Federal Aviation Administration

Memorandum

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To: See Distribution List

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Subject: Interim Policy and Guidance for Automatic Dependent Surveillance Broadcast (ADS-B) Aircraft Surveillance Applications Systems Supporting Oceanic In-Trail Procedures (ITP)

What is the purpose of this memorandum?

This joint Aircraft Certification Service (AIR) and Flight Standards Service (AFS) memorandum provides airworthiness and operational approval policy and guidance for Automatic Dependent Surveillance – Broadcast (ADS-B) Aircraft Surveillance Applications Systems (ASAS) supporting the In-Trail Procedures application in oceanic and remote airspace.

Who does this policy apply to?

This memorandum is applicable to all applicants seeking either certification or operational authorization for the use of ADS-B ASAS for oceanic In-Trail Procedures. This policy is applicable to all persons seeking a certification design approval via supplemental type certificate (STC), amended supplemental type certificate (ASTC), type certificate (TC), or amended TC for ADS-B ASAS and aircraft connectivity (system power, data connectivity, and mounting devices) supporting this application.

How is this policy to be used?

This policy memorandum is intended to provide interim policy guidance for airworthiness and operational approval of ADS-B ITP applications. This policy will clarify and amend the requirements in RTCA/DO-312, *Safety, Performance and Interoperability Requirements Document for the In-Trail Procedure in Oceanic Airspace (ATSA-ITP) Application.* Unless cancelled or revised by the FAA, this interim policy guidance will remain in effect until applicable Minimum Operational Performance Standards are invoked by TSO and associated

Advisory Circular guidance material is published. Publication of In-Trail Procedure TSO and AC guidance is planned by 2011. Appendix A of this memo provides airworthiness and operational approval policy guidance. Appendix B of this memo contains a list of applicable references.

Who should I contact for questions about this policy?

Please contact Christopher Swider, AIR-130, (202) 385-4880 or Dick Temple, AFS-410, (202) 385-4611, for any additional information or questions on this policy.

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Appendix A: In-Trail Procedure Airworthiness and Operational Approval Policies

Appendix B: References

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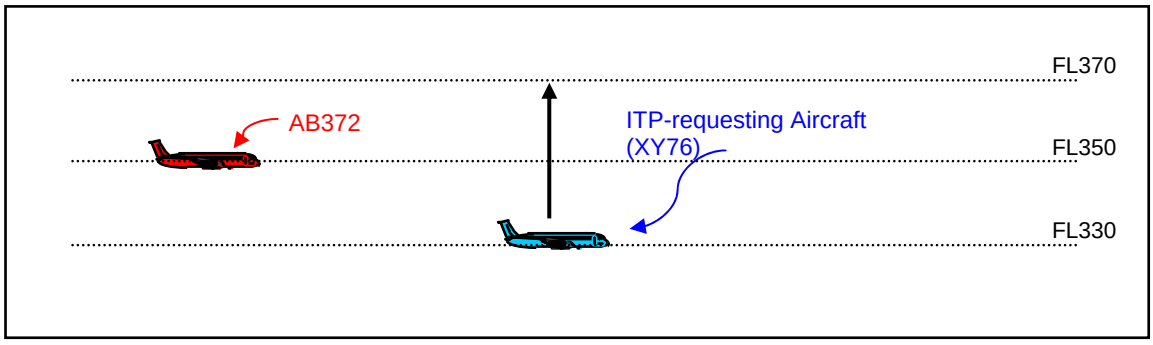
APPENDIX A

