Twenty Second Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/22)

Papeete, Tahiti, 12-14 March 2008

Agenda Item 3: Review relevant work conducted since ISPACG/21

FMC Waypoint Reporting Trial - NZZO FIR

Presented by Airways New Zealand

SUMMARY

In October 2007 Airways New Zealand and Air New Zealand commenced an operational trial of Flight Management Computer Waypoint Reporting (FMC WPR) in the Auckland Oceanic FIR using the Air New Zealand A320 fleet.
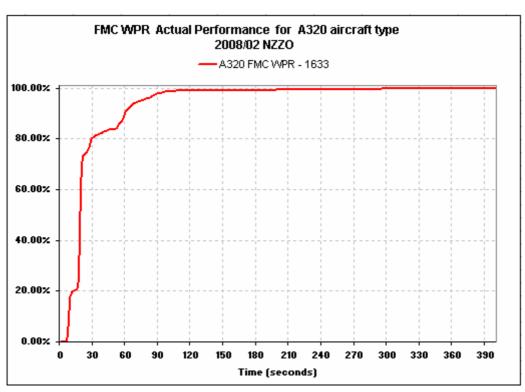
1. INTRODUCTION

1.1 Benefits can be realized by utilizing systems other than FANS1/A datalink and HF voice to provide position reports to ATS providers.

1.2 A number of airlines routinely receive ACARS position reports from their aircraft via satellite as part of their Airline Operational Control (AOC) flight monitoring. These position reports can be forwarded to an ATS provider and used to replace HF voice position reports. This method of delivery for aircraft position reports is known as Flight Management Computer Way Point Reporting (FMC WPR)

2. DISCUSSION

2.1 Because of the continuing growth of traffic in the South Pacific region concerns have been raised regarding the performance of the HF communications network. At certain times of the day traffic density in the Tasman Sea area is such that there is a shortfall in HF system performance because of traffic congestion on the frequencies.

2.2 A mixed aircraft equipage environment will continue to exist for many years in Oceanic airspace and the pressure on the existing HF network will continue to grow. Mandating FANS1/A datalink equipage is not envisaged and is not practicable for many operators because of the cost of the installation.

2.3 The concept of FMC waypoint reporting was developed in North Atlantic (NAT) airspace in the Gander, Shanwick, Reykjavik, and Santa Maria Oceanic Control Areas. In NAT airspace when an ACARS position report is received by a Data Link Service Provider (DSP), it is routed to a central FMC Waypoint Reporting System

(CFRS), where the report is converted into a format acceptable to the ATSU ground systems, and sent to the appropriate ATSU. The use of a similar CFRS system in the South Pacific has been discounted because of the small number of aircraft that will be using the service, the differing message formats used by providers in the South Pacific, and the quoted cost of the service.

2.4   Discussions between Airways and Air New Zealand revealed that the new AOC system installed by the airline has the capability of automatically converting the ACARS position report into an AFTN format acceptable to an ATSU. After AOC conversion the aircraft position report can be automatically sent via AFTN to the ATSU. In April 2007 a trial using this concept with Air New Zealand A320 aircraft commenced in the Auckland Oceanic FIR.

2.5   The trail has been successful to date and has gained the acceptance of pilots and controllers. A six month operational trial is scheduled to be completed at the end of this month, at which time a review will be undertaken for full operational implementation. The use of FMC WPR has reduced the number of HF voice position reports in the Auckland OCA by approximately 25%, and has provided significant operational benefit by reducing peak time congestion on the HF frequencies.

2.6   Guidance material covering the implementation in the Auckland Oceanic FIR is attached at Appendix A.

2.7   DO-306/ED-122 Oceanic SPR Standard specifies the time requirements for position report delivery for time based longitudinal separations as 400 seconds at the continuity requirement, and 300 seconds at 95% probability. The trial results to date indicate that this requirement is being met. Figure 1 below illustrates actual performance in February 2008.

Figure 1: FMC WPR latency

2.8   A comparative analysis of the latency of FMC WPR against FANS-1/A ADS-C is illustrated in Figure 2 below.
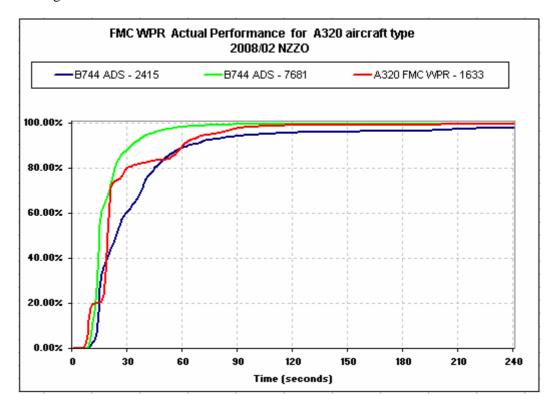

Figure 2: ADS vs FMC WPR Latency

3.   ACTION BY THE MEETING

3.1   The meeting is invited to:

      a)   Note the work being undertaken by Air New Zealand and Airways in establishing FMC WPR in the Auckland OCA.

      b)   Consider whether FMC WPR would be beneficial in other FIR, and if so establish an action plan for implementation.

