



International Civil Aviation Organization

**Fourteenth Meeting of APANPIRG ATS/AIS/SAR Sub-group  
(ATM/AIS/SAR/SG/14)**

Bangkok, 28 June – 2 July 2004

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**Agenda Item 8: Any other business**

**ALTITUDE RESERVATIONS (ALTRV) & PACMARF**

(Presented by the United States of America)

**SUMMARY**

This paper encourages States to consider the need for developing an Altitude Reservation Memorandum of Understanding with the Pacific Military Altitude Reservation Function (PACMARF).

**1. BACKGROUND**

1.1 It is recognized that some military aeronautical operations necessitate non-compliance with certain air traffic procedures. Paragraph 16.1 of the ICAO *Procedures for Air Navigation Services - Air Traffic Management* (Doc 4444 PANS-ATM) discusses responsibilities in regard to military aircraft. Temporary airspace reservations, either stationary or mobile, may be established for the use of large formation flights or other military air operations. Arrangements for the reservation of such airspace shall be accomplished by coordination between the user and the appropriate ATS authority. The coordination shall be effected in accordance with the provisions of Annex 11 and completed early enough to permit timely promulgation of information in accordance with the provisions of Annex 15.

1.2 An altitude reservation (ALTRV) is authorization between PACMARF and the appropriate air traffic service provider, “for airspace utilization under prescribed conditions.” The U.S. military agency responsible for developing ALTRV in the Pacific is the Pacific Military Altitude Reservation Function (PACMARF). PACMARF is located in Hawaii and staffed by the U.S. Air Force. They have responsibility for coordinating all ALTRV requests in the Pacific region where a memorandum of understanding (MOU) exists with the appropriate civil aviation authorities. The PACMARF has a counterpart in Europe for European and Atlantic ALTRV coordination. Within the U.S., this function is performed by the Federal Aviation Administration Central Altitude Reservation Facility (CARF). Each performs the same function within its assigned area of responsibility.

1.3 The purpose of implementing ALTRV procedures is to provide a higher level of safety when a number of aircraft must be moved with less IFR separation between participating aircraft than is allowed by standard air traffic control criteria. It is also used when multiple aircraft must operate within prescribed altitudes, times, and/or areas.

**2. DISCUSSION**

2.1 The long-term outlook in the Asia/Pacific Region indicates a steady increase of both military and civil traffic. For example, the total number of ALTRVs increased by 12.4% from 2002 to 2003. During the first four months of 2004, the number of ALTRVs is 5.7% above 2002 levels. This is similar to the increase experienced during the first four months of 2003. Estimates are that civil traffic will return to the historic high levels of pre-September 11, 2001 during 2004.

2.2 Therefore, it is imperative to improve upon the status quo by implementing measures that increase the level of safety for all airspace users. The U.S. Department of Defense (DOD) would like to partner with individual air traffic service units in providing an ALTRV co-ordination capability in their airspace/flight information regions (FIRs). The objective of this co-ordination is to achieve the best arrangement in order to avoid hazards to civil aircraft and minimize interference with the normal operation of military aircraft.

2.3 The MOU is only intended to establish formal procedures for requesting ALTRV approvals from the ATS provider for the FIR controlled. The decision to approve any request will rest solely with the appropriate air traffic control authority. The establishment of this MOU does not eliminate diplomatic clearance requirements, but will provide a higher level of safety than is presently available using due regard procedures.

2.5 The DOD currently has agreements that establish ALTRV procedures with air traffic control centers in Japan, Korea and the Philippines. Appendix A is a model MOU for establishing procedures for granting an ALTRV to U.S. military aircraft transiting the various FIRs in the Asia/Pacific region.

**3. RECOMMENDATION**

3.1 States are highly encouraged to consider developing an MOU as a means to increase the level of safety for all airspace users. The outcome will be a formal process for States to receive ALTRV requests, transmit their decision on the ALTRV request, and operate ALTRVs within their appropriate FIRs.

3.2 In the interim, appropriate ATS providers within the Asia/Pacific Region are requested to identify a point of contact for ALTRV requests and future discussions on this topic.

