ATC Procedures & Training

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11 December 2012
PBN/TF/10
Summary

PBN Procedures
• Consultation/Collaboration
• Procedure Development
• Documentation

PBN Training
• Resources Used
• Course Content
• Implementation

Lessons
• Many...
Consultation

Meetings
Scoping / Consultation / Safety / Sign-off / Implementation / Wrap-up

Internal Stakeholders
• Users – Towers, Terminal Approach Sectors, Enroute Sectors
• Enablers - System Designers, Policy & Standards, Software, Simulators, Training Providers

External Stakeholders
• Regulator - CAANZ
• RNP AR Designer – G.E. Naverus
• Airlines – AirNZ, Qantas, Jetstar, Virgin, Mt Cook, Air Nelson
• General Aviation
• Recreational – Gliding, Parachuting
• Military - RNZAF
Procedure Development

**Concept of Operations**
- Separations
- Routes and Procedures
- Coordination
- Communications / RTF Phraseologies
- Contingencies
- Emergencies

**Sign-Off**
- Internal Stakeholders

**Safety Assessment**
- Live document...
- Risk Register
Southern PBN/Enroute Structure
including OCA-CH/QN/DN Transitions
Draft 22Jun12

- Unusual / busy Traffic
- Equipment/Cass Peak Out (no RV-PB)
- ATM / Hold Runway (CH Gates/Runway)
- QN Night Ops?
- Conv. vs GNSS vs RAVN2 Routes
- Conventional CH-TU-SW-NV/TU-LX-SH
- and NV-SW-SALOG-CR/SH-LX-TU-CH
- GNSS std route = 15nm PAMDP Chart?
- Area shouldn't need to check 86pt list
  (may require RAVN2/RPAR south of RV)
- Workload/Implementation staffing
- Common GNSS WPTs required?
- Lat-Conv. Charts/Statements
- DN OCA SID "... be leveled at Bdy"

New PBN Routes:
- Routes to Delete:
- Laterally Separated Tracks:
- Lateral distances required in direction of arrow:
- Lateral required between tracks:
- RNAV1 SID/STAR Transition:
- Inbound gates:
- Two-way gates:
Documentation

Regulatory
- Aeronautical Information Circular (AIC)
- Advisory Circular, AIP Supp., AIP
- Charts – ERC, VNC

ATC
- Manual of ATS / MATS Advisory Circular
- Local Unit Orders/Procedures/LOAs
- Operational Instructions

Training
- Training Manual
- Separations, Procedures, Charts
- Exam / Practical Assessment
- Training Presentation
Training Resources

**Online**
- **ICAO** – PBN iKit
- **SESAR / NextGen**

**Simulators**
- **Radar** – Skyline radar simulator
- **Tower** – Total Control tower simulator
- **Portable** – Total Control

**Other Stakeholders**
- **Training Centre** – CBT PBN Modules
- **Operators** – Mt Cook; Air NZ
**Training Content**

**Familiarisation**
- **Background** - Why introduce PBN?
- **PBN Principles / Terminology** - ICAO, MAC 18
- **Concept of Operations** - RNAV2/RNAV1/RNP1
- **AIP Changes** – AIC, AC, Supp, SIDs/STARs
- **ERC Changes** - Routes, Reporting Point, Nav aids, Airspace
- **Area Operations** - LOAs, MTP, RTF, Coord, Staffing
- **Sim-Ex 1** – Famil, Jet/Tprop routes, ATM, Runway Change

**Contingencies**
- **Mixed-Mode Traffic** – RNAV2/RNP1 vs ‘Conventional’
- **Surveillance Outage** – Routing, Separations
- **Lateral Separation** – Statements, Charts, Tables
- **Aircraft Deviations** – ATC observed / Pilot advisory
- **Future Change** – CNS/ATM
- **Sim-Ex 2** – Mixed-mode, Outage, Deviations, Emergencies
Training (cont.)

Competency Assessment

- Classroom Exam
- Practical Assessment (simulator)
- Review Process

PBN Implementation Plan – New Zealand

Big fuel savings on Air NZ test flight

Flight tests could be operating from Queenstown by the start of next season if the Queenstown Airport Corporation has its way.