Guidance Material

for

FMC Waypoint Position Reporting

Trials

In the Auckland OCA

Overview

Introduction This guidance material explains the concept and operational need for Flight Management Computer Waypoint Position Reporting (FMC WPR), specifies the procedures to be followed, explains the messages used, and defines the structure of the pre-operational and operational trials.

In this document This document contains the following topics.

Topic	See Page
Overview	
Background	
Operational Requirements	
Operational Procedures	
OCS Modifications	
Waypoint Reporting Message Data Flow	
Pre-operational Trial	
Operational Trial	
Airways New Zealand AIREP Message Format	
Adventitious Issues	

Background

Overview	This section provides background information on FMC Way Point Reporting (WPR) and covers: ➤ FMC Position Reporting ➤ The need for FMC WPR ➤ History of FMC WPR. ➤ FMC WPR in Auckland OCA. ➤ Potential impact.

FMC Position Reporting	Benefits can be realized by utilizing systems other than FANS1/A datalink and HF voice to provide position reports to ATS providers. A number of airlines routinely receive ACARS position reports from their aircraft via satellite as part of their Airline Operational Control (AOC) flight monitoring. These position reports can be forwarded to an ATS provider and used to replace HF voice position reports. This method of delivery for aircraft position reports is known as Flight Management Computer Way Point Reporting (FMC WPR)

The need for FMC WPR	Because of the continuing growth of traffic in the South Pacific region concerns have been raised regarding the performance of the HF communications network. At certain times of the day traffic density in the Tasman Sea area is such that there is a shortfall in HF system performance because of traffic congestion on the frequencies. A mixed aircraft equipage environment will continue to exist for many years in Oceanic airspace and the pressure on the existing HF network will continue to grow. Mandating FANS1/A datalink equipage is not envisaged and is not practicable for many operators because of the cost of the installation.

Background (continued)

History of FMC WPR

The concept of FMC waypoint reporting was developed in North Atlantic (NAT) airspace in the Gander, Shanwick, Reykjavik, and Santa Maria Oceanic Control Areas.

In NAT airspace when an ACARS position report is received by a Data Link Service Provider (DSP), it is routed to a central FMC Waypoint Reporting System (CFRS), where the report is converted into a format acceptable to the ATSU ground systems, and sent to the appropriate ATSU.

The use of a similar CFRS system in the South Pacific has been discounted because of the small number of aircraft that will be using the service, the differing message formats used by providers in the South Pacific, and the quoted cost of the service.

FMC WPR in Auckland OCA

Discussions between Airways and Air New Zealand revealed that the new AOC system installed by the airline has the capability of automatically converting the ACARS position report into an AFTN format acceptable to an ATSU.

After AOC conversion the aircraft position report can be automatically sent via AFTN to the ATSU.

Air New Zealand will participate in initial trails of the FMC WPR concept in the Auckland OCA using A320 aircraft.

Potential Impact

The use of FMC WPR in the Auckland OCA on the Air New Zealand and Freedom Air A320 fleet will reduce the number of HF voice position reports in the Auckland OCA by approximately 25%.

This reduction will provide a significant operational benefit by reducing peak time congestion on the HF frequencies.

It is envisaged that a successful trial will see FMC WPR introduced with other non-FANS equipped aircraft and with other South Pacific ATSU's.

Operational Requirements

Overview

This section details the operational requirements for FMC waypoint reporting and covers:

> ➤ FMC WPR construction on the aircraft.
> ➤ AOC conversion to ATSU format.
> ➤ Initiating the report on the aircraft.
> ➤ ETA Revision.
> ➤ Flight crew monitoring.

FMC WPR construction on the aircraft

To be considered suitable for operational use a FMC WPR is a position report that:

> ➤ Consists of data entered automatically by the Flight Management System (FMS);
> ➤ Consists of data that is CRC protected by the FMS;
> ➤ Consists of data that is formatted and populated in accordance with the ARINC 702A-1 specification;
> ➤ Is composed and processed by avionics certified to Level C.

