Twenty Third Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/23)

Santiago, Chile, 26-27 March 2009

Agenda Item 3: Review Relevant Work Conducted Since ISPACG/22

FMC WAYPOINT POSITION REPORTING TRIAL - BRISBANE FIR

(Presented by Airservices Australia)

SUMMARY

A pre-operational FMC WPR trial is being conducted by ANZ A320 aircraft in Brisbane Oceanic airspace. It is anticipated that an operational trial will be conducted prior to Q3 2009.

1.   INTRODUCTION

1.1   FMC Waypoint Position reporting (FMC WPR) is the term used to describe the process where an ACARS position report is converted into a format suitable for transmission to an ATS Unit via AFTN. FMC WPR has been in use in the North Atlantic airspace for a number of years.

1.2   A description of an FMC Waypoint Position Reporting (FMC WPR) trial between Air New Zealand and Airways New Zealand were described in WP/16 presented at ISPACG/22. Since ISPACG/22, Airservices Australia has been considering the issues associated with FMC WPR.

2.   DISCUSSION

2.1   Following discussions with Air New Zealand, a pre-operational trial of FMC WPR in Oceanic airspace in the Brisbane FIR is underway with ANZ A320 aircraft. This pre-operational trial consists of two phases:

2.2   **Phase 1**: Commencing 15th Jan 2009, FMC WPRs were sent by a small number of A320 flight crews in order to permit confirmation that the format of ARP received by AFTN was consistent with that required operationally. These position reports were sent to a non-operational AFTN address, and were not used to update the ATS flight plan.

Phase 2: Commencing 4th March 2009, FMC WPRs are being sent by all ANZ A320 flight crews operating flights between New Zealand and Melbourne. During this

phase of the pre-operational FMC WPR trial, ACARS position reports will be sent for the following purposes:

- Routine position reports;
- Revision of estimates;
- Notification of maintaining a cleared level.

These position reports are sent to a non-operational AFTN address, and are not used to update the ATS flight plan. The aims of Phase 2 of the trial are to:

- Continue assessment of the correct formatting of ARP messages;
- Monitor and assess flight crew procedures;
- Monitor FMC WPR performance as well as other associated variables.

During the pre-operational trial, position reporting will still continue via HF voice.
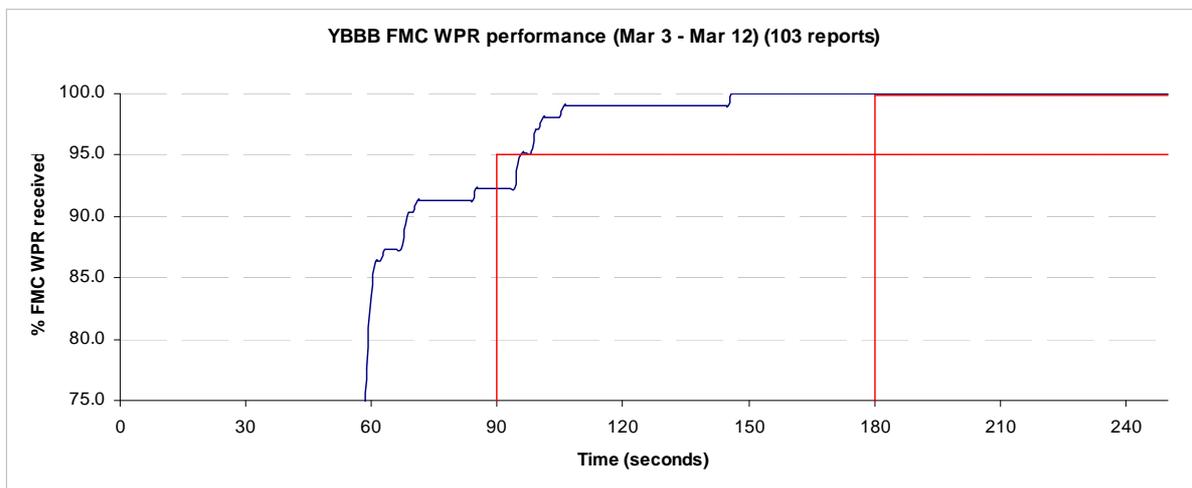
2.4   At the completion of the trial, a final assessment of the suitability of FMC WPR for operational use will be undertaken.

2.5   Draft guidance material and procedures associated with FMC WPR in Brisbane airspace are contained in Attachment A to this working paper.