In-Trail Procedure Airworthiness and Operational Approval Policies

1.0 Background on ADS-B In-Trail Procedures Application

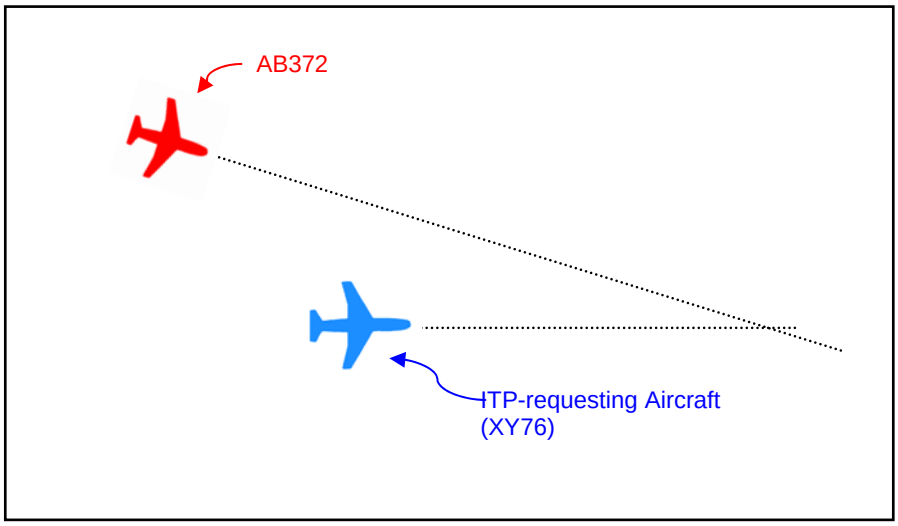
RTCA/DO-312 provides safety, performance and interoperability requirements developed jointly with EUROCAE Working Group 51 and RTCA Special Committee 186 within the group commonly referred to as the "ADS-B Requirements Focus Group". The In-Trail Procedure (ITP) addressed in DO-312 enables aircraft to perform a climb-through or descend-through maneuver past one or two Reference Aircraft in non-radar, procedural oceanic airspace in compliance with an "assumed distance-based longitudinal separation minima" of 10 NM.

The ITP Aircraft may climb/descend from in front or behind one or two Reference Aircraft provided all criteria are met. An example of an ITP climb with the ITP aircraft in front of one Reference Aircraft is shown in Figure 1. For this example, the aircraft are on similar tracks (+/- 45 degrees) rather than an identical track or parallel tracks. The assumed distance-based separation minima is maintained by observing applicable ITP criteria prior to both the clearance request and acceptance and other criteria during the execution of the maneuver. ATC retains procedural separation responsibility throughout the operation, but accepts information derived from avionics onboard the aircraft to determine whether ITP criteria are met. If all criteria are met, ATC issues the ITP procedural clearance. Upon receipt of the clearance, the flight crew verifies that all criteria are still met prior to executing the clearance. The flight crew continues to be responsible for the operation of the aircraft and conformance to its ATC clearance.



Example of a leading climb scenario (vertical view)

Figure 1



Example of a leading climb scenario (horizontal view)

Figure 2

Note: Examples for each of the six potential ITP climb or descent maneuver trajectories are provided in Annex A, Section A.2.1 of DO-312.

Decision criteria for the In-Trail Procedure have been reviewed and accepted by the ICAO Separation and Airspace Safety Panel with a few changes to the original DO-312 criteria. Regional air navigation service providers are currently coordinating the use of this procedure in oceanic airspace which they control. The FAA's Surveillance and Broadcast Services Program Office is coordinating air traffic procedure changes with the Air Traffic Organization allowing Oakland Center oceanic controllers to use this procedural clearance in their oceanic airspace.

NOTE: The aircraft executing the ITP clearance is known as the "ITP Aircraft", but is sometimes referred to in the ITP documents as the "Ownship".

The In-Trail Procedure application is more complex than an airborne situational awareness application. DO-289 defines airborne situational awareness applications as applications that "use additional information to augment current flight crew tasks". In-Trail Procedures would not be possible without ADS-B information, so the application is more than situational awareness. However, ATC maintains separation responsibility so the only responsibility for the flight crew is to apply the ITP criteria, request a clearance, if appropriate, and execute the ITP climb/descent maintaining the current Mach and minimum (or greater) climb/descent rate.

The following table highlights the most significant criteria for the use of the In-Trail Procedure.