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Appendix A – Sample MOU

Memorandum of Understanding (MOU)

Between

Pacific Military Altitude Reservation Function (PACMARF)

And

\_\_\_\_\_ (ACC)

Effective: \_\_\_\_\_

SUBJECT: Defining Inter-facility Coordination Procedures for Altitude Reservations (ALTRV)

**I. AUTHORITY TO ENTER INTO AGREEMENT.**

- a. Pursuant to International Civil Aviation Organization (ICAO) Annex 11, Chapter 2, Paragraph 2.16-2.17 and Pacific Air Forces Instructions 13-202, the following memorandum is entered into by representatives of United States (US) forces and \_\_\_\_\_ (ACC) in \_\_\_\_\_ (State)\_\_\_\_\_.
- b. PACMARF is the single manager, designated by appropriate US authority, for coordinating ALTRVs for all US military services in the Western Pacific and Indian Oceans areas.

**II. PURPOSE OF AGREEMENT:** The purpose of this MOU is to establish and standardize procedures for US forces to conduct altitude reservations operations in airspace under the control of \_\_\_\_\_ ACC. This MOU augments the specifications in ICAO Doc 4444-ATM 501, Chapter 16, Paragraph 16.1. It provides coordination and approval for the movement of US military aircraft not otherwise provided for in standard ICAO procedures. It specifies procedures for coordinating ALTRV approval requests (APREQ) and approvals (APVL) between PACMARF and the \_\_\_\_\_ ACC.

**III. RESPONSIBILITIES.**

a. MUTUAL RESPONSIBILITIES:

- (1) An approved ALTRV constitutes an authority to conduct enroute operations and will be complied with accordingly. If aircrews due to extenuating circumstances determine they cannot comply with the ALTRV APVL, they shall advise air traffic control (ATC). ATC has the prerogative of canceling the entire ALTRV if the aircrew requests routing or altitude change that is not in the ALTRV APVL.

- (2) A moving ALTRV assures aircrews, to the maximum extent possible, will not be taken off their route of flight, delayed in holding, or given altitude changes by ATC except in the interest of safety of flight. Aircrews are expected to remain on schedule within plus or minus three (3) minutes. If unable to do so, aircrews must advise ATC. Should the aircrews not be able to contact the \_\_\_\_\_ ACC, they will adjust their time to arrive at the next reporting point or fix within the ETA limits. Prior coordination is required to accomplish operations under silent communications procedures.
- (3) A stationary ALTRV assures aircrews, to the maximum extent possible, will not be requested to restrict operations within the approved area or requested to vacate the approved area except in the interest of safety of flight. AVANA is not applied to a stationary ALTRV.
- (4) AVANA shall be applied to moving ALTRVs for the purpose of providing separations between other approved ALTRVs and other air traffic. Normal AVANA time is 60 minutes, but upon request from \_\_\_\_\_ ACC, this time can and will be reduced to 30 minutes without question. PACMARF shall screen all ALTRV APREQs to ensure the minimum amount of airspace is requested for that particular operation.
- (5) All mission delays shall be in 24-hour increments added to the original proposed departure time. Exceptions are subject to ACC approval.
- (6) Standard ICAO ATC procedures shall be applied to the ALTRV and other traffic. \_\_\_\_\_ ACC shall provide separation based on the outer limit of each formation's dimensions. Standard radar separation may be applied within areas of radar service to increase the utilization of the airspace and to maintain air safety. \_\_\_\_\_ ACC may require the aircraft to report at a specified point, fix, or time, and to squawk a specified ATC transponder code for the purpose of establishing radar identification.
- (7) It is not necessary for \_\_\_\_\_ ACC to block the entire route of flight and altitudes for the period requested in an ALTRV APREQ if means exist to free that airspace for other users, particularly in the case of moving ALTRVs.

b. PACMARF RESPONSIBILITIES:

- (1) Coordinate with and solicit approval for ALTRVs from the \_\_\_\_\_ ACC. ICAO's Aeronautical Fixed Telecommunications Network will normally be used to forward ALTRV APREQs and major changes.

Subsequent coordination may be accomplished by telephone or FAX. Hardcopy confirmation will be transmitted upon request.