3.   RESULTS

3.1   While the amount of data collected so far is limited, a number of small anomalies have been observed during the pre-operational trial:

- Occasionally, different estimates are received in the FMC WPR-generated ARP compared with the HF ARP
  ⇒ The source of the estimate provided by both HF voice and by FMC WPR is generally the FMC. However, where the pilot is aware of a significant wind change during a route segment, pilots occasionally use flight planned estimates when giving a voice report. This can occasionally result in an apparent discrepancy of several minutes. (It should be noted that the same discrepancy would occur with an ADS-C report). Provided that procedures are in place to revise any notified estimate, this is not considered to be a major issue.

- "Incorrect" level in an ARP
  ⇒ Investigation revealed that the aircraft was on climb when the ACARS position report was transmitted. The level that was received in the ARP was the current level of the aircraft.

3.2   Graphs providing an indication of the performance of the (limited) data collected so far are included below.

YBBB Transit time for each FMC WPR (Mar 3 - Mar 12) (103 reports)
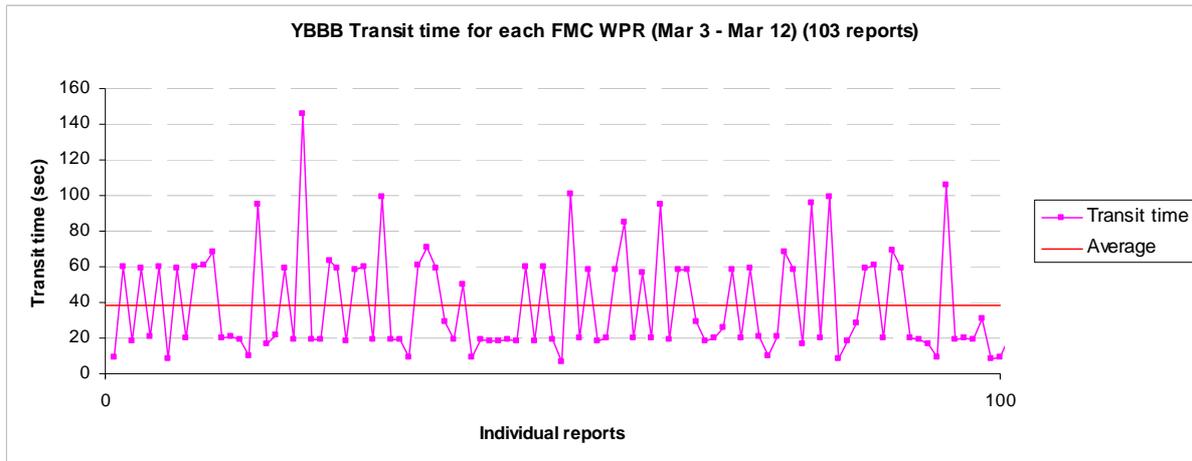
Figure 1. Performance for each individual FMC WPR

YBBB FMC WPR performance (Mar 3 - Mar 12) (103 reports)

Figure 2. Cumulative performance for all FMC WPR received

3.3   The graph in **Figure 1** provides an indication of the individual performance of each FMC WPR. The average transit time is approximately 38 seconds. **Figure 2** shows the cumulative performance of all reports received to date.

4.   ACTION BY THE MEETING

4.1   The meeting is invited to note the work being undertaken by Airservices Australia and Air New Zealand to introduce FMC WPR into the Brisbane FIR

Attachment A

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Guidance Material

for

FMC Waypoint Position Reporting

in YBBB (Tasman Sea) airspace

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Background

Overview	An FMC Waypoint Position Reporting (FMC WPR) trial will be conducted between Airservices Australia (UAS(E)) and Air New Zealand A320 aircraft on air routes between New Zealand and Melbourne.

The first stages of this trial will not affect ATC.

This document provides guidance material concerning FMC WPR, as well as procedures for the trial. |
| **Introduction** | The continuing growth of traffic in the South Pacific region has raised concerns regarding the congestion of the HF communications network.

At certain times of the day traffic density in the Tasman Sea airspace is such that there is a shortfall in HF system performance due to frequency congestion. This results in delays in processing aircraft requests for weather deviations, level changes, etc.

There are no plans to mandate FANS-1/A data link equipage, nor would this be practical for many operators due to the associated installation costs. An environment of mixed aircraft equipage will continue to exist for many years in Oceanic airspace and the pressure on the existing HF network will continue to grow.

Flight Management Computer Waypoint Position Reporting (FMC WPR), may provide a means to alleviate some of the frequency congestion problems currently encountered. |
| **FMC Waypoint Position Reporting** | A number of aircraft types have satellite ACARS capability, but are not FANS-1/A-equipped. These aircraft can exchange 'data link' messages with their company, but not CPDLC messages with ATC.

