

ADS-B ITP Operational Flight Trial Project Status



Federal Aviation
Administration

ADS-B ITP Aircraft Equipage

- **Partnership**

- FAA and United Airlines agreement signed in April 2009



- Retrofit 12 UAL 747-400 aircraft with certified ITP systems
 - ADS-B IN
 - ADS-B Decision Support Software

ADS-B ITP Procedure

- ADS-B ITP Pilot Initiated Procedure
- Allows ADS-B ITP aircraft to climb/descend through blocking same direction traffic with less than standard longitudinal separation.

☐ **UAL863** #D
◦ 310
◦ N517

☐ **UAL839** #D
◦ 320↓300
◦ N513

☐ **VAU2** #D
◦ 300
◦ N519

ADS-B ITP Manual Trial



Entire Oakland FIR
December 9, 2011

South Pacific
August 15, 2011

5.4.2.7 LONGITUDINAL SEPARATION MINIMA BASED ON DISTANCE
USING ADS-B IN-TRAIL PROCEDURE (ITP)

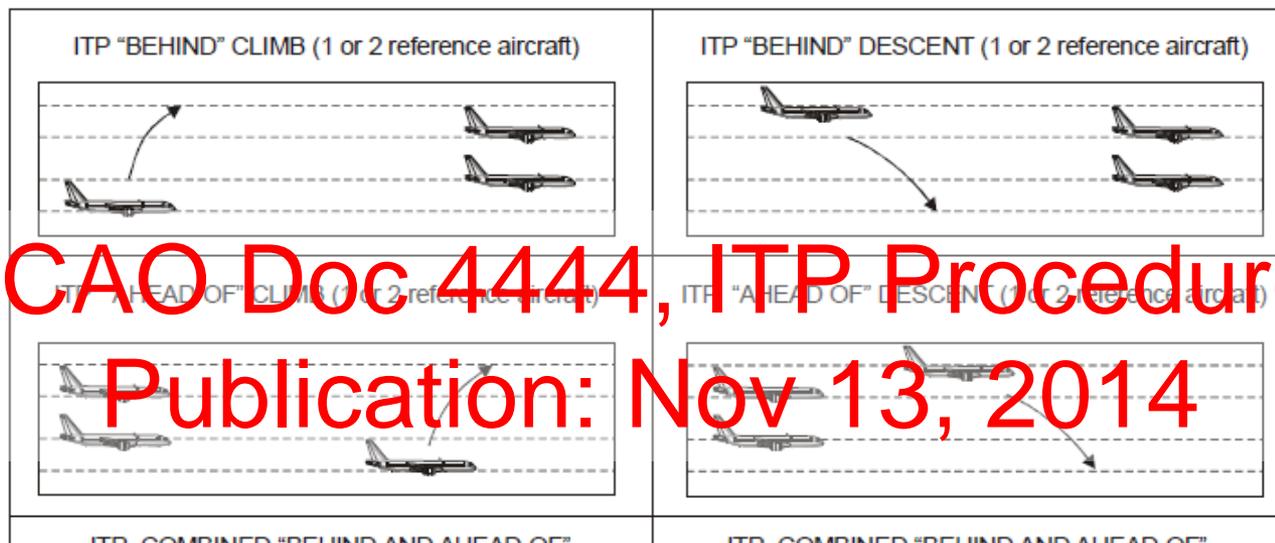
Note 1.— Attention is drawn to Circular 325, In-Trail Procedure (ITP) Using Automatic Dependent Surveillance — Broadcast (ADS-B).

Note 2.— Guidance material on ITP equipment can be found in RTCA DO-312/EUROCAE ED-159 Safety Performance and Interoperability Requirements Document for the In-Trail Procedure in Oceanic Airspace (ATSA-ITP) Application and Supplement and RTCA DO-317A/EUROCAE ED-194, Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Application (ASA) System.