AOC Conversion to ATSU format

To be considered suitable for operational use a FMC WPR received at the AOC shall be:

> ➤ Automatically converted by the AOC into the position report format specified for the ATSU; and
> ➤ Automatically forwarded to the ATSU via AFTN.

 Note: The AOC shall ensure that all FMC reports received are forwarded to the ATSU.

Initiating the report on the aircraft

FMC WPR's may be either automatically initiated by the FMS without flight crew action or manually initiated by the flight crew. In either case FMC WPR's shall be initiated as soon as possible after waypoint passage and no later than 3 minutes from waypoint passage.
Note: In the initial Air New Zealand and Airways New Zealand trial using A320 aircraft the reports will be manually initiated by the flight crew. Phase 1 of the pre-operational trial determined that problems existed with the automatic initiation of reports from the A320. These problems included intermittent failure by the FMC to include the next estimate in the transmitted report, and issues with the correct addressing of reports to the relevant ATSU.

Operational Requirements

ETA Revision   If an estimate transmitted to an ATSU in an FMC WPR changes by three minutes or more the change shall be communicated to the ATSU concerned by the flight crew as soon as possible. This change will normally be communicated by initiating another FMC WPR but may be communicated by HF voice.

Flight Crew Monitoring   The AOC will copy back received position reports to the aircraft. The flight crew will review the reports for accuracy of content and use them to monitor ETA conformance.

Where an ETA revision has been sent by FMC WPR crews shall ensure that a copy of the report has been received from the AOC within 5 minutes and if no such copy is received the revised estimate shall be passed by HF voice.

Operational Procedures

Overview   This section covers the operational procedures to be followed during the
FMC Waypoint Position Reporting Trial in the Auckland Oceanic FIR by Air
New Zealand and Freedom Air A320 aircraft and covers:
  ➢ Flight Crew initiation of WPR,
  ➢ Revising ETA,
  ➢ Level Reports,
  ➢ Island Departures,
  ➢ Voice backup, and
  ➢ HF contact requirements for FMC WPR aircraft.

Flight Crew   During the trial all WPR will be manually initiated by the flight crew using a
initiation of   scratchpad entry into the FMS. The scratchpad entry will be in the format:
WPR

                          NZZO/waypoint name/

Before initiating the report the flight crew will review the FMS generated
report content for accuracy.

The AOC will use the NZZO indicator in the scratchpad entry to address the
AIREP to the NZZO AFTN address.

The WPR will contain current position in latitude and longitude (not the
previously sequenced waypoint) and time, current level, the estimated
position and time, the next+1 position. Wind and temperature data is
included. The remarks section contains the time the FMC initiated the report
and the waypoint name the report was generated for.

Example of an AIREP for a compulsory waypoint received by NZZO:

    **(ARP-FOM927-3531S17058E/0417 F360 RIGMI/0529 DRUMO-MS51
    241/130-FMC 041714 PAPTI)**

Note 1: The scratchpad entry of waypoint name is not used in automatic
processing by the NZZO OCS. The position and time at the time the report is
calculated by the FMS is used by the OCS to update the aircraft profile.

Operational Procedures (continued)

Revising ETA   If an estimate transmitted to an ATSU in an FMC WPR changes by three minutes or more the change shall be communicated to the ATSU concerned as soon as possible. This change will normally be communicated by initiating another FMC WPR but HF voice may be used.

If sent by FMC WPR the scratchpad entry will be in the format:

```
NZZO/REV/
```

This WPR will contain current position in latitude and longitude (not the previously sequenced waypoint) and time, current level, and the revised estimated position and time. A waypoint name will not appear in the remarks section and will be replaced by REV indicating that the report is a revision.

Example of AIREP received by NZZO and sent by FMC WPR for an ETA revision:

```
(ARP-FOM336-3548S16504E/0130 F370 GULUT/0212 PM-MS46
290/115-FMC 013010 REV)
```

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

Example of AOC uplink to an aircraft confirming receipt of an ETA revision:

```
QU CPYXXXX
.AKLDUNZ 241852
CMD
AN .ZK-OJI/FI NZ0739/MA 078I
-  REVISION REPORT RECEIVED
SENT TO  NZZO
FLT NO   ANZ739
TIME     0507
ALTITUDE F360
ESTIMATE RIGMI
ETA      0529
NEXT     DRUMO
TEMP     MS52
WIND     290/77
FMC POS  3319S16528E
```

Operational Procedures (continued)

Level Reports   When an aircraft is using FMC WPR for position reporting level reports may also be made by sending another FMC WPR.