Airlines that operate these aircraft have the ability to receive routine position reports from their aircraft via ACARS as part of their Airline Operational Control (AOC) flight monitoring. With the appropriate ground-based equipment, these position reports can be reformatted and forwarded to an ATS Unit via AFTN as a replacement for HF (voice) position reports.

This method of delivery for aircraft position reports is known as Flight Management Computer Waypoint Position Reporting (FMC WPR). |

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Background (continued)

History of FMC WPR	The concept of FMC WPR was developed in North Atlantic (NAT) airspace in the Gander, Shanwick, Reykjavik, and Santa Maria Oceanic Controlled airspaces.
	In NAT airspace ACARS position reports are transmitted to a Central FMC Waypoint Reporting System (CFRS), where the report is converted into a format acceptable to the ATS Unit (POS message), and then forwarded to the appropriate ATS Unit.
	The use of a similar system was considered for the South Pacific but was discounted for a number of reasons, including the relatively small number of aircraft that would be using the service, the different message formats (ARPs) used by providers in the South Pacific, and the cost of the service quoted by the communication service provider.

Capability for FMC WPR by ANZ	The AOC system installed by Air New Zealand has the capability to automatically convert an ACARS position report into an AFTN format acceptable to an ATS Unit (e.g. ARP). Different formats can be defined for different ATS Units.
	After conversion by the AOC, the position report can then be automatically transmitted via AFTN to the appropriate ATS Unit.

FMC WPR trial between ANZ and ACNZ	Air New Zealand has been participating in operational trials involving FMC WPR with Airways New Zealand in NZZO airspace using A320 aircraft since late 1997.
	Initial estimates indicate that the use of FMC WPR by the Air New Zealand A320 fleet could reduce the total number of HF voice position reports in NZZO airspace by approximately 25%.
	This reduction will provide a significant operational benefit by reducing congestion at peak times on the HF frequencies.

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Operational Requirements

Construction of an ACARS position report on the aircraft	To be considered suitable for operational use, an ACARS position report is a report that: • Is composed and processed by avionics that are "Level C" certified; • Consists of data entered automatically by the Flight Management System (FMS); • Consists of data that is CRC protected; • Consists of data that is formatted and populated in accordance with the ARINC 702A-1 specification.
Sending an ACARS position report	The flight crew can send an ACARS position report by opening the position report page, and selecting the <**SEND**> button (5R). This sends the contents of the position report page to the AOC (i.e. flight operations).

Figure 1. ACARS position report page

The "scratchpad" is the line at the bottom of the position report page where free text information can be entered by the flight crew. This text is included at the end of any ACARS position report sent to the AOC.

The AOC uses the information from the scratchpad to determine the format of the ARP, and which AFTN address that the ARP is sent to.

Note. The contents of the actual position report cannot be modified by the flight crew.

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Operational Requirements (continued)

Conversion of ACARS position report to ARP format by AOC	To be considered suitable for operational use, an ACARS position report received by the AOC shall be: • Automatically converted by the AOC into the position report format (ARP) defined for the specific ATS Unit; and • Automatically forwarded to the ATS Unit – and any other interested party – via AFTN. **Note:** The AOC shall ensure that all valid ACARS reports that are received are forwarded to the specified ATS Unit.
Initiating the report on the aircraft	ACARS position reports may be initiated either automatically or manually by the flight crew. In either case, these reports shall be initiated as soon as possible (and no later than 3 minutes) after the waypoint has been sequenced. **Note:** The pre-operational trial between ANZ and Airways determined that a software problem existed with the automatic initiation of ACARS position reports from the A320. This problem involved an intermittent failure by the FMC to include the estimate for the next waypoint in the transmitted report. A new version of FMC software to correct this problem is expected to be released by Q3 2009.
ETA Revision	If an estimate transmitted to an ATS Unit in an ACARS position report changes by three minutes or more, the change shall be communicated to the ATS Unit concerned by the flight crew as soon as possible. This change will normally be communicated by initiating another ACARS position report but may be communicated by HF voice.
Changes of level	To prevent the transmission of an ARP containing incorrect level information, an ACARS position report should not be transmitted while the aircraft is not maintaining its cleared flight level. Flight crews should wait until the aircraft is in level flights before transmitting the report.

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Operational Requirements (continued)

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Flight Crew Monitoring	On receipt of an ACARS position report, the AOC will transmit a summary of the report back to the aircraft. The flight crew will review this summary for accuracy of content and use it to monitor ETA conformance.
	Where a position report, level report or ETA revision has been sent by ACARS, crews shall ensure that the report summary has been received back from the AOC within 5 minutes otherwise the appropriate information shall be notified via HF voice.
Flight planning requirements	There are no specific flight planning requirements to indicate that an aircraft is capable of FMC waypoint reporting.
Initialisation of the FMC	Prior to departure, the flight crew must ensure that the FMC is initialised with the correct callsign of the aircraft.
	Failure to do so will result in FMC WPR reports being rejected
Requirement for a logon	Unlike FANS data link, there is no requirement for a logon from the aircraft to the ATS Unit for FMC WPR to be available.