Table 1: RTCA DO-312 ITP Criteria as Amended by ICAO

ITP Speed/Distance Criteria	• **ITP Distance >= 15 NM and Closing Ground Speed Differential <= 20 knots** • **ITP Distance >= 20 NM and Closing Ground Speed Differential <= 30 knots**
Relative Altitude Criteria	**Difference in altitude between the ITP and Reference Aircraft is less than or equal to 2000 feet**
Similar Track Criteria	**Difference in track angles between ITP and Reference Aircraft less than +/- 45 degrees**
Position Accuracy for ITP and Reference Aircraft	**ITP and Reference Aircraft data with horizontal position accuracies at least 0.5 NM (95%)**
Position Integrity for ITP and Reference Aircraft	**ITP and Reference Aircraft data with horizontal position integrity bounds of 1.0 NM @ 1x10E-05**
Velocity Accuracy for ITP and Reference Aircraft	**ITP and Reference Aircraft data with horizontal velocity accuracies of at least 10 m/s (19.4 knots) 95%**
Closing Mach Differential (ATC Crosscheck)	**Closing Mach Differential equal or less than 0.06 Mach**

2.0 Airworthiness Approval

2.1 Acceptable Means of Compliance for ITP aircraft

2.1.1 General Requirements

Applicants seeking certification design approval of the ASAS ITP function should comply with the ITP equipment requirements of RTCA/DO-312, section 3.5, as modified by this memorandum.

Conformance monitoring during the maneuver is required (see section 3.1.4 below), so a graphical display of traffic information is required (see section 2.1.2 below). A textual display will not be permitted as the sole means of conformance monitoring. The failure of the conformance monitoring function is a major failure condition and requires development to at

least an equivalent design assurance level. This major failure condition classification is consistent with existing policy for the display of airborne traffic.

An aural and visual advisory-level alert is recommended to assure flight crew awareness that the assumed distance-based longitudinal separation minimum has been breached so the flight crew can increase their attention to the ITP procedure and relative geometry of the reference aircraft. However, the advisory alert is not required if the system and associated procedures provide for the following:

i. A means (e.g. Cockpit Display of Traffic Information(CDTI)) for the flight crew to monitor the relative positions of ownship and ITP reference aircraft throughout the ITP maneuver
ii. A display of ITP Distance and Speed (i.e. Closing Ground Speed Differential) between the ownship and (one/both) reference aircraft that the flight crew can monitor throughout the ITP maneuver (Note: This display may be combined with the display referenced in paragraph i.)
iii. Flight crew procedures to monitor these displays throughout the ITP maneuver to ensure immediate awareness if the assumed distance-based longitudinal separation minimum is breached
iv. Flight crew procedures to monitor ownship performance throughout the ITP maneuver to ensure ITP performance requirements are maintained

Direct Controller-Pilot Communication (DCPC) is also required. To achieve the greatest operational flexibility, we recommend the use of Controller Pilot Data Link Communication (CPDLC) capability to meet the DCPC requirement. RTCA SC-214 is developing an amendment to DO-306 to have CPDLC messages for ITP. In the interim, aircraft should be equipped with FANS-1/A capability and may use the free-text message capability to request and accept an ITP clearance.

2.1.2 CDTI Requirements (Integration with TCAS)

For TCAS-equipped aircraft, inter-source correlation is required between TCAS and ADS-B tracks. The installation should meet the requirements of RTCA/DO-317 as they pertain to the Airborne Surveillance and Separation Assurance Processing (ASSAP) input/output requirements (paragraph 2.2.2), Enhanced Visual Acquisition (EVAcq) (paragraph 2.2.4.1), and CDTI (paragraph 2.3). DO-317 defines unique requirements for TCAS/ASAS integrated systems. Compared to TCAS-only traffic display standards (e.g., DO-185B), DO-317 includes the following differences for systems integrating ADS-B and TCAS:

1) a different prioritization for tracks to be displayed on the CDTI (paragraph 2.2.2.5.1.2.2)

2) different inter-source correlation requirements for ASAS tracks in accordance with paragraph 2.2.3.2.3

3) the addition of Proximate Traffic not correlated with TCAS (paragraph 2.2.3.6)

4) traffic symbol modifications for correlated traffic with TCAS traffic and resolution advisories, including retention of traffic directionality (paragraph 2.3.4.2.3.3)

5) the option to display whether the ADS-B traffic is also monitored by TCAS (paragraph 2.3.4.2.1.f)

6) a requirement to revert to TCAS-only display when the same display is used for an integrated TCAS/ASAS presentation and ASSAP fails (Appendix B).