If sent by FMC WPR the scratchpad entry will be in the format:

```
NZZO/LVL/
```

This WPR will contain current position in latitude and longitude (not the previously sequenced waypoint) and time, current level, and the revised estimated position and time. A waypoint name will not appear in the remarks section and will be replaced by LVL indicating that the report is a level report.

Example of AIREP received by NZZO and sent by FMC WPR for a level report:

```
(ARP-FOM336-3548S16504E/0130 F380 GULUT/0212 PM-MS46
290/115-FMC 013010 LVL)
```

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

Example of uplink confirmation to the aircraft from the AOC on the receipt of a level report.

```
QU CPYXXXX
.AKLDUNZ 241853
CMD
AN .ZK-OJG/FI NZ0852/MA 039I
-   LEVEL REPORT RECEIVED
SENT TO   NZZO
FLT NO    ANZ852
TIME      2034
ALTITUDE F360
ESTIMATE SAKLO
ETA       2049
NEXT      POREN
TEMP      MS46
WIND      271/125
FMC POS   2934S17554E
```

Operational Procedures (continued)

Island Departures   Flights departing YSNF, NCRG, NSFA, NFTF, or NIUE reporting via FMC WPR shall send the following reports on departure:

> ➢ A report on departure that is sent at the same time as the first HF report is normally sent (passing 10,000').

Example of AIREP received on Island Departure passing 10000'. Note designator ALT for these reports.

```
(ARP-ANZ861-1406S17206W/1307 F103 AROXA/1309 ISDOT-PS09 092/9-
FMC 130734 ALT)
```

> ➢ A report sent after passing F245 for flights ex NCRG, NSFA, NFTF, and NIUE.

Example of AIREP received on Island Departure passing F245. Note designator ALT for these reports.

```
(ARP-ANZ861-1517S17235W/1318 F250 ISDOT/1323 TBU-MS22 191/16-
FMC 131849 ALT)
```

Example of uplink confirmation to the aircraft from the AOC on the receipt of an altitude report.

```
QU CPYXXXX
.AKLDUNZ 241854
CMD
AN .ZK-OJI/FI NZ0867/MA 247I
-  ALTITUDE REPORT RECEIVED
SENT TO  NZZO
FLT NO   ANZ867
TIME     1812
ALTITUDE F102
ESTIMATE AROXA
ETA      1814
NEXT     ISDOT
TEMP     PS10
WIND     080/14
FMC POS  1406S17206W
```

> ➢ A report sent on reaching the cleared cruise level.

Example of AIREP received on Island Departure reaching cleared level. Note designator LVL for these reports.

```
(ARP-ANZ849-2202S16209W/1505 F320 URKEP/1531 NUGLI-MS39
257/67-FMC 150552 LVL)
```

Operational Procedures (continued)

Voice Backup   The backup system for FMC WPR is HF voice radio.

If no Position Report is received within five minutes of the scheduled reporting time the ATSU will initiate contact via HF radio to obtain the report.

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

HF Contact Requirements for FMC WPR aircraft   During the trial period an aircraft intending to report position via FMC WPR is not required to establish contact via HF voice at the Auckland OCA boundary.

Flights entering the Auckland OCA from Nadi or Brisbane OCA will be contacted via SELCAL by Auckland Radio and passed contact instructions for the next ATS unit. The receipt of the FMC WPR at the inbound boundary by Auckland Radio will be used as the trigger to SELCAL the aircraft and pass contact instructions.

Flights entering the Auckland OCA from Nadi or Brisbane OCA where published standard calling instructions exist for their destination will not be contacted via SELCAL by Auckland Radio unless a change to the standard calling instructions is required.

Flights departing New Zealand domestic airspace or from airfields within the Auckland Oceanic FIR (YSNF, NCRG, NSFA, NFTF, and NIUE) and intending to use FMC WPR will add the term "F-M-C" after the aircraft call sign when calling Auckland Radio for their HF pre-flight check.
Example:

```
Auckland Radio New Zealand One Two Three F M C Pre-flight
```

Auckland Radio will pass HF frequency and contact instructions for flights proceeding into the Brisbane or Nadi OCA at pre-flight. All other FMC WPR flights will be contacted via SELCAL and passed contact instructions enroute.

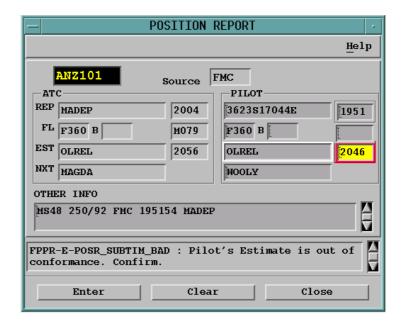# *Modifications to Airways Oceanic Control System (OCS)*

Overview This section details the modifications that have been made to the OCS for FMC WPR and covers

➢ Changes to Position Report Window.
➢ Changes to processing of reported level in the FMC WPR ARP.