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Description of FMC WPR trial

FMC WPR Trial

An FMC WPR trial will be conducted between Airservices Australia (UAS(E)) and Air New Zealand A320 aircraft on air routes between New Zealand and Melbourne.

The reason for limiting the area of the trial is to avoid the rejection of ARPs for aircraft that are radar/ADS-B coupled.

This limitation is currently addressed by requesting that AusFIC does not transmit ARPs to YBBBZQZF for specific positions (e.g. DRUMO). It would not be feasible to implement this same restriction with flight crews.
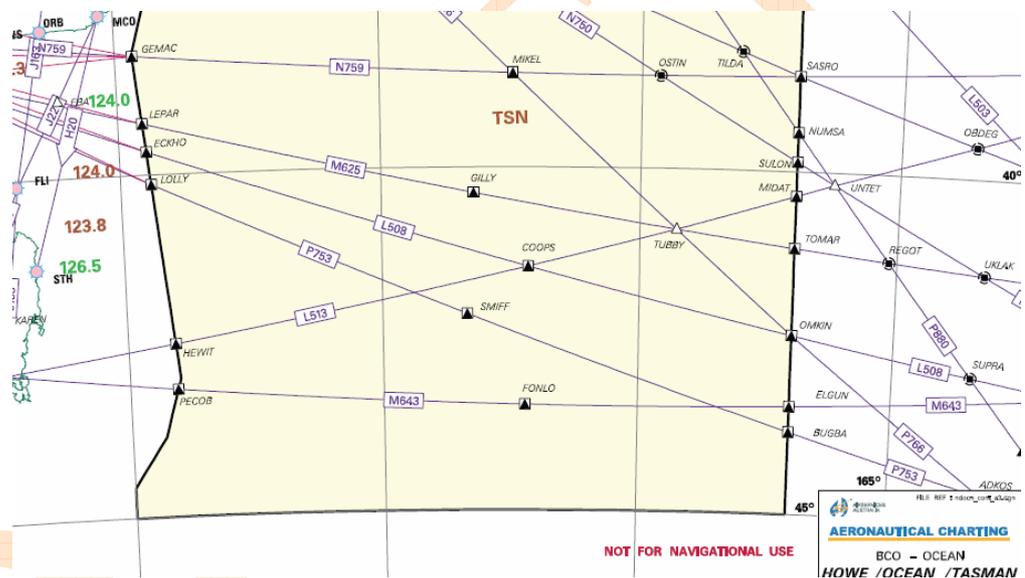
Figure 2. Area of application of trial FMC WPR airspace

Initial estimates indicate that FMC WPR on these air routes could reduce the number of HF position reports by all **ANZ** aircraft in the YBBB FIR by in excess of 40%.

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Description of FMC WPR trial (continued)

Flight Crew initiation of WPR

During the trial all ACARS position reports will be manually initiated by the flight crew. Before transmitting the position report the flight crew will review the content for accuracy.

When an ACARS position report is manually transmitted, the FMC automatically uses the "current position" (i.e. lat/long) as the 'overflown' waypoint. This is obviously not suitable for an ARP to be processed by TAAATS.

To overcome this problem, the flight crew adds a scratchpad entry prior to sending the position report. This scratchpad entry is in the format:

YBBB/[previous waypoint]/[ATO]/; e.g. YBBB/MIKEL/0906/

This scratchpad entry is included in the transmitted ACARS position report, and the information is used by the AOC as follows:

YBBB:
This information is used to:
- Format the ARP in accordance with the format defined for TAAATS;
- Determine the AFTN address(es) to which to transmit the ARP.

MIKEL:
This information is included in the ARP as the name of the overflown waypoint.

0906:
This information is included in the ARP as the ATO of the overflown waypoint.

Figure 3. Position report page with scratchpad entry

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Description of FMC WPR trial (continued)

Flight Crew initiation of WPR (ctd)

As well as the operational position report information, additional data is automatically added by the AOC to the free text field of the ARP:

- NEXT+1 waypoint information;
- Meteorological information;
- The text "-FMC";
- FMC timestamp

A sample FMC WPR-generated ARP is included below:

ARP ANZ726 MIKEL 0906 F350 SASRO 0937 PEBLU MS51 274/64 -FMC 090623

The information after the SASRO estimate (0937) is not used by TAAATS.

