts may require the tracking system GPS receiver be fitted with an external antenna.

2. Position Reporting - Tracking

Where required by NAFC or a Member, aircraft must be equipped with equipment that transmits position reports at intervals of no less than 120 seconds whenever the aircraft electrical busses are powered.

Where required by NAFC or a Member, vehicles (other than aircraft) must be equipped with equipment that transmits position reports at intervals of no less than 600 seconds whenever the vehicle electrical systems are powered.

Some contracts may require aircraft to report at a shorter interval to allow for better detection of flight times where aircraft are not equipped with flight event report capability.

Some contracts may require aircraft engaged exclusively for charter operations to participate in the Australian Fire Aircraft Monitoring System or an acceptable alternative tracking system.

Generally, NAFC and the Members will require position reporting capability on all aircraft that are engaged to conduct air work type operations as any part of their service; regardless of the type of operation they are performing at the time. For example, a Cessna 182 conducting a passenger transport operation that is also contracted to perform air observing or fire spotting operations must be fitted with an operational tracker during the passenger transport charter operation.

While aircraft that are solely engaged for charter operations may not be required to send tracking reports, they should, where they are suitably equipped, participate in the Australian Fire Aircraft Monitoring System.

Ideally the tracking equipment is powered up when the aircraft is first powered up. NAFC acknowledges that in some aircraft the electrical busses are not turned on until after the engine start to protect electrical devices from transient voltages. When this is the case the tracking equipment should be powered on as early as possible.

NAFC encourages the use of tracking equipment that uses algorithms to include intermediate data points between required 120 second intervals. These additional points may include less information than the required points. This type of reporting may be called 'smart beaconing', 'corner pegging', or 'bread crumbs'

3. Event Reporting – Engine and Flight events

Where required by NAFC or a Member, aircraft must be equipped with equipment that transmits an additional position report when the following events occur:

Category	Event	Aircraft	Notes
Engine	Engine on	Fixed wing and Rotary wing	Or equivalent eg rotors in motion
	Engine off	Fixed wing and Rotary wing	
Flight	Take-off	Fixed wing and Rotary wing	
	Landing	Fixed wing and Rotary wing	
	Entry to hover *	Rotary wing	
	Exit from hover *	Rotary wing	

* Entry to, and exit from, hover events are only required under some contracts

As engine and flight related events may be used to determine chargeable periods it is critical that they match the start or end points used for charging. For example if a rotary wing aircraft is charged for time when 'rotors are in motion' then utilising a gearbox oil pressure sensor may be a suitable trigger for engine on / off.

For engine and flight related events the trigger for the event must be acceptable to NAFC.

Engine and flight event triggered reports must include all the data required by a regular position report.

The time reported for any engine or flight event triggered report must be the time of the event that triggered the report.

Engine and flight event triggered reports must include data that indicates the event type that triggered the report.

4. Event Reporting – Firebombing events

Where required by NAFC or a Member, firebombing aircraft must be equipped with an electronic event reporting system that transmits an additional report when the following events occur:

Category	Event type	Aircraft	Notes
Firebombing	Load	Fixed wing and Rotary wing	Amount loaded
	Start of drop	Fixed wing and Rotary wing	Start of substantive flow
	End of drop	Fixed wing and Rotary wing	End of substantive flow

Additional reports triggered by firebombing events must include all the data required by a regular position report plus the following data.

Event type	Attribute	Units	Precision
Load	Volume on board	Litres	100 litres or better
	Product class	Water / Foam / Gel / Retardant	
	Product type	Text	Name of product
Start of drop	Coverage level	USG/100sqft	1 USG/100sqft
	Drop type	Full / Split	
	Height AGL*	Metres	10 metres or better
End of drop	Volume dropped	Litres	100 litres or better
	Height AGL*	Metres	10 metres or better

* Height of drop above ground level is only required under some contracts

For example if 'end of drop' was triggered by the tank doors closing, and the drop system design held the doors open well after the tank was empty to 'clear the tank', then this trigger would not be acceptable to NAFC as it does not adequately coincide with the 'end of drop'.

For firebombing event reports the trigger for the event, and the method of measuring attributes, must be acceptable to NAFC.

The time reported for the firebombing event reports must be the time of the event that triggered the event report.

Firebombing event reports must include data that indicates the event type that triggered the report.

For firebombing drop events reports the start and end of the drop must be coincident with the start and end of the substantive flow from the tank or bucket. Where start of flow does not coincide with doors or valves opening, or flow finishes before doors or valves close, then the start and end of substantive flow should be used to trigger the required position reports.

Where the dynamic nature of the aircraft movement during a drop precludes the reliable measurement of the volume of the drop, then the volume dropped may be measured and reported after the load has settled.

5. Messaging

Where required by NAFC or a Member, aircraft or vehicles must be equipped with a device that provides for the two way transmission of text messages regardless of the aircraft's location.

Text messages must be sent and received via a visual display / interface in the aircraft or vehicle accessible by the pilot and crew.

All message reports must include all the data required by a regular position report in addition to the message text.

6. Installation & operation

The installation, operation, and maintenance of all tracking, event reporting and messaging systems are the responsibility of the operator.

Typically all charges associated with the provision of tracking, event reporting and messaging are borne by the aircraft operator.

7. Data

Operators must maintain accurate records of which tracking device is installed in which aircraft at any point in time.

Operators must update the tracking provider's, data integrator's and NAFC systems with any changes in aircraft and tracker IMEI / serial number when those changes occur.

Typically this will require the operator to ensure the TracPlus data base shows the correct aircraft details for the device IMEI or serial number. And that the IMEI / serial number is correctly entered against one, and only one, of the operator's aircraft in the ARENA system

8. Reliability

Operators must have in place a regular testing and checking programme to ensure tracking, event reporting and messaging systems are maintained in a fully functional state at all times prior to aircraft being engaged.