For the ITP application, TCAS-derived relative position information must be used, if available, to validate the reported ADS-B position integrity of Reference Aircraft with legacy transponders (i.e. DO-260/260A) as described in paragraph 2.2.1.1 below. However, ADS-B aircraft may be displayed on the CDTI IAW RTCA/DO-317 for the Enhanced Visual Acquisition application (paragraph 2.2.4.1.2) without position integrity. If ADS-B aircraft are graphically displayed without valid position integrity, the flight manual should document why these aircraft are not valid ITP Reference Aircraft and no ITP reference information is provided for them. For new displays (i.e. EFB or other graphical display used for ITP), the display must support integration with TCAS as identified above. For existing TCAS displays, the integration of ITP information elements on the display must allow the flight crew to identify and monitor the relative position of candidate and actual Reference Aircraft. Other ITP reference information may be provided separately.

2.1.3 Velocity Quality from Position Sources on ITP Aircraft

Ownship velocity must be validated for use in the ITP application. ITP criteria require the ownship velocity to be accurate within 10 meters per second (95%). The FAA has worked with industry to develop GPS velocity accuracy certification criteria. These criteria are documented in a 10 October 2008 memorandum titled "Policy Reference for Approving Velocity Output Data from GPS (TSO-C-129), GPS/SBAS (TSO-C-145/146), and GPS/GBAS (TSO-C161) Equipment for use with ADS-B". These criteria will be published in 2010 advisory guidance for ADS-B and navigation systems.

Ownship velocity from inertial reference sources may also be used to satisfy ITP velocity requirements. The FAA has not established velocity certification criteria for inertial reference sources, so the applicant must show how the applicable performance standards and intended use of the inertial reference source(s) assures the ITP velocity accuracy requirements. Inertial velocity may be used in conjunction with GPS velocity if the applicant establishes how the resulting performance satisfies the 10 m/s (95%) requirement.

2.2 ITP Aircraft Requirements for Use of Position and Velocity Data from Legacy Avionics of Reference Aircraft

RTCA/DO-312 recognizes that there are a large number of legacy ADS-B avionics installations that present potential data quality issues. Appendix B.A ("ATSA-ITP Availability Enhancement Techniques") identifies two primary issues that may impact the availability of ATSA-ITP. They are as follows:

1) the ability of the ITP equipment to fully assess the required position data quality from ADS-B messages received from candidate Reference Aircraft and

2) the lack of assured (and certified) velocity quality from position sources on both candidate Reference Aircraft and ITP Aircraft.

The following sections will address each of these issues as well as acceptable mitigations.

2.2.1 Position Quality from Candidate Reference Aircraft

TSO-C112() identifies the minimum performance standards air traffic control radar beacon systems/mode select (ATCRBS/Mode S) equipment must meet for approval and identification with the applicable TSO marking. RTCA/DO-181 provides the majority of the minimum performance standard qualification and documentation requirements for ATCRBS/Mode S functions, but does not provide requirements for Extended Squitter message formats and information content. These requirements are addressed in RTCA/DO-260 or DO-260A and invoked in the applicable TSO-C166(). Most worldwide ATCRBS/Mode S equipment is certified to TSO-C112(), but not to TSO-C166(). For this case, there may be no airworthiness approval of the extended squitter message formats and information content. As a result, aircraft surveillance applications systems need to verify some ADS-B message elements to ensure they are receiving valid information.

One extended squitter message element requiring verification is position integrity. Original industry standards for extended squitter (RTCA/DO-260) allowed the reporting of a navigation uncertainty category (NUC) using either a horizontal figure of merit (HFOM) or horizontal protection level (HPL). This standard was not even invoked in TSO-C166 because for most ground or aircraft surveillance applications, position accuracy cannot be used in lieu of position integrity. Legacy transponders certified to TSO-C112 have no airworthiness approval of the position integrity data used in the reported NUC and may be inappropriately reporting HFOM. A similar position integrity issue exists for transponders with extended squitter reporting navigation integrity category (NIC) because without TSO-C166a or an alternate airworthiness basis, the reported NIC may not be based on valid position integrity data. Transponders certified IAW TSO-C166a will use ARINC 429 “label 130” data word as a suitable source for the horizontal integrity containment radius. However, transponders only certified under TSO-C112() may not be reporting valid position integrity.