Chief executive Sco Paterson said yesterday that ideally the corporation would like night flights to be operating for the 2013 ski season.

Air spokesman for the airport’s light plane and helicopter operators Robert Ruheford said night flights could be five or six years away.

“People who are going to get through if they’re going to do it ... not sure how long it will take.”

Air New Zealand’s “perfect flight” using optimum routes and the co-operation of US, New Zealand and Australian authorities, was hailed as a success in Sydney.

The 4600 litres of fuel saving is around 4 per cent normally used.

This meant 9 tonnes less carbon dioxide in the atmosphere. The flight across the Tasman was longer than normal.
Implementation

- Additional Staff on Roster
- Limit Routine Maintenance
- Operational Instruction on Position
- Project Team Monitoring
- Feedback

- Post-Implementation – PBN must be incorporated into ‘standard’ training.
Lessons

- **Resourcing** – ATC staff, Instructors, Simulators, Designers
- **Timeline** – to develop / test Procedures, build Sim-ex’s, Training Notes, Presentation
- **Accurate Tasking** – comprehensive planning; valid assumptions (regulations!)
- **Realistic Testing** – takes time to build sim-ex’s (and re-build)
- **Cut-off Date** – lock-down procedures, to ensure a...
- **Final Package for Training** – with actual procedures and latseps.
Summary

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Lessons
- Resourcing, Planning, Time, Cut-offs
Why introduce PBN?

‘Perfect Flight’ Airspace Concept uses PBN as a CNS/ATM enabler:

- Improve Capacity
- Reduce Flight Time / Delays
- Improve Operator Efficiency
- Reduce Environmental Noise/CO₂

Modern CNS/ATM Technology:

- Comms – Datalink (ARINC/SITA)
- Nav – FMS with GNSS
- Sur – ADSB / Sat.-based
- ATM – 4D strategic ATC.
What is Different?

“PBN represents a shift from sensor-based to performance-based navigation.”

Sensor-based Navigation Accuracy:
- NDB = 10 degree
- VOR = 6 degrees
- DME = 0.5 nm

Performance Based Navigation (PBN):
- RNAV2 = +/- 2nm, 95% of time
- RNP1 = +/-1nm, 95% of time
Coffee Time 😊
CH-WN/WB/O’flights
OCA Profile vs QN-AA
RTF and Coordination

- **Frequencies** no change.
- **Transfer of Control** no change.
- **STARs** for CH/QN/NV/WB Arrivals on first contact 129.3/128.1/129.4
  - QN arrivals advise flying STAR, STH confirm (RNP1 sep’s rely on STAR).
- **Runway Change** will be as per CH/WN change.
  - Tower advise Rwy Change by phone
  - Tower then change Skyline Rwy designator
  - Skyline updates STARs on EPLs
  - KAI/STH issue the new STAR from strip-print or EPL route field.
- **Descent** “Via STAR Profile” if any doubt about restrictions above 11,000’.
- **STAR Diversion** “Continue Via STAR”.
Do you ask enough questions?

Or do you settle for what you know?
"I hear you've requested a lunch break once a day. I consider that a sign of weakness."

Lunch – Sim at 1245
Mixed Mode Traffic

**Un-certificate Routings:**
- Route via CH-AS-TU-LX-QN and return (no RY)
- Route via CH-AS-TU-SW-DN (or SW-BE-NV).

**Separations:**
- Conventional e.g. Latsep Table, R20 PSR, ETP+/-10, Vertical...
- Latsep Charts – valid for conventional traffic vs certified.

**Approaches:**
- Conventional can’t fly STAR, so expect VOR/DME (contingency)...

**Priority/Delay:**
- If uncertified, traffic can expect delays... priority goes to certifieds.
Cass Peak / Surveillance Outage

Route structure remains unchanged; STH should be staffed with a Planner.
As soon loss of Cass Peak is known STH shall:

- Ensure Separations, Call Planner, place Blocker Strip, and
  - Advise CH TMA that OCA departures will be accepted on airways routes (CH VOR);
  - Invercargill Tower that Cass Peak SSR has failed, RNAV2 sep’s are invalid;
  - QN Twr, DN Twr and FIOS that Cass Peak has failed, possible delays on STH.