"-FMC" is added purely to differentiate HF ARPs from FMC WPR-generated ARPs (e.g. for off-line analysis).

"**090623**" is the FMC timestamp (in hhmmss format), and may be used to measure FMC WPR performance.

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Description of FMC WPR trial (continued)

Revising ETA   If a previously advised estimate changes by three minutes or more the revision shall be communicated to the ATS Unit concerned as soon as possible. This revision will normally be communicated by initiating another ACARS position report but HF voice may also be used.

If sent using ACARS the scratchpad entry will be in the format:

YBBB/[previous waypoint]/[ATO]/REV/; e.g. YBBB/MIKEL/0906/REV/

When received by the AOC, this ACARS report will be formatted into an ARP containing the new estimate (e.g. 0940) for the next waypoint (SASRO). The text "REV" will be included in the free text section of the ARP to indicate that the report is a revision.

A sample FMC WPR-generated ARP containing a revised estimate for SASRO is included below:

ARP ANZ726 MIKEL 0906 F350 SASRO 0940 PEBLU MS53 270/51 -FMC 092519 REV

Where an estimate revision is notified using ACARS, the flight crew shall ensure that the summary of the report has been received back from the AOC within 5 minutes of the ACARS report being transmitted, and if no such copy is received the revised estimate shall be notified by HF voice.

An example of an AOC uplink to an aircraft confirming receipt of an ETA revision is included below:

.AKLDUNZ 170925		Originator address and time stamp
CMD		ACARS message identifier
AN .ZK-OJH/FI NZ0726/MA 150I		Registration, Flt Id, Message Assurance
REVISION REPORT RECEIVED		
SENT TO YBBB		
FLT NO	ANZ726	Callsign
TIME	0925	Time revision sent
ALTITUDE	F350	Altitude transmitted in report
ESTIMATE	SASRO	Next waypoint
ETA	0940	Revised estimate (truncated to hhmm)
NEXT	PEBLU	Next+1 waypoint
TEMP	MS53	Temperature MS53
WIND	270/51	Wind velocity 270/51
FMC POS	3838S16023E	Current lat/long converted into ICAO format

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Description of FMC WPR trial (continued)

Level reports   Following a change of level, a flight crew may notify ATC that they are maintaining the newly cleared level by initiating an ACARS position report.

If sent using ACARS the scratchpad entry will be in the format:

YBBB/[previous waypoint]/[ATO]/LVL/; e.g. YBBB/MIKEL/0906/LVL/

When received by the AOC, this ACARS report will be formatted into an ARP containing the current estimate (e.g. 0940) for the next waypoint (SASRO). The text "LVL" will be included in the free text section of the ARP to indicate that the report is a level report.

A sample FMC WPR-generated ARP containing a level report for F370 is included below::

ARP ANZ726 MIKEL 0906 F370 SASRO 0940 PEBLU MS53 270/51 -FMC 092519 LVL

Where a level report is notified using ACARS, the flight crew shall ensure that the summary of the report has been received back from the AOC within 5 minutes of the ACARS report being transmitted, and if no such copy is received the level report shall be notified by HF voice.

Voice Backup   ACARS reporting is potentially subject to the same interruptions to service as CPDLC and/or ADS-C. In the event of FMC WPR failure, the backup system is HF voice.

If no ARP is received within five minutes of the scheduled reporting time the ATS Unit will initiate contact with the aircraft via HF to obtain the overdue report.

If an ATS Unit is advised of or becomes aware of data link communications failure or AFTN failure any aircraft reporting via ACARS will be contacted and advised to revert to voice position reporting.

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Description of FMC WPR trial (continued)

HF Contact Requirements for aircraft reporting via FMC WPR

During the period of the operational trial, participating aircraft are not required to establish HF voice contact at the Brisbane FIR boundary.

Where standard frequency transfer instructions exist for the next ATS Unit, flights entering the Brisbane FIR from either Melbourne, Nadi or Auckland will not be contacted by Brisbane HF unless a change to the standard frequency transfer is required.

Flights that have a requirement to contact Brisbane HF will add the suffix "F-M-C" after the aircraft callsign, e.g.

Brisbane Radio New Zealand One Two Three F M C. Request SELCAL check

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Waypoint Position Reporting – Message Flow

ACARS position reports sent to AOC

The ACARS position reports transmitted when FMC WPR is being used are in accordance with the format defined in ARINC 702. While these messages are currently manually initiated by the flight crew, the operational data is inserted automatically by the FMS.