There are two principal ways to mitigate the position integrity hazard: 1) use TCAS transmissions to independently crosscheck a reference aircraft’s reported position or 2) provide a means to identify candidate Reference Aircraft that have position integrity reporting that meets the minimum position integrity requirements. Ownship ITP equipment must mitigate the position integrity hazard for each Reference Aircraft used in an ITP clearance.

NOTE: Systems integrating TCAS with ADS-B are not required to have unique graphic symbols to indicate TCAS and ADS-B correlation for proximate or other traffic. However, if ADS-B

traffic is graphically displayed without valid position integrity, the flight manual should document why these aircraft are not valid ITP Reference Aircraft and no ITP reference information is provided for them.

2.2.1.1 TCAS Validation of Position Integrity

TCAS range, relative altitude and bearing to the reference aircraft (as determined by ownship TCAS) can be used to verify the candidate Reference Aircraft's reported position is valid provided the reported integrity (NUC or NIC) still meets ITP requirements. These validation requirements vary with the surveillance range and the corresponding availability and accuracy of TCAS information.

The most demanding position integrity requirements are for the closest reference aircraft and especially those aircraft, based on relative geometry, closest to the minimum ITP distances allowed under these procedural clearances. At surveillance ranges less than 30 NM from ownship, the ADS-B reported position must be continuously crosschecked with TCAS track data. The range crosscheck should be based on a root-sum-square of the allowable 95% position error for the Reference Aircraft, the allowable 95% position error for own ship (ITP Aircraft), and an allowance for error in TCAS range. The altitude crosscheck should include any allowable differences based on data formatting, filtering or latency for altitude information that would otherwise be identical. Bearing crosscheck tolerances should reflect TCAS bearing accuracy (typically 30 degrees).

At surveillance ranges greater than 30 NM, the ADS-B reported position must be continuously crosschecked with TCAS track data, when available. The crosscheck tolerances remain the same as above. Where reception of transponder replies from a given aircraft is not sufficient to establish or maintain a track, TCAS range and altitude information should be sufficient to assure the ITP requirements are met when these replies provide validation at least once per minute. ADS-B reports from Reference Aircraft that are beyond the surveillance range of TCAS may be assumed to be valid for ITP, but a nominal surveillance range should be identified in ITP system documentation and candidate Reference Aircraft with lesser slant ranges should be excluded unless other position integrity means such as those referenced below are used.

2.2.1.2 Position Integrity Validation Without TCAS

If TCAS information cannot be used, an alternate means is required to identify candidate Reference Aircraft that have position integrity reporting that meets the minimum position integrity requirements. Candidate aircraft that have an appropriate airworthiness basis for position integrity reporting (e.g., TSO-C166A, AMC 20-24, etc.) may be identified using other ADS-B message elements (i.e. DO-260 version number, aircraft ID, range of 24-bit addresses, etc.). For this option, the applicant proposes a means to identify one or more candidate Reference Aircraft with valid position integrity reporting and provides documentation to show why the proposed identification criteria are sufficient.

NOTE: The intent of this paragraph is to allow for operations when the Reference and ITP aircraft are both known to meet the criteria in Table 1 (e.g. Reference Aircraft with DO-260B).

2.2.2 Velocity Quality from Position Sources on Candidate Reference Aircraft

Transponders transmitting extended squitter messages provide horizontal velocity when available. ITP criteria require the reported velocity to be accurate within 10 meters per second (95%) for the Reference Aircraft. The FAA has worked with industry to develop GPS velocity certification criteria and these criteria are shown in the 10 October 2008 memorandum titled "Policy Reference for Approving Velocity Output Data from GPS (TSO-C-129), GPS/SBAS (TSO-C-145/146), and GPS/GBAS (TSO-C161) Equipment for use with ADS-B" referred to earlier. However, the velocity accuracy for many candidate Reference Aircraft is unknown because there is no message element to indicate if any certification of the horizontal velocity has been accomplished. It is therefore unknown whether the FAA GPS velocity criteria or any other criteria have been used to certify the accuracy of the reported velocity.