Changes to the Position Report Window Changes have been made to identify FMC reports by creating a new source "FMC" in the position report window. Any out of conformance FMC report processed from the sector queue will be identified by the display of source FMC in the window as illustrated below.

```
┌──────────────────────── POSITION REPORT ──────────────────┐
│ ─                                                          ▪ │
│                                                   Help      │
│                                                            │
│    ┌────────┐                                              │
│    │ ANZ101 │          Source │ FMC │                      │
│    └────────┘                                              │
│  ┌ATC─────────────────────────┐ ┌PILOT───────────────────┐ │
│  REP │MADEP      │ │2004│        │3623S17044E  │  │1951│    │
│                                                            │
│  FL  │F360 B│ │     │  │M079│     │F360 B│ │      │ │     │ │
│                                                            │
│  EST │OLREL      │ │2056│        │OLREL        │  │2046│    │
│                                                            │
│  NXT │MAGDA      │               │WOOLY        │           │
│  └─────────────────────────────┘ └───────────────────────┘ │
│  OTHER INFO                                                │
│  │MS48 250/92 FMC 195154 MADEP                       │ ▲  │
│  │                                                   │ ▼  │
│                                                            │
│  │FPPR-E-POSR_SUBTIM_BAD : Pilot's Estimate is out of│ ▲  │
│  │conformance. Confirm.                              │ ▼  │
│  ┌──────────┐      ┌──────────┐      ┌──────────┐         │
│  │   Enter  │      │   Clear  │      │   Close  │         │
│  └──────────┘      └──────────┘      └──────────┘         │
└────────────────────────────────────────────────────────────┘
```

The OTHER INFO data contains the designator FMC, the time that the report was sent from the aircraft "195154" in HMS format, and for a waypoint report the name of the waypoint that has been sequenced. When a report is a level report, or a report following an island departure, or an ETA revision the designators LVL, or ALT, or REV will be seen instead of the waypoint name.

Changes to level processing in FMC ARP Processing of ARP level data has been modified to accept FMC reported level data when it is conformance with cleared level and within the VSP POS-ADS_LEVEL of the cleared level. The VSP is currently set at 200'.

An aircraft cleared at F320, and reporting level via FMC WPR at F318, F319, F320, F321, or F322 will be considered by the system to be in level conformance.

Waypoint Reporting – Message Flow

Overview   This section details the messages that are used in FMC waypoint reporting and covers:

> ➢ Aircraft reports to the AOC via ACARS.
> ➢ AOC reports to the aircraft via ACARS
> ➢ AOC reports to NZZO via AFTN

Aircraft reports to the AOC via ACARS

The POS reports used in WPR are in accordance with the format defined in ARINC 702. These messages are currently manually initiated by the pilot but the operational data is inserted automatically by the FMS. An example of these messages is shown below:

```
.AKLDUNZ 170107
_FML
FI NZ0860/AN ZK-OJN
DT QXT POR1 170107 F09A
-
     POSS15466W172477,,010723,350,AROXA,012135,S14056W172060,
     M46,22628,120/TS010723,091707/SPNZZO(ISDOT(278F
```

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

`.AKLDUNZ 170107`	Address and time stamp
`_FML`	ACARS message identifier
`FI NZ0860/AN ZK-OJN`	Flight Identifier and Registration
`DT QXT POR1 170107 F09A`	DT line – via RGS "POR1" etc

> 2. The operational message:

```
POSS15466W172477,,010723,350,AROXA,012135,S14056W172060,M46,22
628,120/TS010723,091707/SPNZZO(ISDOT(278F
```

`POS`	Message Identifier
`S15466W172477`	Current Position (lat/long in ARINC format)
`010723`	Time at current position (HHMMSS)
`350`	Level
`AROXA`	Next Position
`012135`	Time at next position (HHMMSS)
`S14056W172060`	Next+1 position
`M46`	Temperature MS46
`22628`	Wind Velocity 226/28
`120`	
`TS010723`	Time Sent (HHMMSS)
`091707`	
`SPNZZO(ISDOT(`	Pilot Scratchpad – ATSU designator and waypoint name
`278F`	CRC (Cyclical Redundancy Check) checksum

Waypoint Reporting – Message Flow (continued)

AOC reports to the aircraft via ACARS

The AOC processor automatically responds to each ARINC 702 POS report received from the aircraft with an uplinked message containing the data that has been extracted from the POS and sent to the ATSU in ARP format. The crew use this to verify the data sent to the ATSU and to monitor the ETA at the next waypoint. The message contains 2 parts:

1. The ACARS header information:

```
.AKLDUNZ 170108                      originator address and time stamp
CMD                                  ACARS message identifier
AN .ZK-OJH/FI NZ0803/MA 150I   Registration, Flt Ident, Message Assurance
```

2. The operational message:

```
-   POSITION REPORT RECEIVED
AIREP SENT TO NZZO
FLT NO   ANZ803
WAYPOINT ISDOT
TIME     0107                 Time is truncated to HHMM
ALTITUDE F350
ESTIMATE AROXA
ETA      0121
NEXT     1405S17206W          Lat/Long converted into ICAO format
TEMP     MS46
WIND     226/28
FMC POS  1546S17247E
```

Crews are given details of ETA revisions, level and altitude reports by using a different operational header e.g.

```
-   POSITION REPORT RECEIVED
-   LEVEL REPORT RECEIVED
-   REVISION REPORT RECEIVED
-   ALTITUDE REPORT RECEIVED
```

Waypoint Reporting – Message Flow (continued)

AOC reports to NZZO via AFTN

The AOC processor automatically converts any POS report received into ATSU ARP format and sends it to the ATSU designated in the pilot scratchpad entry via the AFTN.

```
QML0143 230945
FF NZZOZQZF
170108 NZAAANZO
(ARP-ANZ803-1546S17247E/0107 F350 AROXA/0121 1405S17206W-MS46
    226/28-FMC 010723 ISDOT)
```

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 '**010723**' to enable ATSU analysis of communications performance.

The OCS uses actual aircraft position when the report was sent for processing '**1546S17247E**'

Pilot scratchpad entry of waypoint name **'ISDOT'** is used to identify the sequenced waypoint for off-line ATSU analysis. This data is not used in OCS processing. Scratchpad entries using REV, ALT or LVL are used to identify revisions, level and altitude reports.

Pre-Operational Trial

Overview This section describes the pre-operational trial for FMC WPR in the Auckland OCA and describes:
  - ➢ Purpose
  - ➢ Duration
  - ➢ Participants
  - ➢ Exit Criteria

Purpose The pre-operational trial will be used to validate the conversion of the FMC generated reports into OCS format by the ANZ AOC and the procedures for the manual transmission of reports and revisions by the flight crew. During the pre-operational trial FMC WPR will not be sent to the operational Oceanic Control System (OCS) platforms.
  - ➢ Phase 1 of the pre-operational trial will involve an offline comparison of FMC WPR received at the ATSU and operational HF position reports made by voice. The trial will be conducted using selected aircraft and flight crews.
  - ➢ Phase 2 of the pre-operational trial will involve processing of the FMC WPR at the development OCS platform and the standby AIRLOG air ground processor. Phase 2 will be scheduled according to staff availability at the ATSU and will be run in 5 day blocks. The trial will be conducted using all Air New Zealand and Freedom Air A320 aircraft.
  - ➢ During Phase 1 and 2 all FMC WPR's will be sent to the AFTN address NZZMOCST.
  - ➢ Aircraft will continue to report position via HF voice communications while participating in the pre-operational trail.
  - ➢ The trail will be monitored for timeliness, accuracy, continuity, and availability.

Duration Both phases of the pre-operational trial will continue until the exit criteria are met.
Each phase of the pre-operational trial will start at a time to be jointly agreed by the participants.

Participants Participants in the initial pre-operational trial will be Air New Zealand and Airways New Zealand.

Pre-Operational Trial (continued)

Exit Criteria   Phase 1 will continue until participants are agreed that:
- ➢ Message conversion into ATSU format by the AOC has been validated.
- ➢ Message delivery to the ATSU has been validated.

Phase 2 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 Airways and ANZ following a review of the pre-operational trial results.
- ➢ The delivery of FMC WPR messages to the ATSU has been demonstrated to a standard that allows the commencement of an operational trial. This assessment will be made by both Airways and ANZ following a review of the pre-operational trial results.
- ➢ Airways New Zealand is required to complete a satisfactory risk assessment of the FMC WPR concept before commencement of the operational trail. Data gathered during the pre-operational trial phase will be used in this assessment.

Operational Trial

Overview This section describes the operational trial for FMC WPR in the Auckland OCA and describes:
> ➢ Purpose
> ➢ Duration
> ➢ Participants

Purpose The pre-operational trial will be used to validate the operational use of the FMC generated reports into OCS format by the ANZ AOC and the operational procedures for the manual transmission of reports and revisions by the flight crew. During the operational trial FMC WPR will be sent to the operational Oceanic Control System (OCS) platforms, and the HF air-ground communications airlog processor.