An example and description of an ACARS position report is included below:

.AKLDUNZ 170107
FML
FI NZ0726/AN ZK-OJN
DT QXT POR1 170107 F09A
-
POSS38386E160232,,170925,350,SASRO,094004,PEBLU,M53,27051,120/TS170925,021
709/SPYBBB(MIKEL(0906(REV(278F

The message contains 2 parts:
1. The ACARS header information:

.AKLDUNZ 170925	ANZ AOC ACARS address and time stamp
FML	ACARS standard message identifier
FI NZ0726/AN ZK-OJN	Flight Identifier and Registration
DT QXT POR1 170925 F09A	"QXT" indicates report received by SITA "POR1" (Pacific Ocean Region satellite)

2. The operational message:

POSS38386E160232,,170925,350,SASRO,094004,PEBLU,M53,27051,120/TS170925,021
709/SPYBBB(MIKEL(0906(REV(278F

POS	Message Type Identifier
S38386E160232	Current Position (lat/long in ARINC format) (3838.6S 16023.2E)
<blank>	Last sequenced waypoint. Only included in the ACARS report when it is sent automatically
170925	Time at current position (hhmmss)
350	Level
SASRO	Next Position
094004	Time at next position (hhmmss)
PEBLU	Next+1 position (lat/long in ARINC format)
M53	Temperature MS53
27051	Wind Velocity 270/51
120	Fuel (in metric tones, i.e. 12.0 tonnes)
TS170925	Time Sent (hhmmss)
021709	Time sent (mmddyy)
SPYBBB(MIKEL(0906(REV(	Pilot Scratchpad – ATSU designator (YBBB), waypoint name (MIKEL), ATO (0906) and "REV" (revised estimate). Note that the "/" is transmitted as a "("
278F	CRC (Cyclical Redundancy Check) checksum

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Waypoint Position Reporting – Message Flow (continued)

ACARS position reports sent to AOC

The AOC automatically responds to each ACARS position report received with an uplinked message containing a summary of the data that has been extracted from the position report and sent to the ATS Unit in ARP format.

The flight crew uses this summary to verify the information sent to the ATS Unit and to monitor the ETA at the next waypoint.

The uplink report summary consists of 2 parts:

1. The ACARS header information:

.AKLDUNZ 170906	Originator address and time stamp
CMD	ACARS message identifier
AN .ZK-OJH/FI NZ0726/MA 150I	Registration, Flt Id, Message Assurance

2. The operational message:

POSITION REPORT RECEIVED		Operational header
SENT TO YBBB		Message address information
FLT NO	**ANZ726**	Callsign
WAYPOINT	**MIKEL**	Overflown waypoint
TIME	**0906**	ATO (Time is truncated to hhmm)
ALTITUDE	**F350**	Level
ESTIMATE	**SASRO**	Next waypoint
ETA	**0937**	Estimate for next waypoint (hhmm)
NEXT	**PEBLU**	Next + 1 waypoint
TEMP	**MS51**	Temperature MS51
WIND	**274/64**	Wind velocity 274/64
FMC POS	**3835S15733E**	Lat/Long converted into ICAO format

The operational header on the summary sent back to the flight crew describes the type of report; for example:

POSITION REPORT RECEIVED
REVISION REPORT RECEIVED
LEVEL REPORT RECEIVED

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Waypoint Position Reporting – Message Flow (continued)

AOC reports sent to YBBB via AFTN

The AOC automatically converts any ACARS position report received into ARP format defined by the ATS Unit name in the scratchpad entry and sends it to the associated AFTN address(es).

FF YBBBZQZF
160907 NZAAANZO
ARP ANZ726 MIKEL 0906 F350 SASRO 0937 PEBLU MS51 274/64 -FMC 090623

To identify the report as originating from FMC reporting the designator '**-FMC**' is added to the other information field.

The time the message originated from the aircraft is also added to other information '**090623**' to enable analysis of communications performance.

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Pre-Operational Trial

Purpose   The pre-operational trial will be used to validate:

- Conversion of the FMC WPR-generated ARPs into a format suitable for automatic processing by TAAATS; and
- Procedures for the manual transmission of reports, revised estimates and level reports by the flight crew.

During the pre-operational trial FMC WPR will not be sent to the operational platform (TAAATS).

- Phase 1 of the pre-operational trial will involve an offline comparison of FMC WPR-generated ARPs received by YBBB with the corresponding HF (voice) position reports. The purpose of this comparison is to confirm that the ARP format is acceptable for processing by TAAATS, and to identify any gross errors.

  Phase 1 will be conducted using selected ANZ A320 flight crews;

- The purpose of phase 2a of the pre-operational trial is to validate flight crew procedures associated with FMC WPR. Error checking will continue, and in addition, FMC WPR performance will be monitored.