2.2.2.1 Velocity Quality for Candidate Reference Aircraft

Reported velocity must be validated by the ITP Aircraft for candidate Reference Aircraft to be acceptable for use with ITP. Since the NACv reporting may not have been validated for all transmitting aircraft, there is no assurance that any certification criteria have been applied to the Reference Aircraft reported velocity. Therefore, velocity derived from reported ADS-B positions should be calculated to estimate the candidate Reference Aircraft velocity.

Derived velocity may be used either directly as an acceptable estimate of ground speed or as a validation of the Reference Aircraft reported velocity. The derived velocity should be based on pairs of reported ADS-B positions. The applicant will need to show that the separation between pairs of reported ADS-B positions and the number of pair-wise velocity measurements used to calculate the Reference Aircraft velocity are appropriate to track potential changes in velocity due to aircraft acceleration or changing wind conditions. The resulting derived Reference Aircraft velocity can be used directly along with ITP Aircraft (ownship) velocity to determine if ITP differential ground speed requirements are met.

Alternately, the derived velocity may be used to validate the Reference Aircraft reported velocity. If this alternate use is applied, the applicant will need to show the comparison criteria used, including the percentage of the most recent velocity comparisons within criteria necessary to assure the distribution of Reference Aircraft reported velocities is not significantly different from the distribution of derived velocities. When these criteria are met, the Reference Aircraft reported velocity may be considered valid for use along with ITP Aircraft (ownship) velocity to determine if ITP differential ground speed requirements are met.

3.0 Flight Operations

3.1 Flight Crew Responsibilities

3.1.1 ITP Determination and Initiation

ITP operations include new tasks for the flight crew in determining specified criteria. The safety case for the ITP maneuver is based on satisfying the initial conditions which include the ITP

Distance, Ground Speed Differential, Vertical Speed, and the Vertical Distance for the Flight Level change.

The following ITP Speed/Distance Criteria must be satisfied to initiate a request for ITP clearance:

1) initial ITP Distance of no less than 15 NM and a closing ground speed differential of no more than 20 knots, and/or,

2) initial ITP Distance of no less than 20 NM and a closing ground speed differential of no more than 30 knots.

These initial distance criteria values, 15 NM and 20 NM, were selected so that when a flight level change at 300 feet per minute (fpm) and constant Mach number is maintained with the related 20 or 30 knot closing ground speed differential, the distance between the aircraft should not become less than the ITP standard separation minimum (i.e. 10 NM). In addition, the Reference Aircraft is to be no more than 2000 ft. above or below the ITP Aircraft. In order to ensure an acceptable closure throughout the ITP maneuver, the controller will not issue an ITP clearance if it is determined that the closing Mach differential is greater than 0.06 Mach. This Mach differential check is to account for potentially unsafe closure rates due to abnormal or adverse wind gradient conditions. The Mach number check may be achieved by:

1) the use of the cruise Mach numbers of the ITP and Reference Aircraft where the Mach number technique is being used; or

2) requesting Mach numbers from the ITP and Reference Aircraft; or

3) any other methodology determined appropriate and acceptable by the regulatory authority and the Air Navigation Service Provider.

To initiate an ITP request, the flight crew must determine the following preconditions have been met:

1) The ITP Aircraft flight crew desires to change flight level based on any number of operational factors including fuel burn, wind, turbulence avoidance, etc.

2) The aircraft desiring to perform the ITP maneuver has approved ITP equipment which provides the flight crew with the information necessary to assess the preconditions, and then must request an ITP clearance. This information includes the Flight ID and information required to determine whether the ITP criteria is met (flight level, Similar Track status, ITP distance and ground speed differential for Potentially Blocking Aircraft with qualified ADS-B data.

3) The operator is operationally approved by regulatory authority through Operations Specifications (OpSpecs), Management Specifications (MSpecs), Letter of Authorization, Operations Manual, or in another appropriate manner.