> ➢ During the operational trial all FMC WPR's will be sent by ANZ AOC to the AFTN address NZZOZQZF.
> ➢ Aircraft are **not** required to report position via HF voice communications while participating in the operational trail.
> ➢ The trail will be monitored for timeliness, accuracy, continuity, and availability.

Trial start and Duration The operational trial will commence on 1 October 2007. The duration of the operational trial will be six months.

Participants Participants in the operational trial will be Air New Zealand and Airways New Zealand.

Terminating the trial The operational trial may be terminated at any time by either participant.

Airways New Zealand ARP Message Format

Overview   This section describes the AIREP message format (ARP) used by the Airways New Zealand HF air-ground radio operator processor (Airlog) and the Oceanic Control System (OCS). The section contains:

> ➤ ARP Format requirements.
> ➤ Examples of FMC WPR in Airways New Zealand format

ARP Format   The format is based on that used in ICAO PANS-ATM DOC4444 Appendix
Requirements 3 for AFTN messages, with added fields to capture the required position report data as detailed in PANS_ATM Appendix 1.

As per PANS-ATM Doc 4444 Appendix 3 para 1.5 the message starts with an open bracket "(" and ends with a closed bracket ")" the beginning of each field other than the first is indicated by "-". Elements within a field are separated by an oblique stroke or a space as described below. AFTN formatting conventions shall be followed.

The fields used are:

ATS Field   Description
   3   Message Type Designator. e.g. **ARP**
   7   Aircraft identification. As per filed flight plan and a   maximum 7 characters. e.g. **ANZ141**
   X*   Reporting fix and time, flight level, optional speed, next fix and ETA, [Optional next+1 fix with optional ETA]. Points and times are separated by an oblique stroke e.g. **MADEP/0134**. Points are described as per ICAO format <u>NOT ARINC424</u>. Formats allowed are described in PANS-ATM Doc4444 Appendix 3 para 1.6.3.

Examples: **MADEP/0134;**
          AA/0140;
          3305S16305E/0145;
          44S160W/0200.
     * Format :
<fix>/<time> <flightlevel> [<speed>] <nextfix>/time <next+1 fix>/time]

X(2-11)/9999	A999	[A999]	X(2-11)/9999	[X(2-11)/9999]
MADEP/0124	**F350**	**M079**	**33S163E/0200**	**SHARK**

**ARP Format
Requirements**
(Continued)

**Note 1: Initial implementation of FMC WPR with Air New Zealand A320 aircraft will
report current (reported) position in latitude and longitude. This is the actual
aircraft position and time when the FMC generates the report. For a report
manually initiated by the pilot this may be some time after the waypoint
passage.**

Note 2: Usage for FMC WPR is next fix and time then the next+1 fix without time.

Note 3: Speed will not be reported in FMC WPR.

X**   **Optional** Endurance. The word FUEL followed by freetext
describing the fuel remaining using 4-8 characters. This allows
the use of time or weight remaining e.g. **FUEL 0430**, or
FUEL 15000

**** Format :**

[<FUEL> <Free text>]

[AAAA X(4-8)]

FUEL   0900

Note 3: Endurance will not be reported in FMC WPR messages.

X***   **Optional** temperature and wind. Air Temperature recorded as
"PS" (plus) or "MS" (minus) followed without a space by the
temperature in degrees celcius (2 numerics). Wind recorded in
degrees true (3 numerics) followed by an oblique stroke and
the windspeed in kts (2 or 3 numerics)

***** Format :**

[<temperature> <wind direction>/<wind speed>]

[X(4)   999/999]

PS05   290/10
MS45   280/105
MS03   030/05

Note 4: FMC WPR shall include meteorological data with each report.

18   Other Information. Insert 0 (zero) if no other information.
Field may contain any other plan language remarks.

**Note 5: FMC WPR field 18 will include time that data is transmitted by the FMC. This
will be in the format FMC followed by a space and the time in HHMMSS e.g. FMC
180045**

**Note 6: FMC WPR field 18 will include the name of the reported waypoint following
the FMC time where applicable e.g. FMC 180045 PAPTI.**

**Note 7: For WPR used to indicate estimate revisions field 18 will contain the
abbreviation REV following the FMC time e.g. FMC 180045 REV**

**Note 8: For WPR used for level report field 18 will contain the abbreviation LVL
following the FMC time e.g. FMC 180045 LVL**

**Examples of
FMC WPR in
NZZO format**

Example 1: AIREP at mandatory reporting point.

```
(ARP-FOM927-3531S17058E/0417 F360 RIGMI/0529 DRUMO-MS51
241/130-FMC 041714 PAPTI)
```

After crossing PAPTI FOM927 initiated the AIREP at position 3531S17058E at time 0417. The aircraft is at F360 estimating RIGMI at 0529 and DRUMO is the next+1 waypoint. The temperature is MS51 and the wind is from 241 degrees at 130 knots. The remarks section of the report indicates that the FMC sent the report at 0417 and 14 seconds and that this is the scheduled report for PAPTI.