5.4.2.7.1 The routes or airspace where application of the in-trail procedure is authorized, and the procedures to be followed by pilots in accordance with the provisions of Section 5.4.2.7, shall be promulgated in aeronautical information publications (AIPs).

5.4.2.7.2 ITP requests and clearances shall be communicated via a CPDLC message exchange only and in accordance with the appropriate message elements in Appendix 5.

5.4.2.7.3 Longitudinal separation between a climbing or descending ITP aircraft and reference aircraft shall be applied in accordance with 5.4.2.7.3.1, 5.4.2.7.3.2 and 5.4.2.7.3.3. An ITP aircraft shall not be separated simultaneously from more than two reference aircraft using the ITP separation minimum (see Figure 5-35).



ICAO Doc 4444, ITP Procedure
Publication: Nov 13, 2014

ADS-B ITP Procedural differences

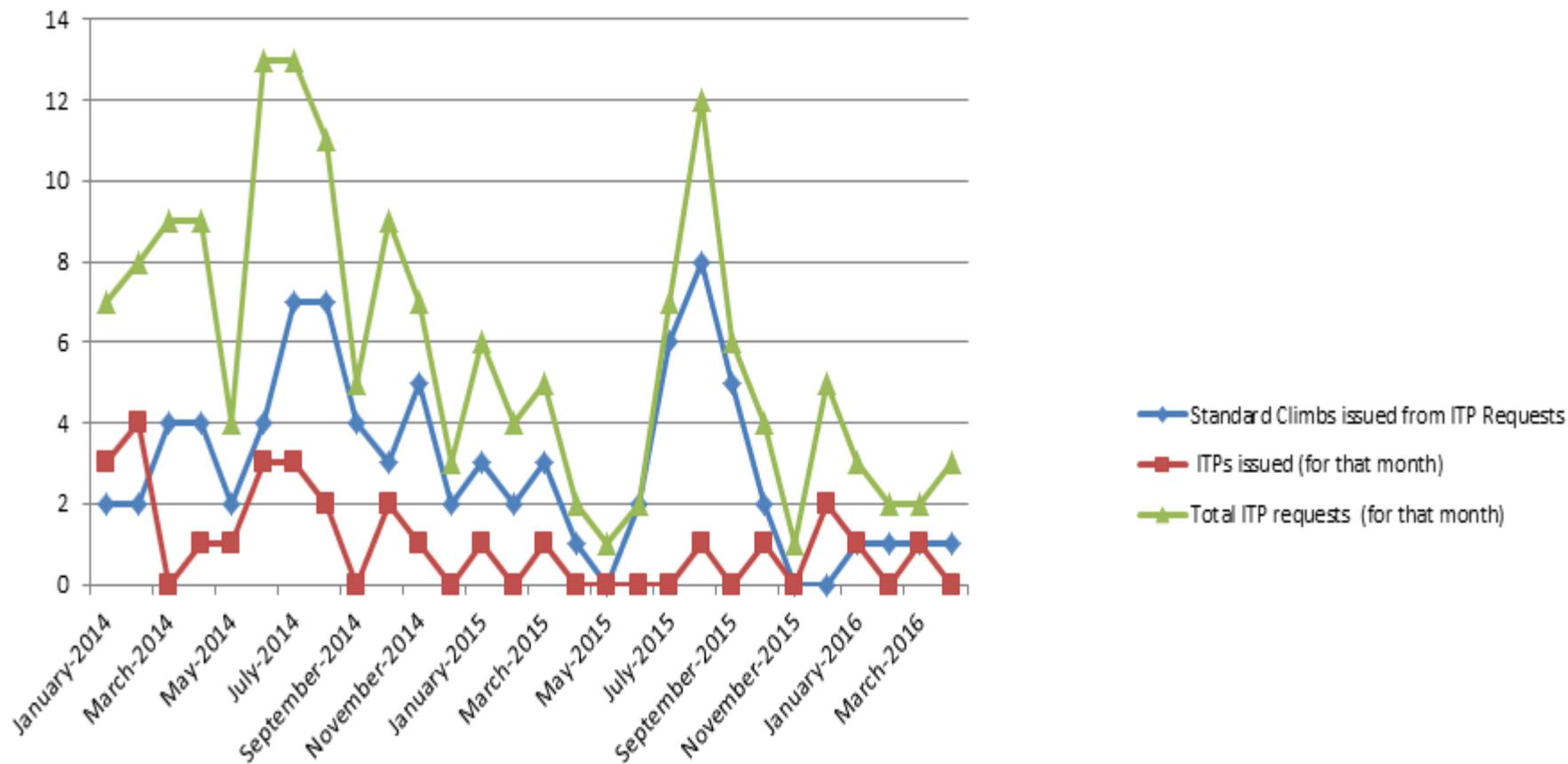
ICAO Doc 4444; 5.4.2.7.3.2 A controller may clear an aircraft for an ITP climb or descent provided the following conditions are satisfied:

- a) the ITP climb or descent has been requested by the pilot;
- b) the aircraft identification of each reference aircraft in the ITP request exactly matches the Item 7 — aircraft identification of the corresponding aircraft's filed flight plan;
- c) the reported ITP distance between the ITP aircraft and any reference aircraft is 28 km (15 NM) or more;
- d) both the ITP aircraft and reference aircraft are either on;
 - 1) same identical tracks and any turn at a waypoint shall be limited to less than 45 degrees; or
 - 2) parallel tracks or same tracks with no turns permitted during the manoeuvre.

Note.— Same identical tracks are a special case of same track defined in 5.4.2.1.5 a) where the angular difference is zero degrees.

FAA Guidance: Same tracks with no turns permitted that degrade required separation during the ITP.

ITP Manual Trial Activity



ADS-B ITP Checklist

- Manual Checklist is being automated in ATOP.

- ATOP Automation software change is completed.
- Facilities are completing testing

ADS-B ITP CONTROLLER PROCEDURE

This procedure must be initiated by an ITP request

If any of the following steps are not true, advise the aircraft UNABLE

Validate ITP Request

The pilot reports on CPDLC a distance between the ITP aircraft and any referenced aircraft that is at least 18nm.

Initiate probe on ITP aircraft

Maximum of 1 or 2 conflicts exist

All call signs in conflict report(s) are included in the ITP request

All conflict aircraft are same direction traffic as ITP aircraft until vertical separation is reestablished

Closing mach difference of ITP aircraft and any referenced aircraft is $\leq .06$.

All conflict aircraft are within 2000' of the ITP aircraft

All conflict aircraft are at a single-assigned altitude

No conflict exists at the requested altitude.

No aircraft involved are cleared for or requesting a route deviation

ITP aircraft and Reference aircraft are not part of another ITP operation at the same time

Issue ITP Altitude Change Clearance (message examples are listed on the back side of this form)

ADS-B In-Trail Procedure (ITP) ATOP Software

- With the new ITP ATOP Software, the request must be properly formatted or the controller will not be able to process the request.

The screenshot displays the CLEARANCE software interface. At the top, the flight number **ANAG1A** is shown next to a long string of coordinates: **37N160E 1631/ 39N170E 1725/ 41N180E 1817/ 42N170W 1908/ 42N160W 1957/ 40N150W 2050/ 39N140W 2**. Below this is a table of flight parameters:

Urgent	Rpt	Negot	Rspn	Misc	Vert	Route	Speed	X-ing	Conn	Pre-Fnt							
RP	RR	CLIMB	@Time	@Fix	%Time	%Fix	DSCND	@Time	@Fix	%Time	%Fix	CROSS	A0A	A0B	NDA	OTA	HOLD

Below the table, there are three lines of climb instructions:

- 20 CLIMB TO AND MAINTAIN (alt) EOS
- 26 CLIMB TO REACH (alt) BY (time) EOS
- 27 CLIMB TO REACH (alt) BY (pos) EOS

A text entry field contains: **<169> (free text) ITP AHEAD OF UAL801 AND AHEAD OF AAL364**. To the right of this field are **INS** and **DEL** buttons.