4) The flight crew of the ITP Aircraft is properly qualified for the ITP maneuver.

3.1.2 Flight Crew Re-Assessment and Performance during ITP Maneuver

After the ITP clearance is issued, the ITP Aircraft flight crew will perform a reassessment of the ITP criteria with respect to the Reference Aircraft to ensure the ITP criteria are still suitable to perform the requested flight level change. If the ITP criteria are still met, the flight crew accepts the clearance and immediately initiates the climb or descent. If the ITP criteria are no longer met, the flight crew should not accept the clearance or perform the maneuver.

If the flight level, Reference Aircraft or type of maneuver (ITP versus standard flight level change), announced by ATC in the clearance, is different from that requested by the flight crew, or if they receive an ITP clearance without requesting one, the flight crew should not perform the maneuver and should ask ATC to confirm the clearance.

NOTE: ATC should not issue an ITP clearance to any aircraft unless that aircraft has initiated the request.

As with a standard climb or descent clearance, the crew must initiate the ITP maneuver without delay after receipt of the clearance. And, the flight crew must reject the clearance if the ITP criteria with Reference Aircraft are no longer valid, if they are not able to reassess conditions due to unavailability of traffic information, or due to other unforeseeable causes.

3.1.3 ITP Maneuver Termination

The procedure terminates when the ITP Aircraft reports established at the new flight level. If the ITP maneuver cannot be successfully completed once the climb or descent has been initiated, the flight crew must notify ATC and request an alternative clearance. Additional options for the flight crew may be to increase their rate of ascent or descent to the assigned altitude while maintaining their assigned Mach number. If an alternative clearance is not received, the flight crew must follow the procedures for in-flight contingencies appropriate for the Flight Information Region.

NOTE: In addition, ICAO Doc 4444 (PANS-ATM), Section 15.2, contains a list of global oceanic contingency procedures.

3.1.4 Flight Crew Monitoring and Alerting

Safety of the ITP maneuver is based on an analysis of safe separation under the expected operating conditions. This separation will be achieved under normal operating conditions, by satisfying the conditions necessary to request and accept the ITP clearance. The flight crew should monitor the ITP conditions (distance, closure rate) and paths of the Reference Aircraft during the maneuver to accommodate unanticipated changes, such as maneuvering by the Reference Aircraft. The flight crew may increase their rate of ascent or descent to the assigned altitude while maintaining their assigned Mach number. The flight crew should ensure the safety of the operation by detecting any changes in the environment that affect the ITP maneuver and taking appropriate actions.

An aural and visual advisory-level alert is not required when the ITP distance of 10 NM has been breached, providing the system and associated procedures in paragraph 2.1.1 are addressed. Options for the flight crew in the event that this ITP distance is reached may be to increase their rate of ascent or descent to the assigned altitude while maintaining their assigned Mach number. The flight crew should inform ATC if they breach the 10 NM ITP Distance at any time during the maneuver. Alerting, based on relative position and aircraft performance, would allow the flight crew to know if the maneuver is not being completed as planned and permit ATC notification. Conformance monitoring during the maneuver will be required and provided on a graphical display of traffic information. A textual display will not be permitted as the sole means of conformance monitoring.

3.2 ATC Communication and Responsibilities

The use of Direct Controller-Pilot Communication (DCPC) is required for ITP. Since DCPC is a more stringent communication requirement, the overall situation is improved. DCPC is further defined to mean either direct voice communication or Controller-Pilot Data Link Communication (CPDLC).

Note: RTCA/DO-312 proposed that high-frequency voice (through a third-party radio operator) was acceptable. However, the associated latencies are not consistent with providing the controller and pilot with an ability to manage unexpected changes during the maneuver.

If the ITP Criteria are met, the ITP Aircraft flight crew requests the ITP clearance using the required phraseology which provides the controller with the following:

1) The requested ITP Flight Level change geometry (i.e., leading or following)

2) The ITP Distance

3) The Aircraft ID of the Reference Aircraft

The controller ensures the request is consistent with the ITP criteria and confirms the flight crew has correctly identified all blocking aircraft at the intervening Flight Levels as part of the request for an ITP clearance. The controller maintains procedural separation between the ITP Aircraft and all other (i.e. non-Reference) aircraft. The controller also ensures the ITP Aircraft is not a Reference Aircraft in another ITP clearance.