- Phase 2b consists of the validation and processing of a number of FMC WPR-generated ARPs sent to the Airservices Australia T&E platform in Melbourne. It is expected that this validation will occur over a single day.

  Phase 2 will be conducted using all Air New Zealand A320 flight crews operating flights on routes between New Zealand and Melbourne (including flights departing from, or with destination, Adelaide).

- During Phase 1 and 2a all FMC WPRs will be transmitted to the AFTN address YBBBBNZX. The AFTN address for the final validation in the T&E (Phase 2b) will be notified at a later date.

- Aircraft will continue to report position via HF voice communications while participating in the pre-operational trial.

- The trial will be regularly monitored for timeliness, accuracy, and continuity.

Duration   Both phases of the pre-operational trial will continue until the exit criteria specified below are met.

Each phase of the pre-operational trial will commence at a time to be jointly agreed by the participants.

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Pre-Operational Trial (continued)

Exit Criteria

Phase 1 will continue until participants are agreed that:

- Message conversion by the AOC into the ARP format required by TAAATS has been validated;
- Message delivery to the AFTN address (YBBBBNZX) has been validated.

Phase 2a will continue until participants are agreed that:

- Flight crew manual initiation of FMC WPR including level and estimate revisions has been demonstrated to a standard that allows the commencement of an operational trial.

  This assessment will be made by both Airservices Australia and Air New Zealand following a review of the pre-operational trial results;

- The delivery of FMC WPR-generated ARPs to YBBB has been demonstrated to a standard that allows the commencement of an operational trial.

  This assessment will be made by both Airservices Australia and Air New Zealand following a review of the pre-operational trial results;

The following minimum data requirements should be considered prior to Phase 2b commencing:

- At least 6 weeks continuous receipt of ARPs generated by FMC WPR; and
- At least 500 ARPs generated by FMC WPR

Phase 2b consists of a single day validation to ensure the correct processing of FMC WPR generated ARPs. If this validation is unsuccessful, Phase 2a will continue until any identified problems are corrected.

- Airservices Australia is required to complete a satisfactory risk assessment of the FMC WPR concept before commencement of any operational trial. Data gathered during the pre-operational trial phase will be used in this assessment.

Participants

Participants in the pre-operational trial will be Air New Zealand and Airservices Australia.

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Operational Trial

Description	After satisfactory completion of the pre-operational trial, an operational trial will be conducted.
	During the operational trial:
	• FMC WPR-generated ARPs will be sent by ANZ AOC to the operational platform (TAAATS), and also to the Brisbane HF operator. The AFTN addresses are YBBBZQZA and YBBBINTL***** respectively
	• Aircraft participating in the operational trial are **not** required to report position via HF voice;
	• The trial will be monitored for timeliness, accuracy, continuity, and availability.
	* The use of AFTN address YBBBINTL will be confirmed prior to the operational trial
Trial start and Duration	The operational trial will commence at a date to be determined. The duration of the operational trial will be six months.
Participants	Participants in the operational trial will be Air New Zealand and Airservices Australia
Terminating the trial	The operational trial may be terminated at any time by either participant with notification by email.

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Processing ARPs by TAAATS

ARP Format Requirements

The format of ARP that is required for processing by TAAATS is described below. Additional free text fields have been added to the standard ARP format to capture additional data for off-line analysis. This data is not processed by TAAATS.

ATS Field	Description
3	Message Type Designator. i.e. **ARP**
7a	Aircraft identification. Must be in accordance with the filed flight plan e.g. **ANZ726**
Reported waypoint	Positions are described as per ICAO format <u>NOT ARINC424 format.</u> Allowable formats are described in PANS-ATM Doc4444 Appendix 3 para 1.6.3; e.g. RIGMI, SY, **3305S16020E, 40S155E**
Time at reported fix	4 figure time (hhmm); e.g. 0123
Flight level	3 figures, preceded by "F"; e.g. F350
Next waypoint	See "Reported waypoint" (above)
Estimate for next waypoint	4 figure time (hhmm); e.g. 0123
Free text	Free text information

Different data fields are separated by a <SPACE> e.g. **RIGMI 0134**.

Note: ARPs generated by FMC WPR shall include meteorological data with each report.

The free text field may also include additional information, as described below:

"-FMC"
<FMC time stamp (hhmmss)>
"LVL"
"REV"
<FMC current position (lat/long)>

This information is used for off-line analysis – it is not processed by TAAATS.