**Tower/FIO Responsibility** - Still responsible for outbound separation against inbounds that they have a strip on; NV may require div-climbs west of track.

**South Responsibility** - STH shall:

- Activate flight-plans from departure aerodromes not under Tower / FIS unit.
- Correlate targets with their respective flight plans.

<table>
<thead>
<tr>
<th>Cass Peak Outage</th>
<th>Check Seps. Planner to advise:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH TMA that traffic is required on airways routes (for Latseps)</td>
</tr>
<tr>
<td></td>
<td>NV Tower that Cass Peak is out; RNAV 2 separations are invalid</td>
</tr>
<tr>
<td></td>
<td>QN Twr, DN Twr, &amp; FIO that Cass Peak is out; delays may occur</td>
</tr>
<tr>
<td></td>
<td>Latseps; Reroute MAMAN-MIPAK via IDARA; apply Starts A/R...</td>
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</table>
Aircraft Deviations

**Controller Observed:**
- Advise Pilot / Essential Traffic.

**Pilot Reports [Pan-Pan, Pan-Pan, Pan-Pan: Unable RNP]:**
- Acknowledge, Prioritise, Ensure Separation from Terrain / Traffic...

**Monitoring & Analysis:**
- QN Mlat/ADSB data will be recorded from 15Nov, and analysed for 05Dec meeting... more data analysed mid-March 2013.
RTF 129.3 Coverage

Mt Rollesby – FL245 Coverage

Mt Maude – FL245 Coverage
Surveillance Coverage (MLAT and ADSB)
Surveillance (MLAT and ADSB)
Domestic/Oceanic Airspace Boundary

Extend NZZC
Questions?

1. Birth
   Form question in your mind

2. Evaluate
   Is it a reasonable question?

3. Remember
   Until you can ask the question

4. Courage
   To ask the question out loud
question:

will lunch be provided?

No.

Sim at 1245...
Safety & Risk...

- Published RNP AR plates – won’t display Engine-Out flight-path.
- Operator RNAV2 / RNP1 certification - is reliant on AC91/21, which hasn’t been published yet... prepare / process / rectify / certify.
- Mixed Mode Certified/Non-certified Op’s – will add complexity to ATC workload, and delay/track-miles to flights.
- Flight Planning – FPL 2012 implementation occurs 15Nov12 also
- Training – it may be difficult for operators to provide resourcing.
- Contingency/Weather Diverts - impact of
  - equipment failure
  - radar failure
  - weather under PBN.
QN – RNAV (RNP) Departures

DEPARTURE PROCEDURES - TAKES-OFF RWY 05
ANPOV ONE ALPHA DEPARTURE - RNAV (RNP) ANPOV1A

Requirements:
1. Requires RNP 0.30 or lower to METUX
2. RF required
3. Requires a minimum climb gradient of 2900/NAI to 4500/NAI

To POMOT:
- Fly the RNAV (RNP) track to METUX, thence proceed on BASIC-RNP 1 transition to POMOT
- Cross LEGAR MMN 4500/NAI MAX 11,000
- Do not exceed 170 IAS until turn is complete at LEGAR
- Do not exceed 175 IAS until turn is complete at QNH81
- Cross METUX at or below 12,000
- Cross ARMAAD at or above FL180
- EDO Branch Point is LEGAR

To TAIMO:
- Fly the RNAV (RNP) track to METUX, thence proceed on BASIC-RNP 1 transition to TAIMO
- Cross LEGAR MMN 4500/NAI MAX 11,000
- Do not exceed 170 IAS until turn is complete at LEGAR
- Do not exceed 175 IAS until turn is complete at QNH81
- Cross METUX at or below 12,000
- Cross ATVOI at or above FL180
- EDO Branch Point is LEGAR

For a climb rate of 2900/NAI

<table>
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<tr>
<th>GS - I</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climb - IAS</td>
<td>483</td>
<td>725</td>
<td>967</td>
<td>1208</td>
<td>1450</td>
</tr>
</tbody>
</table>

Effective: 15 NOV 12

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RNAV (RNP) ANPOV ONE ALPHA DEPARTURE
QN – RNAV (RNP) Y RWY 23
Southern PBN...