The controller then confirms the ITP Aircraft and the Reference Aircraft are on the Same Track. The Same Track criteria are not the same as the Similar Track criteria which is checked by the ITP Aircraft flight crew. Same Track includes the concept of Similar Track (ITP Aircraft and Reference Aircraft are traveling in the same direction, with less than 45^{o} relative track angle between the aircraft) but also includes a check on whether or not the lateral protection areas overlap (i.e., lateral separation cannot be applied). This check can only be done by the controller who knows what separation is being applied between the aircraft.

The controller will also confirm that no more than two Reference Aircraft have been identified in the request. The controller will ensure both the ITP Aircraft and Reference Aircraft are non-

maneuvering and not expected to maneuver during ITP operations. A change of course (only) to remain on the Same Route would not be considered a maneuver, provided the course change is less than 45 degrees and the aircraft remain in a Same Track configuration. Once the controller has checked the closing Mach differential is no greater than 0.06 Mach and the Reference Aircraft is not expected to maneuver, the controller will issue the ITP clearance.

3.3 Terminology

In present ADS-B applications, there is a lack of consistency in the use of terms for ADS-B applications of "Ownship" and "Other Aircraft". It is desirable to have consistent and universally accepted terminology when describing ADS-B applications, especially for pilots and controllers. Standardized terminology should still be applicable when other issues; i.e., third-party communications, multiple sets of application aircraft, etc. is introduced and would be beneficial to ADS-B development, certification, operational approval and field activities.

Within industry working groups, it was noted that for the initial set of ADS-B applications, several different terms were used for "Ownship" and "Other Aircraft". To standardize terminology for both aircraft and avoid confusion, the following terms should be used whenever possible. In the ITP application, "Ownship" and the new term, "ITP Aircraft", are interchangeable. For the "Other Aircraft", instead of using the term "Reference Aircraft", the new term "Target Aircraft" can also be used. These standard terms ("Ownship" and "Target Aircraft") should be used for other ADS-B applications as they are implemented.

3.4 ITP Equipage

The flight crew must be aware that some aircraft without ADS-B broadcasting capability may not be displayed on the CDTI or may be shown only as TCAS traffic. There is also the possibility that some ADS-B equipped aircraft may be transmitting data not suitable to support ITP operations. The flight crew must be able to distinguish between qualified and unqualified aircraft.

APPENDIX B

REFERENCES

RTCA REFERENCE DOCUMENTS

RTCA/DO-181, *Minimum Operational Performance Standards (MOPS) for Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment*

RTCA/DO-312, *Safety, Performance and Interoperability Requirements Document for the In-Trail Procedure in Oceanic Airspace (ATSA-ITP) Application*, provides an operational services and environment description (OSED) and system-level safety and performance analyses and associated requirements for this application.

RTCA/DO-317, *Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications System (ASAS),* provides mature industry operational performance standards for the processing of ADS-B messages and TCAS data and display of this information on a CDTI to support aircraft surveillance applications. Current aircraft surveillance applications in this standard include Airport Surface Situational Awareness (ASSA), Final Approach Runway Occupancy Awareness (FAROA), Enhanced Visual Approach (EVApp) and Enhanced Visual Acquisition (EVAcq).

FAA ADVISORY CIRCULARS, MEMORANDA and TSOs

AC 120-86, *Aircraft Surveillance Systems and Applications,* dated 16 September 2005

AC 120-76, *Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices*, dated 17 March 2003.

FAA Memorandum titled "*Policy Reference for Approving Velocity Output Data from GPS (TSO-C-129), GPS/SBAS (TSO-C-145/146), and GPS/GBAS (TSO-C161) Equipment for use with ADS-B*", dated 10 October 2008

TSO-C112c, *Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment*, dated 18 December 2008

TSO-C166, *Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Service – Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz),* dated 20 September 2004

TSO-C166a, *Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Service – Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz),* dated 21 December 2006