- (2) Resolve, through coordination with project officers and \_\_\_\_\_ ACC, conflicts between two or more ALTRVs. ALTRV APREQs will be precoordinated by all ALTRV project officers to ensure no conflicts exist. PACMARF will verify precoordination was accomplished upon request.
  - (3) Forward ALTRV APREQs upon receipt to \_\_\_\_\_ ACC. APREQs will normally be forwarded six (6) days prior to mission ETD. Missions implementing peacetime national emergency plans, search and rescue, air evacuation, typhoon operations, or operations involving the safety of lives and property may require short-notice coordination.
  - (4) Forward proposed changes to an approved ALTRV to \_\_\_\_\_ ACC as soon as possible, but no later than aircraft departure time. Changes to approved ALTRVs will normally be limited to:
    - (a) Change in the number of aircraft
    - (b) Change in type of aircraft
    - (c) Change in call signs
    - (d) Delays in ETD in 24-hour increments with exceptions
- c. \_\_\_\_\_ ACC RESPONSIBILITIES:
- (1) Approve ALTRV APREQs as requested to the maximum extent possible. Notify PACMARF of the approval/disapproval/alternative as soon as possible but no later than 24-hours prior to mission's ETD.
  - (2) Accept ALTRV APREQs, changes to APVD ALTRVs and termination of ALTRVs only from PACMARF.
  - (3) Inform PACMARF of departure point, destination, call sign, and type of aircraft when a flight plan is received from US military aircraft that \_\_\_\_\_ ACC would rather have filed as an ALTRV.
  - (4) Report ALTRV irregularities in writing to PACMARF as soon as they become known. Examples of irregularities are: Uncoordinated call sign changes, difference in the number and type of aircraft filed versus flying, and/or not flying in accordance with the approved ALTRV or the procedures identified in Attachment 4.

- (5) \_\_\_\_\_ ACC may withhold any ALTRV APVL considered similar to any previous ALTRV that resulted in major difficulty for them. APVL may not be granted for said ALTRV until the situation/difficulty has been resolved.

**IV. ATTACHMENTS:**

- a. ABBREVIATIONS: Attachment 1 contains a list of abbreviations used in ALTRV APREQs.
- b. DEFINITIONS OF TERMS USED IN ALTRV PROCESSING: Attachment 2 contains a list of terms and its definitions as used in ALTRV processing.
- c. ALTRV APREQ and APVL MESSAGE FORMATS: Attachment 3 specifies operational message formats to be used between PACMARF and \_\_\_\_\_ ACC.
- d. ALTRV AIRCRAFT FLIGHT OPERATIONS: Attachment 4 identifies specific aircraft ALTRV procedures (obtained from PACAFI 13-202).
- e. COMMUNICATION: Attachment 5 specifies how to contact PACMARF and \_\_\_\_\_ ACC.

**V. DISAGREEMENTS.** PACMARF and \_\_\_\_\_ ACC will resolve all disagreements concerning the procedures stated herein. If a disagreement cannot be resolved, it will be forwarded to higher headquarters.

**VI. REVIEW AND MODIFICATION.** This agreement will be reviewed every three years beginning the anniversary date of the signing of this Memorandum of Understanding. Modifications to this agreement may be accomplished anytime by mutual consent of both parties concerned.

**VII. EFFECTIVE DATE AND DURATION.** This agreement shall become effective upon the date of final signature of the representatives from \_\_\_\_\_ ACC and Headquarters Pacific Air Forces and will remain in effect until cancelled by mutual consent of both parties concerned.

**VIII. SIGNATORIES:**

\_\_\_\_\_  
(Name, Rank, USAF)  
Director of Air and Space Operations  
Headquarters Pacific Air Forces

\_\_\_\_\_  
(Name)  
Chief, Air Traffic Controller  
\_\_\_\_\_ Area Control Center

## **ABBREVIATIONS**

Abbreviations commonly used in ALTRV APREQs and APVLs:

ADMIS (number) – Aircraft departing at (number of minutes) interval

AIRFL – Air refuel or aerial refueling

ALTRV – Altitude reservation

ALTRV APREQ – Altitude reservation approval request

ALTRV APVL – Altitude reservation approval

APREQ – Approval request

APVL – Approval

ATC – Air Traffic Control

AVANA (number) – Altitude reservation approval void for aircraft not airborne by (time in UTC)