Example 2: AIREP for change in estimate.

```
(ARP-FOM927-3314S16518E/0508 F360 RIGMI/0533 DRUMO-MS47
257/100-FMC 050857 REV)
```

FOM927 has initiated an AIREP at 3314S16518E at 0508. The aircraft is at F360 and estimating RIGMI at 0533 and DRUMO is the next+1 waypoint. The temperature is MS47 and the wind is from 257 degrees at 100 knots. The remarks section of the report indicates that the FMC initiated the report at 0508 and 57seconds and that this report is a revised estimate (REV).

Example 3: AIREP for level report.

```
(ARP-ANZ753-4132S16909E/0451 F360 TOMAR/0535 GILLY-MS49
262/73-FMC 045107 LVL)
```

ANZ753 has initiated an AIREP at 4132S16909E at 0451. The aircraft is at F360 and estimating TOMAR at 0535 with GILLY as the next+1 waypoint. The temperature is MS49 and the wind is from 262 degrees at 73 knots. The remarks section of the report indicates that the FMC initiated the report at 0451 and 07 seconds and that this report is a level report (LVL).

Adventitious Issues

Overview   This section describes possible format issues that **<u>may</u>** be seen in the ATSU ARP during the trial and describes operational work rounds to overcome these. While ANZ is working these to prevent their occurrence we assess that they will be seen. Three adventitious issues are described:
  - ➢ Latitude/Longitude not in ICAO format.
  - ➢ Use of ARINC latitude/longitude designators.
  - ➢ Use of FMC waypoint names.

Latitude Longitude not in ICAO format.   Reports may be received with latitude/longitude in the next or next+1 position in ARINC format and not ICAO. This will cause the message to be displayed in the error queue.

An example of a position in ARINC format is:

S45236E170358

This decodes as:
S45236   Latitude 45 degrees 23.6 minutes South
E170358 Longitude 170 degrees 35.8 minutes East

Corrected to ICAO DDMM format to be accepted by OCS this position will be:

4523S17035E

This correction can be made in the MRCC window.

Use of ARINC latitude and longitude designators   During the pre-operational trials very intermittent use of ARINC 424 latitude/longitude designators was seen in the next or next+1 positions reported. These designators are not known to OCS and the ARP will be sent to the error queue. ANZ are modifying their AOC procedures to prevent the use of this format.

These designators take the form **35W75** (3500S17500W) for south latitudes and west longitudes and will be seen only in the next or next+1 fields. To avoid conversion errors the recommended process is for the controller to request a HF voice report.

Possible Adventitious Issues (continued)

Use of FMC waypoint names
During the pre-operational trials very intermittent use of ARINC 424 waypoint names were seen in the next+1 position reported. These designators are not known to OCS and the ARP will be sent to the error queue. Crews have been briefed to avoid these but they may still be occasionally seen when defining STAR entry points.

Examples of these types of designators are listed below:

```
D1310
CF08
FF05R
```

These designators will usually define STAR commencement points or similar in the FMC and if seen in the next+1 position can be deleted to get OCS to process the report.

- End -

World Air Ops provides Airlines, Aircraft Operators, and Pilots around the World with Operational Support, Flight Planning, Ferry Flights, and Aircraft Deliveries.

You may be interested to view **other documents** in our Free Resource Library - organised by region:

North Atlantic	NAT
Africa	AFI
Europe	EUR
Pacific	PAC
South America	SAM
North America	NAM
Asia	ASI

Our Operations Room has live Airspace, Fuel, and Navigation information updates.
www.worldairops.com/opsroom.html

We provide:
  Route planning and analysis
  Computerised Flight Planning for Business Aviation, Airlines, Charter, Cargo and Military.
  Co-ordination of 3rd party Airport handling, Ground Support, Contract Fuel, Customs
  Delivery, Ferry, and Positioning Flights
  Charter Flights, Overflight permits, 'First Visit' kits and aerodrome reviews.
  Oceanic Flights, Organised Track Systems, International Procedures.

Visit our website for more: **www.worldairops.com**

Or email us your question - we're here to help : air.support@worldairops.com
15 minute response time.

WORLDAIROPS