A red oval highlights the following text at the bottom of the screen:

DL : REQUEST CLIMB TO FL330, ITP 18NM AHEAD OF UAL801 AND 24NM AHEAD OF AAL364

At the very bottom, there is a row of buttons: **ITP**, **CAN**, **TPRD**, **SND**, **UNDL**, **VHF**, **SAVE**, **EALT**, **DVRD**, **COORD**, **RCPT**, **REJ**, **HLP**, **CLS**.

ADS-B In-Trail Procedure (ITP) ATOP Software

- When the ITP request is processed, a slightly different Clearance Window opens

ITP
Clearance
Options

The screenshot shows the CLEARANCE window in the ATOP software. The window title is "CLEARANCE". The main area contains a table with columns: Urgent, Rpt, Negot, Rspn, Misc, Vert, Route, Speed, X-ing, Conn, Pre-Fnt. The table has three rows of data, each starting with a number (20, 26, 27) and a description of a climb procedure. The first row is "20 CLIMB TO AND MAINTAIN (alt) F330 EOS". The second row is "26 CLIMB TO REACH (alt) F330 BY (time) EOS". The third row is "27 CLIMB TO REACH (alt) F330 BY (pos) EOS". Below the table is a text input field containing "(169) (free text) ITP AHEAD OF UAL801 AND AHEAD OF AAL364". To the right of this field are "INS" and "DEL" buttons. At the bottom of the window is a status bar with a scrollable area containing "DL : REQUEST CLIMB TO FL330, ITP 18NM AHEAD OF UAL801 AND 24NM AHEAD OF AAL364". Below the status bar is a row of buttons: ITP, CAN, TPRD, SND, UNBL, VHF, SAVE, EALT, DVRD, COORD, RCPT, REJ, HLP, CLS. The "ITP" button is circled in red.

Urgent	Rpt	Negot	Rspn	Misc	Vert	Route	Speed	X-ing	Conn	Pre-Fnt							
RP	RR	Climb	@Time	@Fix	Time	Fix	DSCND	@Time	@Fix	Time	Fix	CROSS	A0A	A0B	NDA	OTA	HOLD
20		CLIMB TO AND MAINTAIN (alt)		F330													EOS
26		CLIMB TO REACH (alt)		F330		BY (time)											EOS
27		CLIMB TO REACH (alt)		F330		BY (pos)											EOS

(169) (free text) ITP AHEAD OF UAL801 AND AHEAD OF AAL364

DL : REQUEST CLIMB TO FL330, ITP 18NM AHEAD OF UAL801 AND 24NM AHEAD OF AAL364

ITP CAN TPRD SND UNBL VHF SAVE EALT DVRD COORD RCPT REJ HLP CLS

ADS-B In-Trail Procedure (ITP) Software

- Selecting the ITP button in the Clearance Window
 - ATOP validates the required ITP conditions throughout the ITP timeframe,
 - If the validation passes, the ITP clearance can be sent to the aircraft
 - Once an ITP clearance is issued, any imminent conflict between the reference and blocking aircraft is suppressed and not visible in the conflict window
 - The datablock displays “ITP” as a visual cue to the controller that the flight is currently involved in an ITP maneuver



ADS-B ITP Equipped Aircraft



- B787 has obtained certification for their ITP system

- Airbus offers ITP equipment in their aircraft as an option



ADS-B In-Trail Procedure (ITP)

- Oakland will continue their manual ITP trial until the ITP software is installed, so the transition should be seamless.
- Anchorage is targeting implementation of the procedure in Fall 2016.