BNDD – Bounded

CLMB – Climb

CMPS – Compress

DPRT – Depart

DRCT – Direct

DSND – Descend

EAR – End air refueling

ETD – Estimated time of departure

FREQ – Frequency

IFFP – Individual flight plan from this point

KTAS – Knots true airspeed

LVLOF – Level off

MARSA – Military assumes responsibility for separation of aircraft

MITO – Minimum interval takeoff

MNVR – Maneuver

RAVEC – Radar vectors

RCVR – Receiver aircraft in aerial refueling

REMES – Reference message

RNDZ – Rendezvous

ROMES – Reference our message

RSVN – Reservation

RTB – Return to base

RUMES – Reference your message

TNKR – Tanker

XPND – Expand



## DEFINITIONS OF TERMS USED IN ALTRV PROCESSING

Terms used in ALTRV processing:

1. ALTITUDE RESERVATION. Airspace pre-coordinated through PACMARF utilized under prescribed conditions normally employed for the mass movement of aircraft or other special user requirements that cannot be accomplished under standard air traffic control service.
2. ALTITUDE RESERVATION APPROVAL. Authorization by appropriate ACCs within whose area of airspace jurisdiction the ALTRV or parts thereof will operate. An approved altitude reservation normally includes the departure, en route, and arrival phase of flight (arrival at initial approach fix or holding point and/or time ATC assumes control by application of standard ATC separation.
3. ALTITUDE RESERVATION FORMATION:
  - a. STANDARD FORMATION. One in which a proximity of no more than one (1) nautical mile laterally or longitudinally and within one hundred (100) feet vertically from the flight leader is maintained by each wingman.
  - b. NONSTANDARD FORMATION.
    - (1) INDIVIDUAL FLIGHT PLAN FORMATION. More than one aircraft operating by prior arrangements with ATC on the same route or track as a single aircraft with regard to altitude, navigation, and position reporting, longitudinally contained within one minute flying time.
    - (2) CELL FORMATION. Two or more aircraft operating on same route or track, longitudinally contained within one minute flying time, laterally contained within 2.5 NM on both sides of the flight path and utilizing normally three thousand (3,000) consecutive feet of altitude.
    - (3) STREAM FORMATION. Two or more aircraft (or cells aircraft) operating on the same route or track with more than one minute but not more than fifteen minutes of longitudinal spacing between aircraft (or cells), laterally contained within 2.5 NM on both sides of the flight path and utilizing normally three thousand (3,000) consecutive feet of altitude.
4. AVANA – ALTRV. Approval void for aircraft not airborne or remain within the approved AVANA “time frame” (time in GMT). The ALTRV approval is canceled at the time specified if the aircraft is (are) not airborne. The approved AVANA “time frame” is defined as the time between mission ETD plus AVANA, or between time fix and time over plus AVANA.

5. MILITARY ASSUMES RESPONSIBILITY FOR SEPARATION OF AIRCRAFT (MARSA). A condition whereby the military services involved assumes responsibility for separation between participating military aircraft in the ATC system.
6. MOVING RESERVATION. ALTRVs, which encompass en route operations. An ALTRV whose position in space changes with time. A moving ALTRV reserves airspace in front of and releases airspace behind the aircraft in the ALTRV to access by other air traffic.
7. PACIFIC MILITARY ALTITUDE RESERVATION FUNCTION (PACMARF). A facility established by the Commander in Chief, US Pacific Command, manned and equipped by HQ Pacific Air Forces (PACAF), whose mission is to coordinate and solicit approval for use of airspace from US and host nation ATC units for movement of US military aircraft under the altitude reservation concept. PACMARF provides an air traffic service (coordination of ALTRVs) but is not an air traffic control unit and does not issue air traffic clearances.
8. STATIONARY RESERVATION. ALTRVs, which encompass activities in a fixed area. An ALTRV whose position in space is fixed with relation to the surface of the earth. Stationary ALTRVs may include activities such as special test of weapons systems or equipment, certain US Navy carrier, fleet, or antisubmarine operations, rocket, missile, and drone operations, or similar operations.