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Processing ARPs by TAAATS (continued)

Examples of ARPs generated from FMC WPRs

Example 1: ARP for a routine position report

ARP ANZ726 MIKEL 0906 F350 SASRO 0937 PEBLU MS51 274/64 -FMC 090719

After crossing MIKEL at 0906, the flight crew of ANZ726 initiated an ACARS position report. The aircraft was at F350 estimating SASRO at 0937 and PEBLU is the Next+1 waypoint. The temperature is MS51 and the wind is 274 degrees at 64 knots. The free text section of the ARP also indicates that this ACARS report was initiated at 0907 and 19 seconds.

Example 2: ARP notifying a revised estimate.

ARP ANZ726 MIKEL 0906 F350 SASRO 0940 PEBLU MS53 270/51 -FMC 092519 REV 3838S16023E

At 3838S16023E, ANZ726 initiated an ACARS position report to notify a revised estimate. The aircraft is still at F350 and now estimating SASRO at 0940. The temperature is MS53 and the wind is now 270 degrees at 51 knots. The free text section of the ARP also indicates that this ACARS report was initiated at 0925 and 19 seconds and that this report is a revised estimate (REV).

Example 3: ARP notifying maintaining a level.

ARP ANZ726 MIKEL 0906 F370 SASRO 0940 PEBLU MS53 265/63 -FMC 093125 LVL 3836S16136E

At 3836S16136E, ANZ726 initiated an ACARS position report to notify maintaining an assigned level. The aircraft is at F370 and still estimating SASRO at 0940. The temperature is MS53 and the wind is now 265 degrees at 63 knots. The free text section of the ARP also indicates that this ACARS report was initiated at 0931 and 25 seconds and that this report is a "maintaining" report (LVL).

ARP processing

An ARP generated by an FMC WPR is subject to the same reasonableness tests as an ARP generated by AusFIC.

These include:

- ACID must match an FDR
- FDR must be at least coordinated
- Reported and Next positions must be positions on the FDR route
- ATO at reported waypoint must be in the past
- Reported level must match the CFL
- Estimate at the Next waypoint must be within 5 minutes of the TAAATS estimate

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Irregularities that may be observed

Overview
During the pre-operational trials between ANZ and ACNZ a small number of formatting 'irregularities' were observed. Investigation indicated that these were due to airline procedures, rather than an actual problem with the FMC WPR concept. (In fact, the same irregularities can occasionally be observed in CPDLC position reports).

An additional problem involving an "incorrect" level was seen during pre-operational trials in Brisbane.

This section describes possible format issues that **may** be seen in the ARP sent to the ATS Unit.

Latitude/ Longitude not in ICAO format.
The ICAO format for latitude/longitude is **dd[NS]ddd[EW]** or **ddmm[NS]dddmm[EW]**.

An ARP may occasionally be received containing a latitude/longitude in ARINC (non-ICAO) format. This will cause the ARP to be rejected to the FDC error queue.

An example of a position in ARINC format is **S30236E160358**

This decodes as:

S30236   Latitude 30 degrees 23.6 minutes South
E160358   Longitude 160 degrees 35.8 minutes East

Standard FDC ARP rejection procedures will apply.

Use of ARINC latitude and longitude designators
ARINC424 designators are a non-ICAO format for expressing a latitude/longitude using 5 characters. ARINC424 designators take the form **35S60** (3500S16000E) for south latitudes and east longitudes.

During the pre-operational trials intermittent use of ARINC 424 latitude/longitude designators were observed in received ARPs. These designators cannot be processed by TAAATS and the ARP will be sent to the FDC error queue.

ANZ are modifying their AOC procedures to prevent the use of this format.

Standard FDC ARP rejection procedures will apply. To avoid errors in attempting to convert from ARINC424 to ICAO format, the recommended procedure is for the controller to request a HF voice report from the aircraft.

Irregularities that may be observed (continued)

Use of FMC waypoint names

During the pre-operational trials intermittent use of FMC waypoint names were observed in received ARPs. These waypoint names are not known to TAAATS and the ARP will be sent to the FDC error queue.

These designators are usually associated with a SID, STAR etc. Examples of these types of designators are listed below:

D1310
CF08
FF05R

Flight crews have been briefed to avoid these but they may still be occasionally seen when defining STAR entry points.

Standard FDC ARP rejection procedures will apply.

"Incorrect" level in ARP

During the pre-operational trials with YBBB, an occurrence of an "incorrect" level was observed in an FMC WPR-generated ARP.

ARP ANZ832 TONIM 2332 F367 MIKEL 2354 OMKIN MS46 292/126 -FMC 233440

Investigation revealed that the aircraft was on climb to F370 when the ACARS position report was sent. This ARP would have been rejected to the FDC position.

Standard FDC ARP rejection procedures will apply.