## ALTRV APREQ and APVL MESSAGE FORMATS

1. MOVING ALTRV FORMAT. The message shall consist of the mission name followed by the PACMARF reservation number and the following:
  - a. Unit voice call sign
  - b. Number and type of aircraft
  - c. Point of departure
  - d. Route and control information to include:
    - (1) Departure procedure to the first assigned altitude of flight-level and a point in the route of flight where the first assigned altitude or flight-levels will be reached.
    - (2) Route of flight, defined in coordinates (latitude/longitude), fixes, or radial distance from navigational aids.
    - (3) Cumulative elapsed times from departure for each checkpoint or control point.
    - (4) Climb, descent, and level-off, enter/exit points indicating where altitude will be reached. The point where the change commences follows the fix. The level-off point precedes the fix.
      - (a) Any special maneuvers within the ALTRV, such orbits or spacing triangles will be defined to include dimension.
      - (b) Multiple routes will be shown when applicable.
  - e. Destination
  - f. Proposed departure time listed in UTC and departure interval between aircraft. If mission is divided into cells, each cell will be identified with the number of aircraft, departure times and ADMIS. Include AVANA time, if applicable.
  - g. Remarks. Include the following when applicable:
    - (1) True airspeed (cruise, air refueling, low level).
    - (2) Unit call sign of supporting tankers.
    - (3) MARSAs formation

- (4) Routing and altitude requested beyond the ALTRV termination point for aircraft that intend to continue en route in accordance with normal ICAO procedures (This information is required for flight and ATC planning purposes and does not constitute a part of the ALTRV).
- (5) Navigational legs, electronic countermeasures (jamming), and/or chaff to the extent possible.
- (6) Limitations in navigational or communications capability.
- (7) Aircraft will file an ICAO flight plan to and from the ALTRV area, if outside the terminal approach control area.
- (8) Location, routing (IFPP), and procedures for airborne spares to drop out/exit the ALTRV.

2. STATIONARY ALTRV FORMAT. The message shall consist of the mission name followed by the PACMARF reservation number and the following:

- a. Altitude(s) requested, description (coordinates) of area requested, date/time group indicating when area will be occupied.
- b. Pertinent remarks, including:
  - (1) MARSAs information.
  - (2) Any other information, which could have an appreciable affect upon ATC operations.

## **ALTRV AIRCRAFT FLIGHT OPERATIONS**

1. The following ALTRV aircraft procedures were extracted or summarized from PACAFR 55-12, Altitude Reservation (ALTRV) Procedures, and it is understood that any and all aircraft operating under the ALTRV concept will adhere to these guidelines. In the interest of flight safety, any violation of the following procedures should be treated as an irregularity and reported to PACMARF as soon as possible.
  - a. Upon receiving ALTRV APVL, flying units shall not depart earlier than the proposed departure time shown in the flight plan(s), or later than the AVANA time. Likewise, once established on an ALTRV, changes to routing and/or altitude shall not be requested except in the interest of flight safety (e.g., weather deviation, aircraft in-flight emergencies, etc.).
  - b. Aircrews shall remain within the approved AVANA (ALTRV APVL VOID for AIRCRAFT NOT AIRBORNE by (time in UTC) time frame. Once airborne, aircrews shall recompute en route estimated time of arrival (ETA) based on their actual time of departure and shall make position reports as if they were on an individual ICAO flight plan. Aircrews are expected to remain on schedule within plus or minus three (3) minutes. If unable to do so, aircrews must advise ATC. Should the aircrews not be able to contact the appropriate point or fix within the approved AVANA “time frame”.
  - c. The first and last aircraft in a stream type formation will make position reports at each reporting point and will indicate position in formation.
  - d. If required, aircraft will file an ICAO flight plan in addition to an ALTRV APREQ. (e.g., IFPPF to and/or from approved ALTRV.)
  - e. All aircraft shall contact the appropriate ACC ten (10) minutes prior to exiting an ALTRV for ATC clearance beyond the ALTRV.
  - f. Aircraft invoking MARSAs will abide by the implementation and terms of use documented in the respective service regulations.

## COMMUNICATION

### 1. PACMARF:

- a. US mailing address: PACMARF  
900 Hangar Avenue  
Hickam AFB, HI 96853-5426
- b. ICAO AFTN address: PHIKYXYZ or PHIKYWYX
- c. Commercial telephone number: +1.808.449.0883 (Primary)  
+1.808.448.7897 (STU-III)
- d. FAX: Commercial number: +1.808.448.0177

### 2. \_\_\_\_\_ ACC:

- a. Mailing address:
- b. ICAO AFTN message address:
- c. Commercial telephone number:
- d. FAX: