



**FINAL REPORT OF
THE SEVENTH MEETING OF
THE SPECTRUM REVIEW WORKING GROUP
(SRWG/7)**

Bangkok, Thailand
15 – 17 February 2023

The views expressed in this Report should be taken as those of
SRWG/7 Meeting and not of the Organization.

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1. Introduction

1.1 The Seventh Meeting of the Spectrum Review Working Group (SRWG/7) of APANPIRG was held in ICAO APAC Regional Office, Bangkok, Thailand with the hybrid option of video teleconferencing on 15 – 17 February 2023.

2. Attendance

2.1 The meeting was attended by 58 participants (23 in-person attendance and 35 virtual attendance) from 17 States/Administrations and 2 International Organizations including Australia, Bangladesh, Bhutan, China, Hong Kong China, France, India, Indonesia, Japan, Lao PDR, Malaysia, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, USA, IATA and ICAO. The List of Participants is provided in **Attachment 1** to this Report.

3. Opening of the Meeting

3.1 The meeting was opened by Mr Chainan Chaisompong, Chairperson of the SRWG, who extended a warm welcome to all participants and expressed deep appreciation and gratitude for the efforts of all parties to make great achievements. Mr Luo Yi, Regional Officer CNS, also expressed welcome and thanks to the participants.

4. Officers and Secretariat

4.1 Mr Luo Yi, Regional Officer CNS and Mr Derek How, Regional Officer CNS, ICAO Asia and Pacific Regional Office, acted as secretaries for the meeting. The meeting was assisted by Mr Robert Witzen, a former ICAO Officer, an expert in frequency management and the main developer of the Frequency Finder software tool, who offered his expertise voluntarily from Texas, USA.

5. Organization, working arrangement, language and documentation

5.1 The SRWG/7 met as a single body. The working language for the meeting was English inclusive of all documentation and this Report. A total of Seventeen (17) Working Papers and Four (4) Information Papers were considered by the meeting. The List of Papers is provided in **Attachment 2** to this Report.

Agenda Item 1: Adoption of agenda

- 1.1 The provisional agenda presented in **WP/01** was adopted as the agenda for the meeting.

Agenda Item 2: Review outcomes of relevant meetings

Review of Relevant ICAO Meetings - Secretariat (WP/02)

2.1 This paper summarized relevant information and updates with the highlight on the outcomes of SRWG/6 reviewed by CNS SG/26 and noted by APANPIRG/33, and highlights of discussions related to potential impacts from implementation of 5G and Radio Altimeter conducted in RASG-APAC/12 and regional meetings/webinar.

2.2 The CNS SG/26 Meeting adopted Five (5) Conclusions and Two (2) Decisions. In addition, based on the outcome of discussions on various agenda items, the CNS SG/26 Meeting developed Five (5) Draft Conclusions and One (1) Draft Decision for consideration by the APANPIRG/33, which was adopted by the APANPIRG/33 Meeting. The Meeting noted the Conclusions/Decisions adopted by the CNS SG/26 and the APANPIRG/33 and discussed the follow-up.

2.3 The paper also reviewed various topics discussed in CNS SG/26 including frequency simulation for APAC, VHF Communication 8.33 kHz channel spacing requirements, frequency spectrum coordination and planning criteria, a survey on the introduction of 50 kHz channel spacing for ILS and VOR facilities, discussion outcomes in relevant meetings, webinar and regional updates on potential impacts from 5G implementation on radio altimeters, and Amendment 91 to Annex 10, Volume III on selective calling codes.

Relevant Action Items of 57th Conference of DGCA - Secretariat (WP/03)

2.4 This paper summarized the Aeronautical Spectrum-related outcomes of the 57th Conference of Directors General of Civil Aviation Asia and Pacific Regions (DGCA/57). Relevant Discussion Papers and the two Action Items endorsed in association with the discussion were reviewed and SRWG/7 was invited to note the summary of Regional practices and work done in this Region summarized in the Discussion Paper *57-4-3-DP Aeronautical Spectrum Utilization and Protection* and its associated Action Item 57/20, and to identify related issues if any that need to be brought to the attention of the DGCA/58.

2.5 In reviewing the outcomes related to 5G implementation and Radio Altimeters, IATA expressed it was actively supporting States and was happy to provide relevant information. IATA's Global 5G Status Dashboard was demonstrated in the Meeting, which summarized the details of frequency bands used, power, mitigation, concerns identified and remarks on a one-glance interactive map. The Meeting was invited to utilize the Dashboard, which was included in their theme website on IATA support aviation and implementation of 5G at <https://www.iata.org/en/programs/ops-infra/air-traffic-management/5g/>

Outcome of APG23-4 Meeting – Secretariat (WP/15)

2.6 This paper reviewed the outcome of the Fourth Meeting of the Asia Pacific Telecommunity Conference Preparatory Group for World Radiocommunication Conference 2023 (APG23-4), which was held on 15-20 August 2022 in a hybrid mode of physical meeting in Bangkok, Thailand and Video Teleconference. Regional Officers CNS from ICAO APAC Office attended the meeting and the latest ICAO Position, as the result of the study progressed by FSMP based on the latest ITU studies, was presented to APG23-4. In addition, this provided an opportunity to monitor the progress and status of Asia/Pacific regional preliminary views for WRC-23 to protect the aeronautical

spectrum and ensure the ICAO Position is supported at regional forums in accordance with APANPIRG/27 Conclusion 27/45 and to report to CNS SG and its contributory bodies on the regional preparation progress made by APG.

2.7 ICAO representatives participated in various sessions of drafting groups on agenda items relevant to civil aviation and provided input and clarification as required to participants from civil aviation administrations. The overall outcome of the APG23-4 is in line with the ICAO Position. A summary of the ICAO position and APG23-4 Preliminary Views was provided in Appendix A to this paper, and SRWG/7 Meeting noted the description of ICAO's role in the coordination of HF bands under Agenda Item 1.9 of WRC-23. The Meeting also noted other relevant outcomes of APG23-4 on agenda items where aviation is seeking actions by WRC, including VHF voice/data over satellite, sub-orbital vehicles, UAS CNPC links etc.

Outcome of the Workshop on ITU World Radiocommunication Conference 2023 (WRC-23 Workshop) / Regional Preparatory Group (RPG) Meeting for WRC-2023– Secretariat (IP/04)

2.8 This paper reviewed the outcome of the Workshop on ITU World Radiocommunication Conference 2023 (WRC-23 Workshop) / Regional Preparatory Group (RPG) Meeting for WRC-2023, which was held on 13-14 February 2023 at the ICAO APAC Regional Office, Bangkok, Thailand, and was attended by 123 participants (73 virtual attendance and 50 in-person attendance) from 26 States/Administrations, and 7 International Organizations. The Workshop report, presentations, and other resources can be accessed on the same website of SRWG/7. 22 presentations were delivered on Six Agenda Items covering the following aspects during the workshop:

- Introduction including the outcome of the WRC19 and preparation for future WRCs;
- Aviation-related topics and action plans to be implemented at the national and regional levels in WRC-23;
- Regional preparations for WRC-23;
- Radio Altimeter and 5G issues (not on the specific agenda for WRC-23);
- The reality of frequency management in APAC: current practices and new challenges

Summaries of the discussion were provided in the draft report of the Workshop, as in Appendix A.

Agenda Item 3: Review Frequency planning requirements for APAC Region

Agenda Item 3.1: VHF COM Frequency Allotment Plan for APAC

Review of VHF COM Frequency Allotment Plan for APAC – Secretariat (WP/04)

3.1 This paper presented a summary of efforts and Conclusions that were adopted with the aim of improving the utilization of frequency band 117.975-137 MHz in APAC, as follows:

- Conclusion 13/7 - Adoption of a regionally protected frequency for Traffic Information Broadcasts by Aircraft (TIBA);
- Conclusion APANPIRG/26/50 – Amendment to the APAC frequency allotment plan; SRWG/2 WP/5 Global and Regional Allotments, which presented measures envisaged at the global level regarding allotments in the VHF-COM frequency band 117.975 – 137 MHz to increase the efficiency of frequency management and called for an impact assessment in the APAC region;
- SRWG/6 discussed WP/14 Frequency Simulation for India, the simulation demonstrated that the frequency requirements requested by India for up to 2030 can be satisfied within the frequency band 117.975 - 137 MHz with conditions;
- SRWG/4 recommended developing a Regional Aeronautical Radio Frequency Management Guidance Material for implementing frequency assignments in a coordinated manner with ANSP, CAA and national frequency Authorities to satisfy

future operational needs or the introduction of new technologies.

3.2 This paper included the VHF COM Frequency Allotment Plan in the Appendix of the Paper, invited the Meeting to review the various efforts on improving the utilization of frequency band 117.975 MHz-137 MHz, and raised the need to review the necessity to implement 128.95MHz for TIBA.

3.3 Thailand raised that since the use of TIBA frequency was protected and endorsed via APANPIRG Conclusion 13/7, they have published TIBA into their national ATM contingency plan as required by Regional ATM Contingency Plan. In case of any changes that will be made to the allotment of TIBA frequency, which should be agreed as regional basis.

Reconsideration on the Allotment Plan for APAC Region – Secretariat (WP/16)

3.4 This paper presented an overview of the findings from the global database supplementing the discussion in WP/04 that proposed to review the VHF COM frequency allotment plan for APAC to accommodate new requirements. With the allotment plans developed and sub-divided the frequency band 117.975-136 MHz, allocated by ITU to Aeronautical Mobile (R) Service (AM(R)S), for aeronautical applications or services such as TWR, ACC, APP, VOLMET etc. Simulations have shown that certain allotments were prone to saturation while others were underutilised. Reconsideration on such allotments was proposed in this paper for better utilization of the allotments, including to allot the band 122.000-123.675 MHz for TWR, APP (L and I) and ACC (L and I), part of 136.000-136.975 MHz for ACC-U, VOLMET and FIR, part of 136.000-136.975 MHz for use by VDL facilities originally from 128.825-132.025 MHz.

3.5 Besides, if the reduction of 128.825-132.025 MHz to 129.700-130.875 MHz for AOC, and re-assignment of the current use of 128.825-132.025 MHz for VDL to 136.500-136.975 MHz were acceptable, 128.825-129.700 MHz can be re-allotted to VOLMET, ATIS and ACC-L, and 130.875-132.025 MHz can be re-allotted to ACC-U and FIS.

3.6 China spotted a difference in the frequency band allotted to AOC, SRWG/2/WP05 and in the Supplement to DOC 9718 Vol II showed to be allotted to 128.900-132.025MHz. Besides, for frequencies allotted to VDL, DOC 9614 (ASIA/PAC/3 RAN Meeting,1993) showed to be allotted to 136.900MHz,136.925MHz,136.950MHz and 136.975MHz accordingly. However, in APANPIRG/31 final report (Conclusion 31/13) and Supplement to DOC 9718 Vol II, 136-137MHz is allotted to VDL. China suggested further clarification of the current frequency planning, and the draft guidance material would be updated accordingly per the result of the clarification.

3.7 To address the comments and the need to discuss in detail on proposals raised in WP/04 and WP/16, ICAO Secretariat proposed to establish an ad hoc expert group with Ms. Liu Rui, from China as the rapporteur, and Mr. Robert Witzen, as the advisor, with participation from volunteering States/Administrations. This ad-hoc expert group would aim to study the allotment plan, analyse the actual usage of allotment registered in FF, identify areas for improvement and to propose solutions (technical and administrative), explore the potential in reallocating sub-bands/pools, survey the use of TIBA. The group would work in virtual mode, i.e. via emails and VTC as deemed necessary, between SRWG meetings. Bhutan, Hong Kong China, Indonesia, India, Japan, Lao PDR, Philippines, Republic of Korea, Singapore, Thailand, United States and IATA expressed their willingness to participate in the ad-hoc expert group. All Member States were welcomed to join the ad-hoc group to raise their respective concerns over the frequency allotment. **ACTION ITEM 7-1**

Agenda Item 3.2: Review Survey on 50 kHz channel spacing for ILS and VOR Facilities

Survey Result of the Introduction of 50 kHz Channel Spacing for ILS and VOR Facilities in the Asia/Pacific Region – Secretariat (WP/05)

3.8 The ad-hoc group, which was formed from SRWG/5 in 2021 to discuss the possible shortfall of VOR frequency channels with the current 100 kHz channel spacing in the frequency band 108.000-117.975 MHz, reported the outcome of the discussion in the SRWG/6. The Group worked with the ICAO Secretariat and drafted a questionnaire for the APAC States and Airline Operators, including IATA, through State Letter Ref.: T 8/8.5 – AP068/22(CNS). Based on the survey results obtained, it was noted that certain States have already implemented or planned to implement the 50 kHz channel spacing for ILS/VOR facilities. While most of these States indicated no issues in implementation/planning, States should ensure the aircrafts operating in their airspaces are able to support the use of 50 kHz channel spacing. It is encouraged that IATA would advise their member airline operators about the capability of their aircrafts avionics in operating with 50 kHz channel spacing for ILS/VOR facilities. States should also confirm with other relevant bodies, e.g. Defence and Flying Service bodies, that use ILS/VOR facilities on their ability to operate with such 50 kHz channel spacing.

3.9 The Meeting was invited to note that this questionnaire served the purpose of understanding States'/Administrations' readiness and implementation progress of operating with 50 kHz channel spacing for ILS/VOR facilities. States/Administrations should follow their own preceding experience and determine accordingly their own needs to implement, and coordinate with their airspace users. There was no requirement envisaged for the APAC Region for a collective action to migrate into 50 kHz channel spacing for ILS/VOR facilities.

3.10 China informed the Meeting that Annex 10 Volume I was used as a reference in planning their frequency assignments rather than Doc. 9718 Volume II due to foreseeable future frequency resource scarcity challenges. Per discussion, China was invited to identify any inconsistencies between the two documents for sharing. ICAO Secretariat expressed appreciation for the effort from China, India, Japan, Thailand and Mr Robert Witzen in contributing to the ad-hoc working group.

Agenda Item 4: Update on Frequency Finder

Update on Frequency Finder – Secretariat (WP/06)

4.1 This paper presented the latest work, enhancements and functionalities brought to the Frequency Finder (FF) tool to assist ICAO Regional Offices and States/Administrations to manage and coordinate aeronautical frequency assignments and SSR Mode S II/SI codes. The paper also included updates on VHF NAV Module, SSR Standalone Module, Facilitation of Interrogator Code (IC) Allocation and relevant updates in Frequency Finder, and the launch of ICAO Webcourse on Aeronautical Spectrum Use, with a special focus on VHF, at <https://store.icao.int/en/aeronautical-spectrum-use-with-special-focus-on-vhf-asu-online>. States were invited to make extensive use of FF for frequency coordination, and provide feedback on FF usage, suggestions, bugs and recommendations.

Agenda Item 5: Review of Frequency List 2 in the Region

Review of Frequency List 2 in the Region – Secretariat (WP/07)

5.1 This paper presented the status of Frequency List 2, the list of facilities in the band 108-117.975MHz and 960-1215MHz, endorsed in the Third Asia/Pacific Regional Air Navigation (ASIA/PAC/3 RAN) Meeting, and the planned migration of the Frequency List 2 to Frequency Finder (FF) global database similar to other Frequency Lists. A revised Frequency List 2, to be used as the interim solution, was presented and endorsed by the Meeting. This is provided in **Appendix A** to this Report.

5.2 The Meeting was informed of a plan to host an in-person workshop for FF in October 2023 for hands-on training on the installation and usage of FF, pending approval from Air Navigation Bureau (ANB).

5.3 States/Administrations in the Meeting expressed strong interest in attending the FF Workshop. India and Indonesia supported organizing the workshop in in-person only for hands-on experience and troubleshooting. Indonesia also suggested including the SSR Module (II/SI) in the FF workshop.

Agenda Item 6: Frequency Interference in the Region

Addressing Frequency Interference in APAC Region – Secretariat (WP/08)

6.1 This paper presented ICAO's framework in dealing with aeronautical frequency interference and the latest updates/activities in dealing with interference issues observed and reported in the APAC region. The paper listed the provisions under ICAO Doc 9718 Volumes I and II for elements of the framework for rules and preventive measures, and frequency assignment planning criteria in consideration of potential interference. Besides, the established reporting procedure for frequency interference from ASIA/PAC/3 Meeting was reviewed to ensure any immediate operational difficulties can be cleared or at least alleviated and to ensure accurate statistical records are compiled.

6.2 Interference issues have been continuously discussed and shared on regional platforms, with APANPIRG formulated various Conclusions to address interference, which were listed in this paper. In addition, DGCA/57 highlighted that CNS technology elements rely on continued and interference-free access to the frequency spectrum as the common resource for aviation safety, capacity and efficiency. The Conference urged States to coordinate frequency and SSR IC use with the ICAO APAC Office to ensure the frequency and IC lists are correct and up to date. State Letter Ref.: T 8/5.10: AP099/22 (CNS) dated 21 July 2022, Subject *Prevention of harmful interference to Radio Navigation Satellite Service Receivers in the 1559 – 1610 MHz frequency band* was issued to share the information with all stakeholders, sensitize the national radio regulatory authority to the risk encountered by the civil aviation, and encourage States/Administrations to take actions to address this critical issue as appropriate. States were encouraged to reach mutual agreements on resolving interference issues first, and update the registration with ICAO and concerned Aeronautical Information Publications (AIPs) via ICAO APAC Point of Contact on Frequency Affairs maintained by SRWG with information per Attachment 1A to SRWG/1 WP4. States should preview Doc 9718 Volume II Ch. 1 Para 1.3.2.2 on the propagation of radio waves in VHF and UHF frequency bands subjecting to additional conditions. The paper also reviewed the consideration over the requests to ICAO APAC Regional Office on NDB frequency assignment solutions for ocean-going ships.

6.3 States and airspace users were encouraged to report frequency interference, as soon as possible, if the occurrence impacts international operations, and to cooperate with the Regional Office to optimize the use of aeronautical spectrum to eliminate any harmful interference.

Agenda Item 7: 5G and Radio Altimeter issues

Potential Impacts from 5G Implementation on Aircraft Radio Altimeters - Outcomes in Relevant Meetings and Regional Updates – Secretariat (WP/09)

7.1 This paper presented the discussion in APAC after SRWG/6. The paper provided a summary of two Working Papers in RASG-APAC/12, the discussion of IPs from the correspondence group on radio altimeters (CG-RA) under FSMP WG and various studies from States, and the draft guidance material for the implementation of 5G with RA on FSMP WG/14 and WG/15, the two Recommendations on Job Card updates in response to updated jobs and discussions in FSMP/3 about

5G implementation and potential impacts on aircraft radio altimeters, the work on two MOPS on *Guidance Document on Radar Altimeter Radio Frequency (RF) Interference Rejection and Tolerance* and for *Low Range Radar Altimeters*, and relevant regional updates.

7.2 States were reminded of the agreement in CNS SG/25 and States were requested to closely monitor the impact of 5G on radio altimeters in their respective States/Administrations with reference to the safety and frequency spectrum issues. States were advised that Member States' CAA and airworthiness office may collect all relevant information and past issues reported, if any, and inform RASG-APAC in case of any significant concern. The issues related to frequency spectrum may be brought to the attention of the CNS section of the ICAO APAC Office for further coordination with RASG-APAC and ICAO Headquarters.

Outcomes of APT-ICAO Webinar on 5G Implementation and Radio Altimeter – Secretariat (WP/10)

7.3 The APT-ICAO Webinar on 5G Implementation and Radio Altimeter (also known as *APT-ICAO Regional Dialogue: Radio Altimeters at 4200-4400 MHz band and implementation of 5G in adjacent bands*) was held on 23 August 2022 via Video Tele-Conferencing (VTC) on Zoom which was hosted on APT platform. The Webinar was intended to promote the common understanding among the spectrum regulators, the airlines and telecommunication industries on the operation of Radio Altimeters in the band 4.2 – 4.4 GHz and the implementation of 5G in the adjacent bands ensuring aviation safety in the Asia-Pacific region. The Webinar has registered with about 250 participants. There were four topics presented by spectrum regulators (APT), aircraft manufacturers (Airbus), aviation (ICAO) and telecommunication industries (GSMA), covering the different viewpoints and concerns from these entities, potential mitigation measures and future roadmap of complete resolution of the issue of co-existence of 5G implementation and radio altimeters.

7.4 Regarding the concerns raised by GSMA in the presentation, States should take note that it could be difficult for APAC aeronautical spectrum planners/managers to convince the national spectrum regulator for substantial actions to address completely the technical concerns of the aviation community on 5G/RA issue, suggesting the need to seek cross-industry coordination in addressing such concerns and balancing between the provisions and the requirements.

7.5 The webinar was well received by the participants, noting that the event served as a platform to bring together the national spectrum regulators, telecommunications service providers, and the aviation community for direct engagement. Presentations are available on the ICAO Webinar website at <https://www.icao.int/APAC/Meetings/Pages/2022-Webinar-on-5G-Implementation-and-Radio-Altimeter.aspx>.

Agenda Item 8: Review the Regional Guidance Material

Draft of Asia Pacific Regional Aeronautical Radio Frequency Management Guidance Material - China (WP/11)

8.1 This paper presented the draft of Asia Pacific Regional Aeronautical Radio Frequency Management Guidance Material. The guidance material, included in **Appendix B** to this Report, included the objective and scope in Chapter 1, the institutional framework of aviation radio management, frequency coordination and registration and procedure of coordination for aeronautical frequency in APAC in Chapter 2, spectrum management and procedure of APAC region, air-ground communication for HF and VHF in Chapter 3 and radio navigation aid frequency management information in Chapter 4. This edition, which consisted of four chapters and five appendices, was further improved to provide frequency planning criteria in an easy-reading format. The paper also proposed to do further research on GBAS/VDB frequency assignment criteria.

8.2 The Meeting was invited to note that this guidance material was not intended to and should not replace the relevant requirements stipulated in Annex 10 and Doc 9718. In the event of any inconsistency or conflict between this document and Annex 10 and Doc 9718, Annex 10 and Doc 9718 should take precedence.

8.3 With the aforementioned, the Meeting formulated the following Draft Conclusion to be considered by CNS SG/27 meeting.

Draft Conclusion SRWG/7/1 - Asia Pacific Regional Aeronautical Radio Frequency Management Guidance Material Edition 1.0			
What: Asia Pacific Regional Aeronautical Radio Frequency Management Guidance Material provided in Appendix B to this Report be adopted		Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Why: Per discussion from SRWG/7 for the Region to utilize the Guidance Material		Follow-up:	☐ Required from States
When: TBA		Status: Adopted by Subgroup	
Who: ☒ Sub groups ☐ APAC States ☐ ICAO APAC RO ☐ ICAO HQ ☒ Other: SRWG			

8.4 Considering further comments from States, further discussion would be required on this updated draft, ICAO APAC Regional Office would invite the SRWG/7 participants to further improvise and substantiate the draft guidance material, which would be conducted via email, and video teleconference if necessary. Upon further updates and revision to this edition of guidance material, the revised edition would be submitted to CNS SG/27 for consideration. **ACTION ITEM 7-2**

8.5 China and Mr. Robert Witzen appreciated the effort and contribution reciprocally. ICAO Secretariat also thanked the contribution from China and Mr. Robert Witzen for compiling the guidance material which served as a good information source and useful for daily work, which would be able to significantly reduce workload in future. Besides, ICAO Secretariat reminded the Meeting to understand the different levels between planning and regional use of frequency, which the latter could be very difficult when implement. As such, this Draft Conclusion would serve the purpose to move the material forward, while keeping this material as a live document for further necessary enhancements.

Agenda Item 9: State and regional updates

Review of Frequency Coordination in the APAC Region - Secretariat (WP/12)

9.1 This paper presented the status of more than 530 frequency coordinations handled by the ICAO APAC Regional Office for the APAC Region in 2022, and invited States/Administrations to follow established frequency coordination mechanism and planning principles as discussed and endorsed in APANPIRG and its contributory bodies.

9.2 In replying enquiry from Indonesia, ICAO Secretariat mentioned that the reply to State's request for coordination of frequency assignment would be at the earliest possible due to resource constraints, urged States to indicate urgency if their requests were urgent, and suggested using the guidance material as a reference would be an efficient way in addressing assignment issues. India and Hong Kong China appreciated the effort of the ICAO APAC Regional Office for the assignment of a large number of frequencies due to various causes e.g. requirement of new frequencies from new airports and trials to the new GBAS system.

The Utilization of the HF Frequency Spectrum in Indonesia (WP/17)

9.3 In this paper, Indonesia discussed the challenges when utilizing HF frequency spectrum for communication purposes to refer Appendix 27 to the ITU Radio Regulations. Indonesia mentioned that the process for allocating HF frequencies was quite different compared to other aeronautical frequency spectrums. Indonesia provided a summary of relevant guidance and documents in assigning these frequency bands and suggested further discussions on Agenda Item 1.9 in WRC-23 to review Appendix 27 of ITU Radio Regulation to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands, and encouraged sharing of experiences and best practices among APAC Region in HF frequency spectrum assignment process.

9.4 Reviewed the paper, the ICAO Secretariat recalled the discussion in SRWG/1 WP/04 that HF coordination is recommended to be carried out between States. Coordination and registration of HF frequencies is undertaken by the ITU, through the Radio Regulatory Authorities in each country. ICAO does not coordinate assignments for HF frequencies. Pre-coordination of HF frequencies could be arranged through the ICAO ASIA/PAC Office in Bangkok. However, the national radio regulator is required to develop a proposal for the required assignments. Such proposals should be based on the provisions of Appendix 27 to the ITU Radio Regulations, together with the information contained in the ITU International Frequency List (ILS) taking into consideration the protection requirements for HF as contained in Appendix 27. It may be noted that within the ITU, Radio Regulatory Authorities do not allow any role for ICAO to play in HF frequency assignments. In general, ICAO's role in HF assignment coordination is limited because of the current ITU procedures.

9.5 In addition, ICAO Secretariat pointed out that High Frequency Management Guidance Material for the South Pacific Region, endorsed by APANPIRG/21 in 2010, would serve as a reference to address issues raised in this paper. ICAO Secretariat also pointed out that Frequency List 4 was discussed in 1999 and then revisited in 2007.

9.6 Resulting from the discussion at the Meeting, Indonesia was invited to act as Rapporteur to share their experience in this Region on handling HF resource utilization and provide recommendations, produce a survey on the usage of HF in the Region, review ANP Vol II relevant tables, review outcomes from former ICAO meetings, and suggestions to Agenda Item 1.9 in WRC-23 if deemed necessary. **ACTION ITEM 7-3.** Australia, China and India supported the formation of the ad hoc group and expressed their interest in participating in the ad hoc group.

Implementation of the Frequency Finder to Support Better Coordination - Indonesia (IP/02)

9.7 Implementation of Frequency Finder tools is critical in ensuring that all CNS facilities that use frequency spectrum are properly operated. This paper pointed out some issues that Indonesia requested to be addressed to support better and more effective coordination. Further to the issues discussed in SRWG/6 WP/15 raised by Indonesia on frequency coordination in border areas, Indonesia raised the following items for consideration:

- a. Urgent frequency assignment process for operations requiring immediate response;
- b. Standard Operating Procedure (SOP) in Frequency coordination mechanism through the Frequency Finder, including the number of allocations to be submitted, and time required for acceptance into Global Database.
- c. It's important for some States, Indonesia in specific, to estimate overall processing time due to a large number of planned frequency allocations for new airports.
- d. Explanation of the current algorithm in order to determine the compatible distance in the Frequency Finder simulation, due to some far-enough cases rejected in previous allocations.

9.8 ICAO Secretariat commented that items a. and b. were good proposals for consideration. For item c, States were invited to note that while the ICAO APAC Regional Office would handle requests on a first-come-first-serve basis to ensure fairness, it would also try its best to support requests from States, especially States with tremendous needs for new frequency assignments like Indonesia. The Meeting was also informed that this paper would be forwarded to ICAO Headquarters for their consideration. On item d, India shared the same comment with Indonesia and ICAO Secretariat would provide continuous coordination and obtain necessary explanations to States.

Update on Space-based VHF – Singapore (IP/03)

9.9 This paper updated the meeting on the progress of Space-based VHF discussions at International Telecommunications Union (ITU) Working Party 5B (WP 5B) and ICAO Frequency Spectrum Management Panel (FSMP) working group meetings. With the support of ICAO and the different Regional Groups of the ITU, the space-based VHF frequency allocation was formally accepted as an agenda item for World Radiocommunication Conference 2023 (WRC-23), with ITU WP 5B being responsible for this agenda item and FSMP being the designated point of the liaison of ICAO.

9.10 ITU-R has studied the architecture, parameters, and baseline link budgets of a reference aeronautical mobile satellite (route) service “AMS(R)S” system for the provision of standardized communications for air traffic management, without modification to aircraft equipment. Compatibility studies have been conducted to ensure the protection of existing systems from possible interference from new AMS(R)S.

9.11 The Preliminary Draft New Report (PDNR) detailing the technical studies and assessments of space-based VHF studies was progressed at the ITU WP 5B meeting held on 14-25 November 2022, and provided in the paper. In addition, the Draft Conference Preparatory Meeting (CPM) report detailing the proposed regulatory changes for WRC-23 was completed at the ITU WP 5B meeting held on 11-22 July 2022 and provided in the paper. In addition, relevant papers on contributions to space-based VHF to be discussed in FSMP WG/16 were summarized in the paper for the interest of this meeting. The meeting was invited to note the information contained within this paper for WRC-23 Agenda Item 1.7 and to support the ICAO Positions for WRC-23.

9.12 On enquiry from Thailand regarding the timeframe of actual use of space-based VHF and compatibility between current and future systems, Singapore referred to IP/05 of FSMP WG/16 for a detailed timeframe and the compatibility issue was under discussion in Future VHF Sub-group under Comms Panel. ICAO Secretariat supplemented that Job Cards had been created to study compatibility concerns at Panel’s level, and invited Singapore to share updates in the next SRWG meeting. In addition, on enquiry from China on which frequency band to use, and Mr Robert Witzgen on whether the use of space-based VHF requires necessary or preferred frequency assignment, Singapore replied that the use of frequency in 117.975-137 MHz band had been approved and to be assigned by ICAO, which studies had been conducted by ITU-R on compatibility with existing services in and near the frequency band for both VHF voice and data. On enquiry of IATA about whether Space VHF service will have any impact or costs to airlines in terms of retrofitting or modifications, Singapore confirmed the ITU compatibility studies were based on no retrofit or modification to aircraft’s onboard equipment, thus no additional cost for airlines in adopting space-based VHF.

Agenda Item 10: Review POC of States on Frequency Affairs

Review of POCs – Secretariat (WP/13)

10.1 This paper reviewed the current status of POCs of States on frequency-related affairs for review and update. ICAO APAC Office issued a State Letter Ref.: T 8/8.9 - AP057/21(CNS) with Subject: *Focal Point for Frequency Coordination* on 08 April 2021, to remind Administrations to revise and update the POC on frequency affairs. In addition, WP/20 to CNS SG/26 highlighted the need to

contact Air Navigation Service Providers (ANSPs) from time to time for CNS-related issues, both for urgencies such as network issues, cyber security and follow-up on cyber-attacks etc. and for administrative purposes and regional coordinated planning such as AMHS ad-hoc routing, frequency allocations etc. To ensure this correspondence mechanism works efficiently on frequency coordination, the POC list has to be maintained regularly. As such, the POC list for Frequency Affairs was reviewed and updated. This updated POC list is provided in **Appendix C** to this report.

Agenda Item 11: Review the Action Items

Review of Action Items – Secretariat (WP/14)

11.1 This paper invited the meeting to review the action items. The updated Action Items List is provided in **Appendix D** to this report.

Agenda Item 12: Next Meeting and Any Other Business

Date for Next Meeting

12.1 The Secretariat informed the meeting that the date for the next meeting would be tentatively scheduled in March 2024, and States that are interested to host the next meeting may contact the ICAO Secretariat. In addition, the Secretariat reviewed the Agenda Items to be discussed in the next meeting, and invited States for comments, if any, three months in advance of the meeting, i.e. by end-2023.

Note of appreciation

12.2 The Meeting thanked Mr. Robert Witzel for his continuous support to SRWG and spectrum-related activities particularly in supporting this meeting remotely. The Meeting also thanked the Chairperson, Mr. Chainan Chaisompong, for his chairmanship to take the challenge from previously hibernated meetings and to lead the SRWG team to demonstrate its value throughout the difficult times of the Covid-19 pandemic to accomplish a lot of tasks under this working group, including the simulation of VHF communication, the revision of Terms of Reference of this working group to broaden the scope of work, the study of implementation of 50kHz channel spacing for ILS and VOR facilities, the discussion of issues for 5G implementation to radio altimeters, and the review and formulation of the APAC Region Aeronautical Radio Frequency Management Guidance Material.



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Frequency	DME ch	Country	Ctry	Location	Latitude	Longitude	Facility	Cat.	VHFDOC	VHFpwr	TRD	DMEDOC	DMEPwr	Remarks
108.100	n/a	China	CHN	CHONGQING	29D43`00" N	106D39`E	ILS	I	25/62.5	17		n/a	n/a	
108.100	018X	China	CHN	SHANGHAIPUDONG	31D08`00" N	121D48`E	ILS/DME	I	25/62.5	17		80/100	27	
108.100	018X	India	IND	Thanjavur	10D43`04" N	079D05`E	ILS/DME	NAT	25/62.5	17		80/100	27	
108.100	018X	Japan	J	IWAMI	34D40`00" N	131D48`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 18 AT GP
108.100	018X	Japan	J	KANSAI INTL	34D26`00" N	135D16`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME 18 AT GP
108.100	018X	Japan	J	TOKYO INTL.	35D33`00" N	139D46`E	ILS/DME	I	25/62.5	17		25/62.5	27	
108.100	018X	Malaysia	MLA	KOTA KINABALU	05D55`16" N	116D02`E	ILS/DME	N	25/62.5	17		80/100	27	7Aug07 GP02
108.100	018X	Malaysia	MLA	KUALA TERENGGANU	05D23`23" N	103D06`E	ILS/DME	N	25/62.5	17		80/100	27	21June07
108.100	018X	Nepal	NPL	KATHMANDU	27D41`49" N	085D21`E	ILS/DME	N	25/62.5	17		80/100	27	FI 10Jun18
108.100	n/a	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D32`40" N	072D50`E	ILS	N	25/62.5	17		n/a	n/a	6Apr.13 28L
108.100	018X	Pakistan	PAK	New Gwadar Int. Airport	25D17`22" N	062D28`E	ILS/DME	NAT	25/62.5	17		25/100	27	
108.100	018X	Republic of Korea	KOR	INCHEON INTL	37D28`29" N	126D24`E	ILS/DME	I	25/62.5	17		80/100	27	
108.100	018X	Republic of Korea	KOR	SACHEON	35D04`52" N	128D03`E	ILS/DME	N	25/62.5	17		25/100	27	DME 18 AT LOC
108.100	018X	Republic of Korea	KOR	ULJIN	36D46`00" N	129D27`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.100	018X	Singapore	SNG	TENGHAH	01D24`00" N	103D42`E	ILS/DME	N	25/62.5	17		80/100	27	
108.150	018Y	China	CHN	DONGMULANTOU	20D09`00" N	110D40`E	ILS/DME	N	25/62.5	17		25/100	27	FI ; DVOR
108.200	019X	China	CHN	DAQING	46D46`00" N	125D08`E	VOR/DME	I	200/450	29		200/450	40	DVOR
108.200	019X	China	CHN	DATONG	40D03`00" N	113D29`E	VOR/DME	I	200/450	29		200/450	40	DVOR
108.200	019X	China	CHN	JINGGANGSHAN	26D51`00" N	114D43`E	VOR/DME	I	200/450	29		200/450	40	DVOR
108.200	019X	Republic of Korea	KOR	PYONGTAEK	36D58`00" N	127D01`E	VOR/DME	N	200/450	29		200/450	40	T-VOR/DME
108.300	n/a	Cambodia	KMR	SIEM REAP	13D25`00" N	103D50`E	ILS	N	25/62.5	17		n/a	n/a	9May08
108.300	020X	China	CHN	CHANGZHI	36D16`00" N	113D08`E	ILS/DME	I	25/62.5	17		80/100	27	
108.300	n/a	China	CHN	HUANGSHAN	29D44`00" N	118D16`E	ILS	I	25/62.5	17		n/a	n/a	
108.300	n/a	China	CHN	JIAMUSI	46D51`00" N	130D29`E	ILS	I	25/62.5	17		n/a	n/a	
108.300	020X	China	CHN	JIUZHAI	32D50`00" N	103D41`E	ILS/DME	I	25/62.5	17		80/100	27	
108.300	n/a	China	CHN	MEIXIAN	24D16`00" N	116D06`E	ILS	N	25/62.5	17		n/a	n/a	
108.300	020X	China	CHN	SHANGHAIPUDONG	31D06`00" N	121D30`E	ILS/DME	I	25/62.5	17		80/100	27	
108.300	n/a	China	CHN	TONGLIAO	43D34`00" N	112D12`E	ILS	I	25/62.5	17		n/a	n/a	
108.300	020X	China	CHN	ZHUHAISANZAO	22D00`00" N	113D23`E	ILS/DME	I	25/62.5	17		80/100	27	
108.300	020X	India	IND	BANGALORE	13D12`24" N	077D43`E	ILS/DME	I	25/62.5	17		80/100	27	2May07
108.300	020X	India	IND	Doom Dooma	27D33`45" N	095D34`E	ILS/DME	NAT	25/62.5	17		80/100	27	
108.300	020X	India	IND	GOA	15D23`02" N	073D50`E	ILS/DME	NAT	25/62.5	17		80/100	27	
108.300	020X	India	IND	GONDIA	21D32`05" N	080D17`E	ILS/DME	N	25/62.5	17		80/100	27	21Mar08
108.300	020X	India	IND	Kalaburagi airport	17D18`26" N	076D56`E	ILS/DME	NAT	25/62.5	17		25/100	27	
108.300	020X	India	IND	Panagarh	23D28`42" N	087D26`E	ILS/DME	NAT	25/62.5	17		80/100	27	
108.300	020X	India	IND	PENGPUI	23D50`57" N	092D37`E	ILS/DME	N	25/62.5	17		80/100	27	8Sep08
108.300	020X	India	IND	SRINAGAR	34D00`07" N	074D45`E	ILS/DME	NAT	25/62.5	17		80/100	27	
108.300	020X	Lao People's Democratic	LAO	Nongkhang	34D00`07" N	074D45`E	ILS/DME	N	25/62.5	17		80/100	27	
108.300	n/a	Malaysia	MLA	BUTTERWORTH	05D27`59" N	100D23`E	ILS	I	25/62.5	17		n/a	n/a	NOT COMMISSION
108.300	020X	Pakistan	PAK	BACHA KHAN	31D00`31" N	071D30`E	ILS/DME	N	25/62.5	17		80/100	27	14Jan13
108.300	020X	Republic of Korea	KOR	CHEJU JUNGSEOK	33D24`23" N	126D42`E	ILS/DME	N	25/62.5	17		25/62.5	27	TRAINING
108.300	020X	Republic of Korea	KOR	JEJU JUNGSEOK	33D24`23" N	126D42`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.300	020X	Republic of Korea	KOR	SEOUL GIMPO INTL	37D34`13" N	126D46`E	ILS/DME	I	25/62.5	17		25/100	27	DME 20 AT LOC



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108.300	020X	Singapore	SNG	CHANGI	01D22`00" N	104D00`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-20 AT GP
108.300	020X	Viet Nam	VTN	VINH	18D44`33" N	105D40`E	ILS/DME	N	25/62.5	17		80/100	27	8Oct10
108.400	021X	Bhutan	BTN	PARO	27D18`03" N	089D30`E	VOR/DME	I	200/450	29		200/450	40	Updated 8Mar02
108.400	021X	Japan	J	KAGAWA	34D13`00" N	134D01`E	VOR/DME	N	200/450	29		200/450	40	DVOR
108.500	022X	Australia	AUS	NOWRA	34D57`06" S	150D31`E	ILS/DME	N	25/62.5	17		25/100	27	Runway 21 TRD - 44D
108.500	022X	Brunei Darussalam	BRU	BRUNEI	04D55`00" N	011D45`W	ILS/DME	N	25/62.5	17		80/100	27	28Sep09
108.500	022X	China	CHN	ALI	32D05`00" N	080D03`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	ANSHUN	26D16`00" N	105D53`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	n/a	China	CHN	BAOTOU	40D34`00" N	109D59`E	ILS	N	25/62.5	17		n/a	n/a	
108.500	022X	China	CHN	BAYANNAOER	40D56`00" N	107D43`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	BEIJING	40D06`00" N	116D37`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	BOLE	44D54`00" N	082D17`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	CHANGBAISHAN	42D03`00" N	127D36`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	n/a	China	CHN	CHIFENG	42D09`00" N	118D50`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	022X	China	CHN	DAQING	46D46`00" N	125D08`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	GUILIN	25D12`00" N	110D02`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	HAIKOU	19D56`00" N	110D26`E	ILS/DME	N	25/62.5	17		25/62.5	27	
108.500	n/a	China	CHN	HANDAN	36D31`00" N	114D25`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	n/a	China	CHN	HANGZHOU	30D13`00" N	120D25`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	n/a	China	CHN	HEIHE	50D11`00" N	127D18`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	022X	China	CHN	JINCHANG	38D00`00" N	102D20`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	JINING	35D18`00" N	116D22`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	KANGDING	30D08`00" N	101D45`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	n/a	China	CHN	KELAMAYI	45D29`00" N	084D56`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	n/a	China	CHN	LANZHOU	36D30`00" N	103D37`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	n/a	China	CHN	LIANYUNGANG	34D35`00" N	118D53`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	022X	China	CHN	LIBO	25D28`00" N	107D58`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	LINCANG	23D44`00" N	100D02`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	LIPING	26D19`00" N	109D08`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	MANZHOU	49D34`00" N	117D21`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	PANZHIHUA	26D32`00" N	101D48`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	QIANZHOU	29D32`00" N	108D50`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	TENGCHONG	24D56`00" N	098D29`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	TIANSHUI	34D33`00" N	105D53`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	TONGREN	27D54`00" N	109D19`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	TULUFAN	43D02`00" N	089D07`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	n/a	China	CHN	WENSHAN	23D33`00" N	114D19`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	022X	China	CHN	XISHUANGBANNA	21D58`00" N	100D46`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	022X	China	CHN	YICHUN	47D45`00" N	129D00`E	ILS/DME	I	25/62.5	17		80/100	27	
108.500	n/a	China	CHN	YULIN	38D22`00" N	109D35`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	n/a	China	CHN	YUSHU	32D50`00" N	097D01`E	ILS	I	25/62.5	17		n/a	n/a	
108.500	022X	ICAOTEST APAC	ZZZ	Leeuwarden	52D52`52" N	020D20`E	ILS/DME	NAT	25/62.5	17		25/100	27	
108.500	022X	India	IND	CHENNAI	12D58`56" N	080D09`E	ILS/DME	N	25/62.5	17		80/100	27	1Oct04



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108.500	022X	India	IND	HYDERABAD	17D13`40" N	078D24`E	ILS/DME	I	25/62.5	17		80/100	27	2May07
108.500	022X	India	IND	JHARSUGUDA	21D54`27" N	084D02`E	ILS/DME	N	25/62.5	17		80/100	27	
108.500	022X	India	IND	NEW DELHI IGI	28D34`19" N	077D07`E	ILS/DME	I	25/62.5	17		80/100	27	18Sep09
108.500	022X	India	IND	SILCHAR	24D55`06" N	092D59`E	ILS/DME	N	25/62.5	17		80/100	27	7/02 DME/GP
108.500	022X	Japan	J	AGUNI	34D26`00" N	135D12`E	ILS/DME	I	25/62.5	17		80/100	27	FI 20Dec13
108.500	022X	Japan	J	TOKYO INTL.	35D34`00" N	139D47`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.500	n/a	Malaysia	MLA	ALOR SETAR	07D47`82" N	126D12`E	ILS	N	25/62.5	17		n/a	n/a	
108.500	022X	Malaysia	MLA	NEW KUALA LUMPUR	02D46`37" N	101D42`E	ILS/DME	N	25/62.5	17		25/62.5	27	14 L
108.500	022X	Republic of Korea	KOR	GIMHAE INTL	35D11`47" N	128D56`E	ILS/DME	I	25/62.5	17		25/100	27	DME 22 AT LOC
108.500	022X	Republic of Korea	KOR	GWANG JU	35D06`44" N	126D48`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13 LLZ
108.500	n/a	Republic of Korea	KOR	SUWON	37D14`00" N	127D01`E	ILS	N	25/62.5	17		n/a	n/a	
108.500	022X	Viet Nam	VTN	CHU LAI AIRPORT	15D25`12" N	108D41`E	ILS/DME	I	25/62.5	17		80/100	27	12Apr17
108.550	022Y	Japan	J	NANKISHIRAHAMA	33D39`00" N	135D22`E	ILS/DME	N	25/62.5	17		80/100	27	FI 24Dec13
108.550	022Y	Japan	J	NARITA INTL AP	35D44`00" N	140D24`E	ILS/DME	N	25/62.5	17		80/100	27	FI 24Dec13
108.550	022Y	Japan	J	TAJIMA	35D31`00" N	134D47`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.550	022Y	Japan	J	YONAGUNI	24D28`00" N	122D58`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.550	n/a	Republic of Korea	KOR	INCHEON INTL	37D26`35" N	126D26`E	ILS	N	25/62.5	17		n/a	n/a	FI New RWY16; NC
108.550	022Y	Singapore	SNG	CHANGI	01D19`58" N	104D00`E	ILS/DME	N	25/62.5	17		25/62.5	27	DEM-22 AT GP27Sep04
108.600	023X	China	CHN	JIXI	45D17`00" N	131D11`E	VOR/DME	I	200/450	29		200/450	40	DVOR
108.650	023Y	Japan	J	OYAMA	34D04`00" N	139D34`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
108.700	024X	China	CHN	CHENGDU	30D33`00" N	103D57`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	n/a	China	CHN	DATONG	40D04`00" N	113D28`E	ILS	I	25/62.5	17		n/a	n/a	
108.700	024X	China	CHN	EERDUOSI	39D30`00" N	109D51`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	024X	China	CHN	HANZHONG	33D03`00" N	107D01`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	024X	China	CHN	HUAIAN	33D48`00" N	119D08`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	n/a	China	CHN	HUAIHUA	27D27`00" N	109D43`E	ILS	I	25/62.5	17		n/a	n/a	
108.700	024X	China	CHN	JINGGANGSHAN	26D51`00" N	114D45`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	024X	China	CHN	JIUZHAI	32D52`00" N	103D41`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	024X	China	CHN	NANCHONG	30D47`00" N	106D09`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	n/a	China	CHN	QUANZHOU	24D47`00" N	118D35`E	ILS	I	25/62.5	17		n/a	n/a	
108.700	024X	China	CHN	SHANGHAIPUDONG	31D04`00" N	121D30`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	024X	China	CHN	WANZHOU	30D48`00" N	108D25`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	024X	China	CHN	XINGYI	25D04`00" N	104D58`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	024X	China	CHN	XINING	36D32`00" N	102D01`E	ILS/DME	I	25/62.5	17		80/100	27	
108.700	n/a	China	CHN	YANJI	42D53`00" N	129D28`E	ILS	I	25/62.5	17		n/a	n/a	
108.700	n/a	China	CHN	YIWU	29D21`00" N	120D02`E	ILS	I	25/62.5	17		n/a	n/a	
108.700	n/a	China	CHN	YUNCHENG	35D07`00" N	111D04`E	ILS	I	25/62.5	17		n/a	n/a	
108.700	n/a	China	CHN	ZHONGWEI	37D34`00" N	105D08`E	ILS	I	25/62.5	17		n/a	n/a	
108.700	024X	China - Hong Kong	HKG	Chek Lap Kok	22D17`43" N	113D53`E	ILS/DME	NAT	25/62.5	17		80/100	27	30May19 rwy25L
108.700	024X	India	IND	DELHI	28D32`24" N	077D06`E	ILS/DME	NAT	25/62.5	17		80/100	27	
108.700	024X	India	IND	FURSATGANJ AP	26D14`98" N	081D23`E	ILS/DME	N	25/62.5	17		80/100	27	3Apr02
108.700	024X	India	IND	HUBLI	15D21`31" N	075D04`E	ILS/DME	N	25/62.5	17		80/100	27	21Mar08
108.700	024X	India	IND	NAL(BIKANER)	28D03`34" N	073D11`E	ILS/DME	NAT	25/62.5	17		80/100	27	



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108.700	024X	Japan	J	HIROSHIMA	34D26`00" N	132D56`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME 24 AT GP
108.700	n/a	Japan	J	KADENA	26D21`00" N	127D45`E	ILS	N	25/62.5	17		n/a	n/a	
108.700	024X	Japan	J	KANSAI INTL	34D27`00" N	135D15`E	ILS/DME	I	25/62.5	17		80/100	27	FI 20Dec13
108.700	024X	Japan	J	TSUSHIMA	34D18`00" N	129D19`E	ILS/DME	N	25/62.5	17		25/62.5	27	at LOC
108.700	n/a	Japan	J	YOKOTA	35D46`00" N	139D21`E	ILS	N	25/62.5	17		n/a	n/a	FI 26Dec13
108.700	024X	Lao People's Democratic	LAO	LUANG PRABANG	21D03`00" N	101D28`E	ILS/DME	N	25/62.5	17		25/62.5	27	
108.700	024X	Malaysia	MLA	BINTULU (NEW)	03D07`00" N	113D01`E	ILS/DME	N	25/62.5	17		25/62.5	27	
108.700	024X	Malaysia	MLA	KERTEH	04D32`04" N	103D25`E	ILS/DME	N	25/62.5	17		80/100	27	20Apr01
108.700	024X	Maldives	MLD	MALE	04D10`00" N	073D30`E	ILS/DME	I	25/62.5	17		25/62.5	27	
108.700	024X	Pakistan	PAK	LAHORE AIIAP	31D32`23" N	074D24`E	ILS/DME	N	25/62.5	17		80/100	27	rwyt 36L
108.700	024X	Pakistan	PAK	QUETTA	30D14`24" N	066D57`E	ILS/DME	N	25/62.5	17		80/100	27	2Apr09
108.700	024X	Republic of Korea	KOR	DAEGU INT	35D53`05" N	128D40`E	ILS/DME	I	25/62.5	17		25/62.5	27	13R
108.700	024X	Republic of Korea	KOR	DAEGU INTL	35D54`08" N	128D38`E	ILS/DME	N	25/62.5	17		25/62.5	27	31L
108.700	024X	Republic of Korea	KOR	SEOUL GIMPO INTL	37D32`45" N	126D48`E	ILS/DME	I	25/62.5	17		25/100	27	26Dec13
108.800	025X	New Zealand	NZL	WHENUAPAI	36D47`13" S	174D37`E	VOR/TAC	N	200/450	29		200/450	40	MIL
108.900	026X	Brunei Darussalam	BRU	BRUNEI	04D57`00" N	114D56`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY03
108.900	026X	China	CHN	BEIJING	40D03`00" N	116D37`E	ILS/DME	I	25/62.5	17		80/100	27	
108.900	026X	China	CHN	CHONGQING	29D44`00" N	106D39`E	ILS/DME	I	25/62.5	17		80/100	27	
108.900	026X	China	CHN	DAZHOU	31D08`00" N	107D26`E	ILS/DME	I	25/62.5	17		80/100	27	
108.900	026X	China	CHN	DIQING	27D46`00" N	099D41`E	ILS/DME	I	25/62.5	17		80/100	27	
108.900	n/a	China	CHN	HUHHOT	40D51`00" N	111D51`E	ILS	N	25/62.5	17		n/a	n/a	
108.900	n/a	China	CHN	JINAN	36D53`00" N	117D13`E	ILS	I	25/62.5	17		n/a	n/a	
108.900	n/a	China	CHN	LINZHI	29D19`00" N	094D21`E	ILS	I	25/62.5	17		n/a	n/a	
108.900	n/a	China	CHN	LOYANG	34D45`00" N	112D24`E	ILS	I	25/62.5	17		n/a	n/a	LUOYANG
108.900	026X	China	CHN	NANNING	22D14`00" N	108D11`E	ILS/DME	I	25/62.5	17		80/100	27	
108.900	n/a	China	CHN	NINGBO	29D50`00" N	121D28`E	ILS	I	25/62.5	17		n/a	n/a	
108.900	n/a	China	CHN	WUHAI	39D47`00" N	106D48`E	ILS	I	25/62.5	17		n/a	n/a	
108.900	n/a	China	CHN	WUXI	31D29`00" N	120D25`E	ILS	I	25/62.5	17		n/a	n/a	
108.900	n/a	China	CHN	XUZHOU	34D03`00" N	117D32`E	ILS	I	25/62.5	17		n/a	n/a	
108.900	026X	China	CHN	ZHANGJIAJIE	29D06`00" N	110D26`E	ILS/DME	I	25/62.5	17		80/100	27	
108.900	026X	China	CHN	ZHANJIANG	21D14`00" N	110D21`E	ILS/DME	I	25/62.5	17		80/100	27	
108.900	026X	China - Hong Kong	HKG	INTERNATIONAL	22D17`43" N	113D53`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-26 AT GP 25L
108.900	026X	India	IND	BARAPANI	25D42`35" N	091D58`W	ILS/DME	N	25/62.5	17		80/100	27	11OCT13
108.900	026X	India	IND	DEHRADUM	30D11`32" N	078D10`E	ILS/DME	N	25/62.5	17		80/100	27	21Mar08
108.900	026X	India	IND	HYDERABAD	17D13`51" N	078D27`E	ILS/DME	NAT	25/62.5	17		80/100	27	21JAN19
108.900	026X	India	IND	KANNUR	11D55`12" N	075D32`E	ILS/DME	N	25/62.5	17		80/100	27	FI 25May15
108.900	026X	India	IND	PORBANDER	21D39`55" N	069D38`E	ILS/DME	N	25/62.5	17		80/100	27	21Mar08
108.900	026X	Japan	J	AKITA	39D37`00" N	140D12`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 26 AT GP
108.900	026X	Japan	J	FUKUOKA	33D36`00" N	130D27`E	ILS/DME	N	25/62.5	17		80/100	27	FI 20Dec13
108.900	026X	Japan	J	KUSHIRO	43D02`00" N	144D12`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME26 GP
108.900	026X	Japan	J	MIYAKOJIMA	24D46`00" N	125D17`E	ILS/DME	N	25/62.5	17		80/100	27	FI 24Dec13
108.900	026X	Japan	J	MIYAZAKI	31D53`00" N	131D26`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 26 AT GP
108.900	026X	Japan	J	NAGOYA	35D16`00" N	136D55`E	ILS/DME	N	25/62.5	17		25/62.5	27	



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108.900	026X	Japan	J	TOKUSHIMA	34D08`00" N	134D35`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.900	026X	Japan	J	TOKYO INTL.	35D34`00" N	139D47`E	ILS/DME	I	25/62.5	17		80/100	27	FI 26Dec13
108.900	026X	Lao People's Democratic	LAO	PAKSE	15D07`27" N	105D47`E	ILS/DME	NAT	25/62.5	17		80/100	27	installed in 2014
108.900	n/a	Malaysia	MLA	BUTTERWORTH	05D28`36" N	100D23`E	ILS	N	25/62.5	17		n/a	n/a	NOT COMMISSION
108.900	026X	Republic of Korea	KOR	INCHEON INTL	37D29`10" N	126D26`E	ILS/DME	I	25/62.5	17		25/100	27	33 R DME 26 AT LOC
108.900	026X	Republic of Korea	KOR	MUAN	35D58`35" N	126D22`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.900	026X	Singapore	SNG	CHANGI	01D21`00" N	103D59`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-26 AT GP
108.900	026X	Viet Nam	VTN	BUON ME THUOT	12D40`07" N	108D02`E	ILS/DME	N	25/62.5	17		80/100	27	FI 28Apr15
108.950	026Y	Japan	J	MIHO	35D29`00" N	133D13`E	ILS/DME	N	25/62.5	17		80/100	27	FI 24Dec13 RWY26 GP
108.950	026Y	Japan	J	NOTO	37D17`00" N	136D57`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
108.950	026Y	Japan	J	TANEGASHIMA	30D37`00" N	130D59`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
109.000	027X	Japan	J	MIYAKE JIMA	34D07`00" N	139D30`E	VOR/DME	I	200/450	29		200/450	40	24Dec13; DVOR
109.000	027X	New Zealand	NZL	OHAKA	40D12`35" S	175D23`E	VOR/TAC	N	200/450	29		200/450	40	MIL
109.000	027X	Republic of Korea	KOR	CHEONGJU	36D43`04" N	127D29`E	VOR/DME	I	250/450	29		250/450	40	DVOR
109.000	027X	Republic of Korea	KOR	JEJU INTL	33D30`41" N	126D29`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
109.050	027Y	Japan	J	NANKISHIRAHAMA	33D40`00" N	135D22`E	VOR/DME	N	200/450	29		200/450	40	FI 24Dec13 ; DVOR
109.100	n/a	Cambodia	KMR	SIHANOUK VILLE	13D23`50" N	103D48`E	ILS	N	25/62.5	17		n/a	n/a	9May08
109.100	n/a	China	CHN	CHENGDU	30D34`00" N	103D56`E	ILS	I	25/62.5	17		n/a	n/a	
109.100	n/a	China	CHN	DALIAN	38D58`00" N	121D33`E	ILS	I	25/62.5	17		n/a	n/a	
109.100	n/a	China	CHN	HEFEI	31D46`00" N	117D19`E	ILS	I	25/62.5	17		n/a	n/a	RWY 14
109.100	028X	China	CHN	SHANTOU	23D26`00" N	116D46`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.100	n/a	China	CHN	XINING	36D32`00" N	102D02`E	ILS	I	25/62.5	17		n/a	n/a	
109.100	028X	China	CHN	ZHANJIANG	21D12`00" N	110D22`E	ILS/DME	I	25/62.5	17		80/100	27	
109.100	028X	India	IND	BHUBANESHWAR	20D14`22" N	085D49`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.100	028X	India	IND	COIMBATORE	11D02`11" N	077D03`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.100	028X	India	IND	HUBLI	15D21`34" N	075D04`E	ILS/DME	N	25/62.5	17		80/100	27	FI 29Apr17
109.100	028X	India	IND	LILABARI	27D18`00" N	094D06`E	ILS/DME	N	25/62.5	17		80/100	27	7/02 DME/GP
109.100	028X	India	IND	SURAT	21D06`13" N	072D43`E	ILS/DME	N	25/62.5	17		80/100	27	
109.100	028X	Indonesia	INS	PANGKAL PINANG	02D10`25" S	106D08`E	ILS/DME	N	25/62.5	17		80/100	27	OFF OFF RWY-34
109.100	028X	Indonesia	INS	YOGYAKARTA ADI	07D47`16" S	110D25`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-09
109.100	n/a	Japan	J	SHIMOFUSA	35D47`00" N	140D01`E	ILS	N	25/62.5	17		n/a	n/a	
109.100	028X	Lao People's Democratic	LAO	XIENGKHOUANG	19D20`56" N	103D09`E	ILS/DME	N	25/62.5	17		80/100	27	FI 6Feb18
109.100	028X	Malaysia	MLA	NEW KUALA LUMPUR	02D45`05" N	101D43`E	ILS/DME	N	25/62.5	17		25/62.5	27	32 R
109.100	n/a	Philippines	PHL	DAVAO	07D08`07" N	125D39`E	ILS	N	25/62.5	17		n/a	n/a	RWY05
109.100	n/a	Philippines	PHL	MACTAN	10D17`43" N	123D58`E	ILS	I	25/62.5	17		n/a	n/a	RWY22
109.100	n/a	Philippines	PHL	MANILA INTL.	14D30`53" N	121D01`E	ILS	I	25/62.5	17		n/a	n/a	RWY06
109.100	n/a	Philippines	PHL	ZAMBOANGA	06D55`18" N	122D04`E	ILS	N	25/62.5	17		n/a	n/a	RWY09
109.100	028X	Republic of Korea	KOR	INCHEON INTL	37D27`07" N	126D27`E	ILS/DME	I	25/62.5	17		15/100	27	
109.100	028X	Republic of Korea	KOR	SACHEON	35D05`50" N	128D05`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 28 AT LOC
109.100	028X	Thailand	THA	PETCHABUN	16D40`34" N	101D11`E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
109.100	028X	Thailand	THA	SUARNABHUMI	13D40`17" N	100D44`E	ILS/DME	I	25/62.5	17		80/100	27	FI 19MAR12
109.100	028X	Viet Nam	VTN	PLEIKU	14D00`15" N	108D00`E	ILS/DME	N	25/62.5	17		80/100	27	FI 2Jun15
109.150	028Y	Japan	J	KITAKYUSHU	33D50`00" N	131D02`E	ILS/DME	N	25/62.5	17		80/100	27	FI 20Dec13



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109.150	028Y	Japan	J	KOBE	34D38`00" N	135D14`E	ILS/DME	N	25/62.5	17		80/100	27	FI DME 28 GP
109.200	029X	China	CHN	DONGSHAN	27D45`00" N	120D38`E	VOR/DME	I	200/450	29		200/450	40	DVOR
109.200	029X	China	CHN	WANZHOU	30D48`00" N	108D26`E	VOR/DME	I	200/450	29		200/450	40	DVOR
109.200	029X	China	CHN	WENZHOU	27D45`00" N	120D38`E	VOR/DME	I	200/450	29		200/450	40	DVOR
109.250	029Y	Japan	J	OKI	36D11`00" N	133D19`E	VOR/DME	N	200/450	29		200/450	40	26Dec13; DVOR
109.300	030X	Australia	AUS	BRISBANE	27D23`08" S	153D06`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 19R TRD-27D
109.300	030X	Australia	AUS	MELBOURNE	37D39`36" S	144D48`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 27 TRD - 94D
109.300	030X	Australia	AUS	SYDNEY	33D56`51" S	151D11`E	ILS/DME	I	25/62.5	17		25/62.5	27	Runway 34R TRD - 168D
109.300	030X	Australia	AUS	TOWNSVILLE	19D14`07" S	146D46`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 01 TRD - 204D
109.300	n/a	China	CHN	BEIJING	40D04`00" N	116D36`E	ILS	I	25/62.5	17		n/a	n/a	
109.300	030X	China	CHN	CHANGCHUN	44D00`00" N	125D42`E	ILS/DME	I	25/62.5	17		80/100	27	
109.300	n/a	China	CHN	DUNHUANG	40D10`00" N	094D50`E	ILS	I	25/62.5	17		n/a	n/a	
109.300	n/a	China	CHN	GANZHOU	25D52`00" N	114D48`E	ILS	I	25/62.5	17		n/a	n/a	
109.300	030X	China	CHN	GUANGZHOU	23D25`00" N	113D18`E	ILS/DME	I	25/62.5	17		80/100	27	
109.300	n/a	China	CHN	JIUQUAN	39D52`00" N	098D19`E	ILS	I	25/62.5	17		n/a	n/a	
109.300	030X	China	CHN	LANZHOU	36D32`00" N	103D37`E	ILS/DME	I	25/62.5	17		80/100	27	
109.300	030X	China	CHN	NANYANG	33D00`00" N	112D38`E	ILS/DME	I	25/62.5	17		80/100	27	
109.300	030X	China	CHN	QINHUANGDAO	39D59`00" N	119D45`E	ILS/DME	I	25/62.5	17		80/100	27	
109.300	n/a	China	CHN	TAIYUAN	37D44`00" N	112D37`E	ILS	I	25/62.5	17		n/a	n/a	
109.300	n/a	China	CHN	XICHANG	28D00`00" N	102D11`E	ILS	I	25/62.5	17		n/a	n/a	
109.300	030X	China	CHN	XILINHAOTE	43D54`00" N	115D57`E	ILS/DME	I	25/62.5	17		80/100	27	
109.300	030X	China	CHN	ZHENGZHOU	34D32`00" N	113D49`E	ILS/DME	I	25/62.5	17		80/100	27	
109.300	030X	China - Hong Kong	HKG	INTERNATIONAL	22D18`29" N	113D56`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-30 AT GP 07R
109.300	030X	India	IND	BANGALORE	13D12`27" N	077D40`E	ILS/DME	I	25/62.5	17		80/100	27	2May07
109.300	030X	India	IND	DIMAPUR	25D52`38" N	093D47`E	ILS/DME	N	25/62.5	17		25/62.5	27	PLANNED
109.300	030X	India	IND	Phalodi	27D05`41" N	072D11`E	ILS/DME	NAT	25/62.5	17		80/100	27	
109.300	030X	Indonesia	INS	MEDAN BARU	03D39`06" N	098D53`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-05
109.300	030X	Indonesia	INS	SORONG DOMINE	00D53`41" S	131D17`E	ILS/DME	N	25/62.5	17		80/100	27	OFF OFF RWY-09
109.300	030X	Japan	J	AMAMI	28D26`00" N	129D43`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 30 AT GP
109.300	030X	Japan	J	HAKODATE	41D46`00" N	140D51`E	ILS/DME	I	25/62.5	17		25/62.5	27	20Dec13
109.300	030X	Japan	J	HANAMAKI	39D25`00" N	141D08`E	ILS/DME	N	25/62.5	17		25/62.5	27	20Dec13
109.300	030X	Japan	J	HYAKURI	36D12`00" N	140D25`E	ILS/DME	N	25/62.5	17		80/100	27	FI 20Dec13
109.300	030X	Japan	J	KUMAMOTO	32D50`00" N	130D51`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.300	030X	Japan	J	MATSUYAMA	33D49`00" N	132D43`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME-30 AT GP
109.300	030X	Japan	J	NIIGATA	37D57`00" N	139D06`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.300	030X	Japan	J	RISHIRI	45D14`00" N	141D11`E	ILS/DME	N	25/62.5	17		80/100	27	26Dec13
109.300	030X	Japan	J	SHIZUOKA	34D48`00" N	138D10`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
109.300	030X	Japan	J	TOYAMA	36D39`00" N	137D11`E	ILS/DME	N	25/62.5	17		25/62.5	27	AT LOC
109.300	030X	Malaysia	MLA	KOTA BHARU	06D09`53" N	102D18`E	ILS/DME	N	25/62.5	17		80/100	27	04Mar05
109.300	030X	Malaysia	MLA	SANDAKAN	05D54`00" N	118D03`E	ILS/DME	I	25/62.5	17		150/300	37	
109.300	030X	Nepal	NPL	Guatam Buddha	27D30`26" N	083D23`E	ILS/DME	ICA	25/62.5	17		80/100	27	2May19; PLI
109.300	030X	Pakistan	PAK	ISLAMABAD BBIAP	33D36`32" N	073D07`E	ILS/DME	N	25/62.5	17		80/100	27	FI 6Jan14
109.300	030X	Pakistan	PAK	SIALKOT	32D33`05" N	074D22`E	ILS/DME	N	25/62.5	17		80/100	27	



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109.300	n/a	Philippines	PHL	CLARK INTL. AIRPORT	15D12`14" N	120D34`E	ILS	N	25/62.5	17		n/a	n/a	RWY02R
109.300	030X	Republic of Korea	KOR	INCHEON INTL	37D29`02" N	126D26`E	ILS/DME	I	25/62.5	17		25/100	27	33L DME 30 AT LOC
109.300	030X	Republic of Korea	KOR	YANGYANG	38D04`19" N	128D39`E	ILS/DME	I	25/62.5	17		25/100	27	
109.300	030X	Republic of Korea	KOR	YECHON	36D37`54" N	128D20`E	ILS/DME	N	25/62.5	17		25/100	27	DME 30 AT LOC
109.300	030X	Singapore	SNG	PAYA LEBAR	01D22`00" N	103D55`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.300	030X	Thailand	THA	BURIRUM	15D14`22" N	103D15`E	ILS/DME	N	25/62.5	17		80/100	27	FI 19MAR12
109.300	030X	Thailand	THA	DON MUEANG INTL	13D53`40" N	100D35`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.300	030X	Thailand	THA	PHRAE	18D08`02" N	100D09`E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
109.300	030X	Viet Nam	VTN	CANTHO	10D04`45" N	105D41`E	ILS/DME	N	25/62.5	17		80/100	27	8Oct10
109.300	n/a	Viet Nam	VTN	DANANG	16D01`00" N	108D11`E	ILS	I	25/62.5	17		n/a	n/a	
109.300	030X	Viet Nam	VTN	Noi Bai International	21D13`34" N	105D47`E	ILS/DME	NAT	25/62.5	17		80/100	27	RWY 29R
109.350	030Y	Japan	J	NAKASHIBETSU	43D35`00" N	144D58`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.350	030Y	Japan	J	OSHIMA	34D48`00" N	139D22`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
109.400	031X	China	CHN	BAYANNAOER	40D55`00" N	107D46`E	VOR/DME	I	200/450	29		200/450	40	DVOR
109.400	031X	China	CHN	SHANGHAIHONGQIAO	31D08`00" N	121D40`E	VOR/DME	I	200/450	29		200/450	40	DVOR
109.500	032X	Australia	AUS	AVALON	38D03`34" S	144D27`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 18 TRD-7.50D
109.500	032X	Australia	AUS	BRISBANE	27D22`13" S	153D08`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 01R TRD-207D
109.500	032X	Australia	AUS	CAIRNS	16D51`53" S	145D44`E	ILS/DME	I	25/62.5	17		25/62.5	27	Runway 33
109.500	032X	Australia	AUS	CANBERRA	35D17`14" S	149D11`E	ILS/DME	ICA	25/62.5	17		25/100	27	Runway 35 TRD 180D
109.500	032X	Australia	AUS	EAST SALE	38D06`29" S	147D08`E	ILS/DME	N	25/62.5	17		25/62.5	27	Runway 22 TRD-54D
109.500	032X	Australia	AUS	LAUNCESTON	41D32`03" S	147D12`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 32 TRD - 147D.
109.500	032X	Australia	AUS	PERTH	31D57`43" S	115D57`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 21 TRD - 13.5D
109.500	n/a	Bangladesh	BGD	DHAKA ZIA INTL	23D49`00" N	090D24`E	ILS	I	25/62.5	17		n/a	n/a	
109.500	n/a	China	CHN	HUHEHAOTE	40D51`00" N	111D48`E	ILS	I	25/62.5	17		n/a	n/a	
109.500	n/a	China	CHN	LOYANG	34D44`00" N	112D22`E	ILS	I	25/62.5	17		n/a	n/a	LUOYANG
109.500	032X	China	CHN	SANYA	18D18`00" N	109D26`E	ILS/DME	N	25/62.5	17		80/100	27	FI
109.500	n/a	China	CHN	YICHANG	30D33`00" N	111D30`E	ILS	I	25/62.5	17		n/a	n/a	
109.500	032X	China - Hong Kong	HKG	Chek Lap Kok	22D19`13" N	113D52`E	ILS/DME	NAT	25/62.5	17		80/100	27	FI 09Sep19; NC
109.500	032X	Democratic People's Republic	KRE	PYONGYANG SUNAN	39D11`16" N	125D40`E	ILS/DME	I	25/62.5	17		25/100	27	
109.500	032X	India	IND	AMRITSAR	31D43`16" N	074D47`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.500	032X	India	IND	BHAVNAGAR	21D44`52" N	072D10`E	ILS/DME	N	25/62.5	17		80/100	27	7/02 DME/GP
109.500	032X	India	IND	CALICUT	11D08`39" N	075D55`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.500	032X	India	IND	DELHI	28D34`02" N	077D05`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY10
109.500	032X	India	IND	DIBRUGARH	28D27`38" N	095D00`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.500	032X	India	IND	MUMBAI	19D05`12" N	072D51`E	ILS/DME	I	25/62.5	17		80/100	27	FI RWY09
109.500	032X	India	IND	VIJAWADA	16D31`39" N	080D47`E	ILS/DME	N	25/62.5	17		80/100	27	21Mar08
109.500	032X	Indonesia	INS	TANJUNG PANDAN	02D43`48" S	107D45`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-18
109.500	032X	Lao People's Democratic	LAO	Nongkhang	20D36`48" N	104D03`E	ILS/DME	ICA	25/62.5	17		80/100	27	09Sep19; PLI;
109.500	032X	Malaysia	MLA	KUANTAN	03D46`36" N	103D12`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.500	n/a	Papua New Guinea	PNG	PORT MORESBY	09D26`00" S	147D13`E	ILS	I	25/62.5	17		n/a	n/a	
109.500	n/a	Philippines	PHL	GENERAL SANTOS	06D02`27" N	123D05`E	ILS	N	25/62.5	17		n/a	n/a	RWY17
109.500	n/a	Philippines	PHL	SUBIC	14D47`41" N	120D16`E	ILS	N	25/62.5	17		n/a	n/a	RWY07
109.500	032X	Republic of Korea	KOR	GIMHAE INTL	35D11`48" N	128D56`E	ILS/DME	I	25/62.5	17		80/100	27	FI



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109.500	032X	Sri Lanka	SLK	MATTALA	06D16'18" N	081D06' E	ILS/DME	ICA	25/62.5	17		80/100	27	DME 32 at GP
109.500	032X	Thailand	THA	CHIANG RAI	19D58'00" N	099D53' E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.500	032X	Thailand	THA	ROI ET	16D07'00" N	103D46' E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
109.500	032X	Thailand	THA	SUKHOTHAI	17D14'58" N	099D49' E	ILS/DME	N	25/62.5	17		80/100	27	FI 19MAR12
109.500	032X	Thailand	THA	SURATTHANI	09D07'15" N	099D07' E	ILS/DME	I	25/62.5	17		25/62.5	27	AIP
109.500	032X	Thailand	THA	SUVARNABHUMI	13D42'13" N	100D44' E	ILS/DME	I	25/62.5	17		80/100	27	FI 19MAR12
109.600	033X	China	CHN	SHANGHAIHONGQIAO	31D07'00" N	121D20' E	VOR/DME	I	200/450	29		200/450	40	DVOR
109.600	033X	Japan	J	SHONAI	38D49'00" N	139D48' E	VOR/DME	N	200/450	29		200/450	40	DVOR
109.600	033X	Republic of Korea	KOR	POHANG	35D59'11" N	129D24' E	VOR/TAC	N	200/450	29		200/450	40	TERMINAL; DVOR
109.650	033Y	French Polynesia	OCA	HUAHINE	16D41'07" S	151D02' W	VOR/DME	N	200/450	29		200/450	40	9Feb11
109.650	033Y	Japan	J	OBIHIRO	42D44'00" N	143D13' E	VOR/DME	N	200/450	29		200/450	40	DVOR
109.700	034X	Australia	AUS	ADELAIDE	34D57'35" S	138D30' E	ILS/DME	I	25/62.5	17		25/100	27	Runway 23 TRD-50D
109.700	034X	Australia	AUS	DARWIN	12D24'31" S	130D51' E	ILS/DME	I	25/62.5	17		25/100	27	Runway 29 TRD-109D
109.700	034X	Australia	AUS	SYDNEY	33D56'39" S	151D09' E	ILS/DME	I	25/62.5	17		25/62.5	27	Runway 25 TRD - 74D
109.700	034X	Brunei Darussalam	BRU	BRUNEI	04D55'00" N	011D45' E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY 21
109.700	n/a	Cambodia	KMR	PHNOM PENH AIRPORT	11D33'11" N	104D50' E	ILS	N	25/62.5	17		n/a	n/a	
109.700	034X	China	CHN	CHENGDU	30D31'00" N	103D56' E	ILS/DME	I	25/62.5	17		80/100	27	
109.700	n/a	China	CHN	CHONGQING	29D44'00" N	106D39' E	ILS	I	25/62.5	17		n/a	n/a	
109.700	n/a	China	CHN	DEHONG	24D24'00" N	098D31' E	ILS	I	25/62.5	17		n/a	n/a	
109.700	n/a	China	CHN	KUNMING	25D00'00" N	102D45' E	ILS	I	25/62.5	17		n/a	n/a	
109.700	034X	China	CHN	LIJIANG	26D39'00" N	110D14' E	ILS/DME	I	25/62.5	17		80/100	27	
109.700	n/a	China	CHN	LINZHI	29D19'00" N	094D21' E	ILS	I	25/62.5	17		n/a	n/a	
109.700	034X	China	CHN	PUER	22D48'00" N	100D58' E	ILS/DME	I	25/62.5	17		80/100	27	
109.700	034X	China	CHN	TIANJIN	39D07'00" N	117D23' E	ILS/DME	I	25/62.5	17		80/100	27	
109.700	n/a	China	CHN	URUMQI	43D54'00" N	087D29' E	ILS	I	25/62.5	17		n/a	n/a	
109.700	034X	China	CHN	XIAMEN	24D32'00" N	118D07' E	ILS/DME	I	25/62.5	17		80/100	27	
109.700	n/a	China	CHN	YIBIN	28D48'00" N	104D33' E	ILS	I	25/62.5	17		n/a	n/a	
109.700	034X	China - Macao	MAC	MACAU	22D09'00" N	113D34' E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.700	034X	India	IND	Charbatia	20D33'38" N	085D53' E	ILS/DME	NAT	25/62.5	17		80/100	27	
109.700	034X	India	IND	Hirasar-Rajkot	22D22'05" N	071D01' E	ILS/DME	NAT	25/62.5	17		25/100	27	
109.700	034X	India	IND	INS Garud, Cochin	09D57'16" N	076D16' E	ILS/DME	NAT	25/62.5	17		25/100	27	
109.700	034X	India	IND	KANPUR CHAKERI	26D24'15" N	080D23' E	ILS/DME	N	25/62.5	17		80/100	27	18Sep09
109.700	034X	India	IND	PUNE	18D34'56" N	073D55' E	ILS/DME	N	25/62.5	17		80/100	27	26Jun08
109.700	034X	Indonesia	INS	CURUG BUDIARTO	06D17'12" S	106D33' E	ILS/DME	N	25/62.5	17		80/100	27	OFF,RWY-30
109.700	034X	Indonesia	INS	MALANG ABDUL	07D55'01" S	112D42' E	ILS/DME	N	25/62.5	17		80/100	27	RWY-35
109.700	034X	Indonesia	INS	TARAKAN JUWATA	03D19'00" N	117D33' E	ILS/DME	N	25/62.5	17		80/100	27	RWY-24
109.700	034X	Japan	J	CHUBU CENTRAIR	34D50'00" N	136D49' E	ILS/DME	N	25/62.5	17		80/100	27	FI 20Dec13
109.700	034X	Japan	J	FUKUE	32D41'00" N	128D50' E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.700	n/a	Japan	J	KADENA	26D22'00" N	127D47' E	ILS	N	25/62.5	17		n/a	n/a	
109.700	n/a	Japan	J	MISAWA	40D42'00" N	141D23' E	ILS	N	25/62.5	17		n/a	n/a	FI 24Dec13
109.700	034X	Japan	J	TAKAMATSU	34D13'00" N	134D00' E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 34 AT GP
109.700	n/a	Japan	J	YOKOTA	35D44'00" N	139D21' E	ILS	N	25/62.5	17		n/a	n/a	
109.700	034X	Pakistan	PAK	FAISALABAD	31D22'00" N	072D59' E	ILS/DME	N	25/62.5	17		25/62.5	27	



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109.700	034X	Pakistan	PAK	KARACHI INTL.	24D54`00" N	067D08`E	ILS/DME	I	25/62.5	17		25/62.5	27	SEC RWY
109.700	034X	Pakistan	PAK	LAHORE AIIAP	31D32`23" N	074D24`E	ILS/DME	N	25/62.5	17		80/100	27	FI RWY36L
109.700	n/a	Philippines	PHL	BAOLOD	10D39`00" N	122D56`E	ILS	I	25/62.5	17		n/a	n/a	RWT03 16MAR11
109.700	034X	Republic of Korea	KOR	YEOSU	34D51`13" N	127D36`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13 -acpt
109.700	034X	Singapore	SNG	CHANGI	01D20`00" N	103D59`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-34 AT GP
109.700	034X	Thailand	THA	BANGKOK INTL	13D55`43" N	100D36`E	ILS/DME	I	25/62.5	17		80/100	27	FI 22Dec15
109.700	034X	Thailand	THA	LAMPANG	18D16`37" N	099D30`E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
109.700	034X	Thailand	THA	NAKHON PHANOM	17D23`17" N	104D38`E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
109.700	034X	Thailand	THA	NAKHON RATCHASIMA	14D56`47" N	102D18`E	ILS/DME	N	25/62.5	17	53	80/100	27	19MAR12
109.700	034X	Thailand	THA	NAKHON SI THAMMARAT	08D32`29" N	099D56`E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
109.700	034X	Viet Nam	VTN	BUON ME THUAT	12D39`60" N	108D07`E	ILS/DME	N	25/62.5	17		80/100	27	2Jun15
109.850	035Y	Japan	J	OKUSHIRI	42D04`00" N	139D27`E	VOR/DME	N	200/450	29		200/450	40	26Dec13; DVOR
109.850	035Y	Japan	J	OSHIMA	34D47`00" N	139D22`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
109.900	036X	Australia	AUS	ALICE SPRINGS	23D48`56" S	133D55`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 12 TRD-300D
109.900	036X	Australia	AUS	CAIRNS	16D53`36" S	145D45`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 15 TRD-335D
109.900	036X	Australia	AUS	ESSENDON	37D43`53" S	144D53`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 26 TRD - 88D.
109.900	036X	Australia	AUS	HOBART	42D40`48" S	147D31`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 12 TRD - 315D.
109.900	036X	Australia	AUS	PERTH	31D56`32" S	115D57`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 24 TRD - 58D
109.900	036X	Australia	AUS	SYDNEY	33D56`13" S	151D11`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 07 TRD - 254D
109.900	036X	Australia	AUS	TAMWORTH	31D04`12" S	150D50`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 30R TRD - 133D
109.900	n/a	China	CHN	BEIJING	40D04`00" N	116D36`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	CHANGDE	28D56`00" N	111D39`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	CHANGSHA	28D13`00" N	113D13`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	GUANGHAN	30D56`00" N	104D19`E	ILS	N	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	HAERBIN	45D37`00" N	126D14`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	HANGZHOU	30D14`00" N	120D27`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	HARBIN	45D37`00" N	126D14`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	KASHI	39D32`00" N	076D01`E	ILS	N	25/62.5	17		n/a	n/a	
109.900	036X	China	CHN	LIANCHENG	25D40`00" N	116D44`E	ILS/DME	I	25/62.5	17		80/100	27	
109.900	n/a	China	CHN	MUDANJIANG	44D31`00" N	129D34`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	SHIJIAZHUANG	38D16`00" N	114D42`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	036X	China	CHN	WUHAN	30D46`00" N	114D12`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.900	n/a	China	CHN	XI'AN	34D27`00" N	108D45`E	ILS	N	25/62.5	17		n/a	n/a	
109.900	n/a	China	CHN	YINCHUAN	38D24`00" N	106D24`E	ILS	I	25/62.5	17		n/a	n/a	
109.900	036X	China	CHN	YINING	43D58`00" N	081D21`E	ILS/DME	I	25/62.5	17		80/100	27	
109.900	036X	China - Hong Kong	HKG	Chek Lap Kok	22D19`13" N	113D52`E	ILS/DME	NAT	25/62.5	17		80/100	27	31May19
109.900	036X	Cook Islands	CKH	RAROTONGA	21D12`21" S	159D48`W	ILS/DME	N	25/62.5	17		25/62.5	27	
109.900	036X	French Polynesia	OCA	TAHITI FAAA	17D33`37" S	149D36`W	ILS/DME	I	25/62.5	17		25/62.5	27	
109.900	036X	Guam (United States)	GUM	SAIPAN	15D07`00" N	145D44`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.900	036X	India	IND	BANGALORE	13D11`22" N	077D43`E	ILS/DME	N	25/62.5	17		80/100	27	FI 9Oct18; NC
109.900	036X	India	IND	BHAVNAGAR	21D45`00" N	072D11`E	ILS/DME	N	25/62.5	17		25/62.5	27	PROPOSED
109.900	036X	India	IND	BHOPAL	23D17`34" N	077D19`E	ILS/DME	N	25/62.5	17		25/62.5	37	
109.900	036X	India	IND	JAIPUR	26D49`33" N	075D49`E	ILS/DME	N	25/62.5	17		25/62.5	27	



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109.900	036X	India	IND	KOLKATA	22D38`41" N	088D26`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY01
109.900	036X	India	IND	LUCKNOW	26D45`43" N	080D53`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.900	036X	India	IND	Rajahmundry	17D05`43" N	081D47`E	ILS/DME	NAT	25/62.5	17		80/100	27	
109.900	036X	India	IND	TRIVANDRUM	08D28`38" N	076D55`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.900	036X	India	IND	UDAIPUR	24D37`11" N	073D54`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.900	036X	India	IND	VARANASI	25D27`09" N	082D50`E	ILS/DME	N	25/62.5	17		25/62.5	27	
109.900	036X	Indonesia	INS	KENDARI HALUOLEO	04D05`00" S	122D25`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-08
109.900	036X	Indonesia	INS	SEMARANG AHMAD	06D58`28" S	110D22`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-13
109.900	036X	Lao People's Democratic	LAO	VIENTIANE	17D58`36" N	102D34`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.900	036X	Malaysia	MLA	JOHOR BAHRU	01D39`18" N	103D40`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-36 AT GP
109.900	036X	Malaysia	MLA	PENANG	05D17`14" N	100D16`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME 36 AT GP
109.900	036X	Malaysia	MLA	SUBANG	03D08`42" N	101D32`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-36 AT GP
109.900	036X	Myanmar	BRM	YANGON MINGALADON	16D54`00" N	096D09`E	ILS/DME	I	25/62.5	17		120/450	37	
109.900	036X	New Caledonia	NCL	NOUMEA TONTOUTA	22D01`00" S	166D12`E	ILS/DME	I	25/62.5	17		25/62.5	27	19-06-2002
109.900	036X	New Zealand	NZL	AUCKLAND	37D01`04" S	174D45`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME/GP, RWY 23 L
109.900	036X	New Zealand	NZL	CHRISTCHURCH	43D28`12" S	172D33`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.900	036X	New Zealand	NZL	DUNEDIN	45D56`07" S	170D11`E	ILS/DME	N	25/62.5	17		25/62.5	27	28Dec09
109.900	036X	New Zealand	NZL	WELLINGTON	41D19`02" S	174D48`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME/GP RWY34
109.900	036X	Pakistan	PAK	LAHORE	31D31`00" N	074D23`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME NAT
109.900	n/a	Philippines	PHL	CAGAYAN DE ORO	08D24`08" N	124D36`E	ILS	N	25/62.5	17		n/a	n/a	16MAR11
109.900	n/a	Philippines	PHL	DAVAO	07D06`54" N	125D38`E	ILS	N	25/62.5	17		n/a	n/a	RWY23
109.900	n/a	Philippines	PHL	MACTAN	10D19`12" N	123D59`E	ILS	I	25/62.5	17		n/a	n/a	RWY04
109.900	n/a	Philippines	PHL	MANILA INTL.	14D29`50" N	120D59`E	ILS	I	25/62.5	17		n/a	n/a	RWY24
109.900	036X	Republic of Korea	KOR	JEJU INTL	33D30`58" N	126D30`E	ILS/DME	I	25/62.5	17		25/100	27	DME 36 AT LOC
109.900	036X	Republic of Korea	KOR	SEOUL GIMPO INTL	37D32`44" N	126D48`E	ILS/DME	I	25/62.5	17		50/100	27	26Dec13
109.900	036X	Samoa	SMO	APIA FALEOLO	13D49`00" S	171D59`W	ILS/DME	N	25/62.5	17		25/62.5	27	
109.900	036X	Sri Lanka	SLK	KATUNAYAKE	07D11`43" N	079D53`E	ILS/DME	ICA	25/62.5	17		80/100	27	DME 36 at GP
109.900	036X	Thailand	THA	CHIANG MAI	18D47`00" N	098D58`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME AT LOC
109.900	036X	Thailand	THA	CHUMPHON	10D42`40" N	099D22`E	ILS/DME	N	25/62.5	17		80/100	27	FI 19MAR12
109.900	036X	Thailand	THA	PHUKET	08D06`48" N	098D18`E	ILS/DME	I	25/62.5	17		25/62.5	27	
109.900	036X	Thailand	THA	SONGKHLA HAT YAI	06D55`49" N	100D22`E	ILS/DME	I	25/62.5	17		300/450	37	
109.900	036X	Viet Nam	VTN	PLEIKU	14D00`11" N	108D00`E	ILS/DME	N	25/62.5	17		80/100	27	28Apr15
109.900	036X	Viet Nam	VTN	VAN DON	21D07`48" N	107D25`E	ILS/DME	N	25/62.5	17		80/100	27	4Apr17
109.950	n/a	Republic of Korea	KOR	INCHEON INTL	37D27`57" N	126D24`E	ILS	N	80/100	17		n/a	n/a	FI New RWY34R; NC
110.000	n/a	Afghanistan	AFG	GHAZNI	33D30`00" N	068D24`E	VOR	I	200/450	29		n/a	n/a	
110.000	037X	Indonesia	INS	MAKASAR SULTAN	05D03`09" S	119D34`E	VOR/DME	N	200/450	27		200/450	37	FI ; DVOR
110.000	037X	Thailand	THA	CHUMPHON	10D42`40" N	099D22`E	VOR/DME	N	300/450	29		300/450	40	DVOR
110.100	038X	Australia	AUS	BRISBANE	27D24`27" S	153D06`E	ILS/DME	I	25/62.5	17		25/62.5	27	Runway 19L TRD-27D
110.100	038X	Australia	AUS	PERTH	31D55`34" S	115D58`E	ILS/DME	I	25/62.5	17		25/62.5	27	Runway 03 TRD - 194D
110.100	038X	Australia	AUS	SYDNEY	33D55`39" S	151D10`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 34L TRD - 168D
110.100	038X	Brunei Darussalam	BRU	BRUNEI	04D55`00" N	011D45`W	ILS/DME	N	25/62.5	17		80/100	27	28Sep09
110.100	n/a	China	CHN	ANQING	30D35`00" N	117D02`E	ILS	I	25/62.5	17		n/a	n/a	
110.100	038X	China	CHN	CHANGCHUN	43D59`00" N	125D40`E	ILS/DME	I	25/62.5	17		80/100	27	



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110.100	038X	China	CHN	CHONGQING	29D42`00" N	106D38`E	ILS/DME	I	25/62.5	17		80/100	27	
110.100	n/a	China	CHN	GUILIN	25D14`00" N	110D02`E	ILS	N	25/62.5	17		n/a	n/a	
110.100	n/a	China	CHN	LINZHI	29D11`00" N	094D11`E	ILS	I	25/62.5	17		n/a	n/a	
110.100	038X	China	CHN	TANGSHAN	39D43`00" N	117D59`E	ILS/DME	I	25/62.5	17		80/100	27	
110.100	038X	China	CHN	WEIHAI	37D12`00" N	122D14`E	ILS/DME	I	25/62.5	17		80/100	27	
110.100	n/a	China	CHN	XIANGFAN	32D09`00" N	112D17`E	ILS	I	25/62.5	17		n/a	n/a	
110.100	n/a	China	CHN	XUZHOU	34D04`00" N	117D35`E	ILS	I	25/62.5	17		n/a	n/a	
110.100	038X	China	CHN	ZHUHAISANZAO	22D00`00" N	113D23`E	ILS/DME	I	25/62.5	17		80/100	27	
110.100	n/a	Guam (United States)	GUM	GUAM ANDERSON	13D35`00" N	144D57`E	ILS	I	25/62.5	17		n/a	n/a	
110.100	038X	India	IND	AURANGABAD	19D51`47" N	075D23`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.100	038X	India	IND	HYDERABAD	17D27`15" N	078D28`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.100	038X	India	IND	INS Rajali	13D04`57" N	079D42`E	ILS/DME	NAT	25/62.5	17		80/100	27	Arrakonam
110.100	038X	India	IND	JAMMU	32D41`06" N	074D50`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.100	038X	India	IND	MANGALORE	12D57`38" N	074D53`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.100	038X	India	IND	MUMBAI	19D05`42" N	072D51`E	ILS/DME	I	25/62.5	17		80/100	27	RWY14
110.100	038X	India	IND	Sarsawa	29D59`39" N	077D24`E	ILS/DME	NAT	25/62.5	17		25/100	27	
110.100	038X	Indonesia	INS	BATAM HANG NADIM	01D08`12" S	104D07`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY-04
110.100	038X	Indonesia	INS	GORONTALO	00D38`22" N	122D51`E	ILS/DME	N	25/62.5	17		80/100	27	WY-09
110.100	038X	Indonesia	INS	MAKASAR SULTAN	05D04`13" S	119D33`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-21
110.100	038X	Indonesia	INS	MEDAN POLONIA	03D34`07" N	098D40`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY-05
110.100	n/a	Indonesia	INS	SURABAYA JUANDA	07D22`57" S	112D48`E	ILS	N	25/62.5	17		n/a	n/a	RWY-10
110.100	038X	Japan	J	FUKUE	32D40`00" S	128D50`E	ILS/DME	N	25/62.5	17		80/100	27	DME Loc 3820Dec13
110.100	038X	Japan	J	HACHIOJIMA	33D07`00" N	139D47`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME38 AT LOC
110.100	038X	Japan	J	KOMATSU	36D24`00" N	136D25`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 38 AT GP
110.100	n/a	Japan	J	MEMANBETSU	43D52`00" N	114D10`E	ILS	N	25/62.5	17		n/a	n/a	
110.100	038X	Japan	J	OSAKA INTL.	34D48`00" N	135D26`E	ILS/DME	I	25/62.5	17		25/62.5	27	38 at GP
110.100	038X	Japan	J	TOKUNOSHIMA	27D50`00" N	128D53`E	ILS/DME	N	25/62.5	17		25/62.5	27	AT LOC
110.100	038X	Japan	J	TOKYO INTL.	35D36`00" N	139D49`E	ILS/DME	I	25/62.5	17		80/100	27	FI 26Dec13
110.100	038X	Japan	J	UBE	33D56`00" N	131D18`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 38 AT GP
110.100	038X	Japan	J	YAMAGATA	38D25`00" N	140D22`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 38 AT GP
110.100	n/a	Malaysia	MLA	KUALA LUMPUR INTL	02D42`23" N	101D41`E	ILS	N	25/62.5	17		n/a	n/a	FI R/W 14R LLZ
110.100	038X	Malaysia	MLA	MIRI	04D20`00" N	114D00`E	ILS/DME	I	25/62.5	17		80/100	27	
110.100	n/a	Pakistan	PAK	KARACHI INTL.	24D54`00" N	067D09`E	ILS	I	25/62.5	17		n/a	n/a	PRIMARY RWY
110.100	038X	Papua New Guinea	PNG	PORT MORESBY	09D27`00" S	147D14`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.100	n/a	Philippines	PHL	CLARK INTL. AIRPORT	15D10`18" N	120D33`E	ILS	N	25/62.5	17		n/a	n/a	RWY20L
110.100	038X	Thailand	THA	KRABI	08D06`27" N	098D58`E	ILS/DME	N	25/62.5	17		80/100	27	FI 19MAR12
110.100	038X	Thailand	THA	NARATHIWAT	06D31`49" N	101D44`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.100	038X	Thailand	THA	PHITSANULOK	16D46`13" N	100D17`E	ILS/DME	N	25/62.5	17		80/100	27	FI 19MAR12
110.100	038X	Thailand	THA	SUARNABHUMI	13D39`24" N	100D45`E	ILS/DME	I	25/62.5	17		80/100	27	FI 19MAR12
110.100	038X	Thailand	THA	UBON RATCHATHANI	15D14`23" N	104D51`E	ILS/DME	I	25/62.5	17		25/62.5	27	AIP
110.100	038X	Thailand	THA	UDON THANI	17D23`41" N	102D46`E	ILS/DME	N	25/62.5	17		25/62.5	27	AIP
110.100	038X	Viet Nam	VTN	HAIPHONG CATBI	20D49`03" N	106D42`E	ILS/DME	N	25/62.5	17		80/100	27	03Dec.14
110.100	038X	Viet Nam	VTN	PHU CAT	13D51`55" N	109D06`E	ILS/DME	N	25/62.5	17		80/100	27	FI 4Apr17



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110.150	038Y	Japan	J	ODATE-NOSHIRO	40D11`00" N	140D23`E	ILS/DME	N	25/62.5	17		80/100	27	FI 38 at GP
110.150	038Y	Japan	J	SAGA	33D09`00" N	130D17`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
110.200	039X	Japan	J	TOTTORI	35D32`00" N	134D10`E	VOR/DME	N	200/450	29		200/450	40	DVOR
110.200	039X	Republic of Korea	KOR	WONJU	37D28`32" N	127D58`E	VOR/DME	I	25/100	17		25/100	27	DVOR
110.200	039X	Thailand	THA	NAKHON RATCHASIMA	14D56`47" N	102D18`E	VOR/DME	N	300/450	29		300/450	40	DVOR
110.300	n/a	American Samoa	SMA	PAGO PAGO	14D19`00" S	170D42`W	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	China	CHN	AKESU	41D16`00" N	080D16`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	n/a	China	CHN	ALETAI	47D45`00" N	088D05`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	BAOSHAN	25D02`00" N	099D10`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	China	CHN	BEIJING	40D04`00" N	116D36`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME AT GP
110.300	n/a	China	CHN	CHANGSHA	28D12`00" N	113D13`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	China	CHN	ENSHI	30D20`00" N	109D29`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	n/a	China	CHN	FUZHOU	25D55`00" N	119D39`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	China	CHN	GUANGYUAN	32D23`00" N	105D41`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	040X	China	CHN	GUANGZHOU	23D22`00" N	113D18`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.300	n/a	China	CHN	GUIYANG	26D34`00" N	106D48`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	HAERBIN	45D38`00" N	126D16`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	HAILAER	49D12`00" N	119D48`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	HETIAN	37D03`00" N	079D51`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	KUERLE	41D38`00" N	086D09`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	KUNMING	25D00`00" N	102D45`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	China	CHN	LASA	29D18`00" N	090D54`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	n/a	China	CHN	NANJING	31D45`00" N	118D53`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	SHANGHAI HONGQIAO	31D13`00" N	121D20`E	ILS	I	25/62.5	17		n/a	n/a	
110.3	n/a	China	CHN	SHENYANG	41D38`00" N	123D28`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	China	CHN	SHIJIAZHUANG	38D18`00" N	114D41`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	n/a	China	CHN	URUMQI	43D54`00" N	087D29`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	WENZHO	27D55`00" N	120D50`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	WUHAN	30D48`00" N	114D13`E	ILS	I	25/62.5	17		n/a	n/a	FI
110.300	040X	China	CHN	WUZHOU	23D27`00" N	111D15`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	n/a	China	CHN	XI'AN	34D27`00" N	108D45`E	ILS	N	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	XIAMEN	24D33`00" N	118D07`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	n/a	China	CHN	ZHANGJIAJIE	29D06`00" N	110D27`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	China	CHN	ZHAOTONG	27D20`00" N	103D46`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	040X	China	CHN	ZHENGZHOU	34D31`00" N	113D52`E	ILS/DME	I	25/62.5	17		80/100	27	
110.300	040X	Cook Islands	CKH	RAROTONGA	21D12`21" S	159D47`W	ILS/DME	I	25/62.5	17		25/62.5	27	
110.300	040X	Democratic People's Republic	KRE	WONSAN KALMA	39D08`58" N	127D30`E	ILS/DME	NAT	25/62.5	17		80/100	27	
110.300	n/a	Guam (United States)	GUM	GUAM AGANA	13D29`00" N	144D48`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	India	IND	AGARTALA	23D52`48" N	091D14`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.300	n/a	India	IND	AGRA	27D09`02" N	077D56`E	ILS	N	25/62.5	17		n/a	n/a	IAF
110.300	040X	India	IND	AHMEDABAD	23D03`50" N	072D37`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.300	040X	India	IND	CHENNAI	12D59`11" N	080D09`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.300	040X	India	IND	COCHIN (INTL)	10D08`58" N	076D22`E	ILS/DME	N	25/62.5	17		25/62.5	27	



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110.300	040X	India	IND	DELHI	28D33`37" N	077D07`E	ILS/DME	I	25/62.5	17		25/100	27	RWY28
110.300	n/a	India	IND	GOA	15D22`39" N	073D48`E	ILS	N	25/62.5	17		n/a	n/a	
110.300	040X	India	IND	GUWAHATI	26D05`48" N	091D34`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.300	n/a	India	IND	GWALIOR	26D17`00" N	078D14`E	ILS	N	25/62.5	17		n/a	n/a	
110.300	040X	India	IND	IMPHAL	24D45`04" N	093D53`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.300	040X	India	IND	KOLKATA	22D40`06" N	088D26`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY19
110.300	040X	India	IND	MUMBAI	19D05`16" N	072D52`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY27
110.300	040X	India	IND	NAGPUR	21D05`12" N	079D03`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.300	040X	India	IND	PATNA	25D35`38" N	085D05`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.300	040X	India	IND	RAIPUR	21D10`32" N	081D44`E	ILS/DME	N	25/62.5	17		80/100	27	16Feb07
110.300	040X	Indonesia	INS	BALI NGURAH RAI	08D44`59" S	115D10`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-27
110.300	040X	Indonesia	INS	JAYAPURA	02D34`00" S	140D31`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY-30
110.300	040X	Indonesia	INS	NATUNA RANAI	03D53`41" N	108D23`E	ILS/DME	N	25/62.5	17		80/100	27	
110.300	040X	Indonesia	INS	TANJUNG REDEB	02D09`37" N	117D26`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-19
110.300	n/a	Japan	J	CHITOSE	42D49`00" N	141D40`E	ILS	N	25/62.5	17		n/a	n/a	
110.300	040X	Japan	J	KANOYA	31D22`00" N	130D50`E	ILS/DME	N	25/62.5	17		80/100	27	20Dec13
110.300	040X	Japan	J	MEMANBETSU	43D53`00" N	144D10`E	ILS/DME	N	25/62.5	17		80/100	27	FI 24Dec13 R40 GP
110.300	040X	Japan	J	NAHA	26D13`00" N	127D39`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-40 AT GP
110.300	n/a	Japan	J	OKAYAMA	34D46`00" N	135D52`E	ILS	I	25/62.5	17		n/a	n/a	
110.300	040X	Malaysia	MLA	KOTA KINABALU	05D56`00" N	116D03`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-40 AT GP
110.300	040X	Malaysia	MLA	KUCHING	01D29`00" N	110D20`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-40 AT GP
110.300	040X	Malaysia	MLA	SUBANG	03D17`48" N	101D27`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-40 AT GP
110.300	040X	Mongolia	MON	ULAAN BAATAR	47D49`47" N	106D47`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.300	040X	New Zealand	NZL	AUCKLAND	37D00`22" S	174D48`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME/GP, RWY 05 R
110.300	040X	New Zealand	NZL	CHRISTCHURCH	43D30`01" S	172D31`E	ILS/DME	I	25/62.5	17		25/62.5	27	28Dec09
110.300	040X	New Zealand	NZL	DUNEDIN	45D55`25" S	170D12`E	ILS/DME	N	25/62.5	17		25/62.5	27	28Nov12
110.300	040X	New Zealand	NZL	WELLINGTON	41D20`10" S	174D48`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME/GP RWY16
110.300	040X	Pakistan	PAK	ISLAMABAD CHAKLALA	33D37`00" N	073D06`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME NAT
110.300	040X	Pakistan	PAK	MULTAN	30D12`00" N	071D25`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.300	n/a	Philippines	PHL	KALIBO	11D40`23" N	122D22`E	ILS	N	25/62.5	17		n/a	n/a	16MAR11
110.300	040X	Republic of Korea	KOR	CHEONGJU	36D43`36" N	127D30`E	ILS/DME	I	25/62.5	17		80/100	27	FI
110.300	n/a	Republic of Korea	KOR	GUNSAN	33D55`08" N	126D36`E	ILS	N	25/62.5	17		n/a	n/a	
110.300	040X	Republic of Korea	KOR	ULSAN	35D36`16" N	129D21`E	ILS/DME	I	25/62.5	17		25/100	27	DME 40 AT LOC
110.300	040X	Sri Lanka	SLK	KATUNAYAKE	07D10`01" N	079D52`E	ILS/DME	ICA	25/62.5	17		80/100	27	DME 40 at GP
110.300	040X	Thailand	THA	DON MUEANG INTL	13D53`51" N	100D36`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.300	040X	Thailand	THA	NAN	18D48`32" N	100D46`E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
110.300	040X	Thailand	THA	SAKHONNAKHON	07D12`50" N	104D08`E	ILS/DME	N	25/62.5	17		80/100	27	19MAR12
110.300	040X	Thailand	THA	TRANG	07D30`32" N	099D37`E	ILS/DME	I	25/62.5	17		80/100	27	19MAR12
110.300	040X	Viet Nam	VTN	CAM RANH	11D58`40" N	109D16`E	ILS/DME	N	25/62.5	17		80/100	27	FI 20Jun17
110.300	040X	Viet Nam	VTN	DONG HOI	17D30`58" N	106D35`E	ILS/DME	N	25/62.5	17		80/100	27	26Jun13
110.350	040Y	Republic of Korea	KOR	INCHEON INTL	37D26`29" N	126D26`E	ILS/DME	I	25/62.5	17		15/100	27	
110.400	041X	China	CHN	XUEJIADAO	35D58`00" N	120D14`E	VOR/DME	I	200/450	29		200/450	40	DVOR
110.450	041Y	Japan	J	TAJIMA	35D31`00" N	134D47`E	VOR/DME	N	200/450	29		200/450	40	DVOR



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110.450	041Y	Japan	J	TOKUNOSHIMA	27D49'00" N	128D53' E	VOR/DME	N	200/450	29		200/450	40	DVOR
110.500	042X	Afghanistan	AFG	KABUL	34D35'00" N	069D10' E	ILS/DME	I	25/62.5	17		25/100	27	
110.500	042X	Afghanistan	AFG	KABUL	34D35'36" N	069D10' E	ILS/DME	I	25/62.5	17		25/100	27	
110.500	042X	Australia	AUS	Oakey	27D24'59" S	151D44' E	ILS/DME	N	25/62.5	17		25/100	27	Details Updated.
110.500	042X	Australia	AUS	Williamtown	32D48'23" S	151D50' E	ILS/DME	N	25/62.5	17		25/100	27	Runway 12 TRD - 310D
110.500	n/a	China	CHN	BAOTOU	40D33'00" N	110D00' E	ILS	N	25/62.5	17		n/a	n/a	
110.500	042X	China	CHN	Changdu	30D32'00" N	097D08' E	ILS/DME	I	25/62.5	17		80/100	27	
110.500	n/a	China	CHN	Dandong	40D01'00" N	124D17' E	ILS	I	25/62.5	17		n/a	n/a	
110.500	n/a	China	CHN	Jinan	36D50'00" N	117D13' E	ILS	I	25/62.5	17		n/a	n/a	
110.500	042X	China	CHN	Nanchang	28D51'00" N	115D54' E	ILS/DME	I	25/62.5	17		80/100	27	
110.500	042X	China	CHN	Nantong	32D03'00" N	120D59' E	ILS/DME	I	25/62.5	17		80/100	27	
110.500	n/a	China	CHN	Shenyang	41D39'00" N	123D30' E	ILS	I	25/62.5	17		n/a	n/a	
110.500	042X	China	CHN	Tianjin	39D09'00" N	117D20' E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.500	n/a	China	CHN	Zhoushan	29D56'00" N	122D22' E	ILS	I	25/62.5	17		n/a	n/a	
110.500	042X	China - Hong Kong	HKG	Chek Lap Kok	22D19'59" N	113D55' E	ILS/DME	NAT	25/62.5	17		80/100	27	FI 31May19 rwy07N; NC
110.500	042X	Fiji	FJI	Nausori	18D02'00" S	178D33' E	ILS/DME	I	25/62.5	17		80/100	27	FI 26Jan18
110.500	042X	India	IND	Bangalore	12D57'02" N	077D40' E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.500	042X	India	IND	Delhi	28D34'09" N	077D06' E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY27
110.500	042X	India	IND	Lilabari	27D18'00" N	094D06' E	ILS/DME	N	25/62.5	17		80/100	27	Planned
110.500	042X	India	IND	Madurai	09D50'07" N	078D05' E	ILS/DME	I	25/62.5	17		80/100	27	5Nov99
110.500	042X	India	IND	Mopa Airport	15D44'45" N	073D50' E	ILS/DME	NAT	25/62.5	17		80/100	27	
110.500	042X	India	IND	Ranchi	23D18'34" N	085D19' E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.500	042X	India	IND	Vadodara	22D20'35" N	073D13' E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.500	042X	Indonesia	INS	Biak Franskaisepo	01D11'45" S	136D07' E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY-11
110.500	042X	Indonesia	INS	Jakarta Soekarno HTA	06D07'13" S	106D38' E	ILS/DME	N	25/62.5	17		80/100	27	RWY-07R
110.500	042X	Indonesia	INS	Makasar Sultan	05D04'13" S	119D33' E	ILS/DME	N	25/62.5	17		80/100	27	RWY-03
110.500	042X	Indonesia	INS	Manado	01D33'45" N	124D55' E	ILS/DME	N	25/62.5	17		80/100	27	RWY-36
110.500	042X	Indonesia	INS	Palembang Sult.	02D53'39" S	104D41' E	ILS/DME	I	25/62.5	17		80/100	27	RWY-29
110.500	042X	Japan	J	Asahikawa	43D42'00" N	142D26' E	ILS/DME	N	25/62.5	17		25/62.5	27	20Dec13
110.500	042X	Japan	J	Fukushima	37D14'00" N	140D26' E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 42 AT GP
110.500	042X	Japan	J	Tokyo Intl.	35D32'00" N	139D49' E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
110.500	042X	Malaysia	MLA	IPOH	04D33'24" N	101D05' E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.500	042X	Malaysia	MLA	New Sibu	02D15'00" N	111D59' E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.500	n/a	Myanmar	BRM	Mandalay New Intl	21D43'00" N	095D59' E	ILS	N	25/62.5	17		n/a	n/a	
110.500	042X	Singapore	SNG	Changi	01D21'21" N	104D00' E	ILS/DME	N	25/62.5	17		80/100	27	DME42 at GP27Sep04
110.500	042X	Thailand	THA	Ranong	09D47'18" N	098D35' E	ILS/DME	N	25/62.5	17		80/100	27	FI 22Dec15
110.500	042X	Thailand	THA	Suvarnabhumi	13D41'30" N	100D45' E	ILS/DME	I	25/62.5	17		80/100	27	FI 19MAR12
110.500	042X	Viet Nam	VTN	Danang	16D02'37" N	108D12' E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.500	042X	Viet Nam	VTN	Hanoi Noi Bai	21D13'00" N	105D47' E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.500	n/a	Viet Nam	VTN	Noibai	21D12'00" N	010D54' E	ILS	N	25/62.5	17		n/a	n/a	
110.500	042X	Viet Nam	VTN	Tan Son Nhut	10D49'00" N	106D39' E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.550	042Y	ICAOTEST APAC	ZZZ	Henglo	52D52'52" N	005D05' E	ILS/DME	ICA	25/62.5	17		25/100	27	
110.600	043X	Republic of Korea	KOR	Yangyang	38D03'48" N	128D39' E	VOR/DME	I	25/100	17		25/100	27	DVOR



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110.600	043X	Thailand	THA	SURATTHANI	09D08`00" N	099D08`E	VOR/DME	I	150/450	27		150/450	37	DVOR
110.650	043Y	Japan	J	SHIZUOKA	34D48`00" N	138D12`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
110.650	043Y	Japan	J	TARAMA	24D39`00" N	124D40`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
110.650	043Y	Japan	J	YUWA	39D37`00" N	140D11`E	VOR/DME	N	200/450	29		200/450	40	DVOR
110.700	n/a	Australia	AUS	AMBERLEY	27D39`00" S	152D43`E	ILS	N	25/62.5	17		n/a	n/a	
110.700	044X	Australia	AUS	EDINBURGH	34D43`12" S	138D36`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 18 TRD-08D
110.700	n/a	Australia	AUS	PEARCE	31D41`12" S	116D01`E	ILS	N	25/62.5	17		n/a	n/a	Coordinates Updated.
110.700	044X	Australia	AUS	TINDAL	14D31`59" S	132D23`E	ILS/DME	N	25/62.5	17		25/100	27	Runway 14 TRD - 319D
110.700	044X	China	CHN	BEIHAI	21D33`00" N	109D18`E	ILS/DME	N	25/62.5	17		80/100	27	18Apr11
110.700	n/a	China	CHN	DALI	25D39`00" N	100D19`E	ILS	I	25/62.5	17		n/a	n/a	
110.700	n/a	China	CHN	DONGYING	37D30`00" N	118D47`E	ILS	I	25/62.5	17		n/a	n/a	
110.700	n/a	China	CHN	FUYANG	32D53`00" N	115D44`E	ILS	I	25/62.5	17		n/a	n/a	
110.700	044X	China	CHN	FUZHOU	25D57`00" N	119D40`E	ILS/DME	I	25/62.5	17		80/100	27	
110.700	n/a	China	CHN	JINGDEZHEN	29D21`00" N	117D11`E	ILS	I	25/62.5	17		n/a	n/a	
110.700	n/a	China	CHN	LINYI	35D04`00" N	118D25`E	ILS	I	25/62.5	17		n/a	n/a	
110.700	044X	China	CHN	QINGDAO	36D15`00" N	120D23`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.700	n/a	China	CHN	QIQIHAER	47D14`00" N	123D56`E	ILS	I	25/62.5	17		n/a	n/a	
110.700	044X	China	CHN	SHANGHAIPUDONG	31D07`00" N	121D48`E	ILS/DME	I	25/62.5	17		80/100	27	
110.700	044X	China	CHN	SHENZHEN	22D38`00" N	113D49`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.700	n/a	China	CHN	WEIHAI	37D11`00" N	122D14`E	ILS	I	25/62.5	17		n/a	n/a	
110.700	044X	China	CHN	XINING	36D31`00" N	102D04`E	ILS/DME	I	25/62.5	17		80/100	27	
110.700	044X	India	IND	CALICUT	11D07`55" N	075D58`E	ILS/DME	N	25/62.5	17		80/100	27	21Mar08
110.700	044X	India	IND	KHAJURAHO	24D49`30" N	079D55`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.700	n/a	Indonesia	INS	BANJARMASIN	03D26`19" S	114D45`E	ILS	I	25/62.5	17		n/a	n/a	RWY-10
110.700	044X	Indonesia	INS	MERAUKE MOPAH	08D32`11" S	140D24`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-16
110.700	044X	Indonesia	INS	TIMIKA MOZES	04D32`11" S	136D53`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-12
110.700	044X	Japan	J	AGUNI	35D47`00" N	140D24`E	ILS/DME	N	25/62.5	17		80/100	27	24Dec13
110.700	044X	Japan	J	KANSAI INTL	34D25`00" N	135D14`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME 44 AT GP
110.700	044X	Malaysia	MLA	NEW KUALA LUMPUR	02D44`26" N	101D41`E	ILS/DME	N	25/62.5	17		25/62.5	27	14 R
110.700	044X	Malaysia	MLA	PULAU LANGKAWI	06D20`50" N	099D44`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME 44 AT GP
110.700	044X	New Zealand	NZL	OHAKEA	40D12`35" S	175D24`E	ILS/DME	N	25/62.5	17		25/62.5	27	MIL RWY09, DME/GP
110.700	044X	New Zealand	NZL	WHENUAPAI	36D47`05" S	174D38`E	ILS/DME	N	25/62.5	17		25/62.5	27	MIL, DME/GP
110.700	n/a	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D32`46" N	072D50`E	ILS	N	25/62.5	17		n/a	n/a	6Nov.13 28R
110.700	044X	Republic of Korea	KOR	MOKPO	34D45`52" N	126D23`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 44 AT LOC
110.700	044X	Republic of Korea	KOR	SEOUL GIMPO INTL	37D34`21" N	126D46`E	ILS/DME	I	25/62.5	17		25/100	27	DME 44 AT LOC
110.700	044X	Vanuatu	NHB	PORT VILA BAUERFIELD	17D41`00" S	168D19`E	ILS/DME	N	25/62.5	17		25/62.5	27	OFFSET LOCALISOR
110.700	044X	Viet Nam	VTN	CAM RANH	11D59`40" N	109D13`E	ILS/DME	I	25/62.5	17		80/100	27	7Dec11
110.750	044Y	Japan	J	NEW CHITOSE	35D47`00" N	141D41`E	ILS/DME	I	25/62.5	17		80/100	27	FI 24Dec13
110.800	045X	Japan	J	UBE	33D56`00" N	131D17`E	VOR/DME	N	200/450	29		200/450	40	DVOR
110.800	045X	Thailand	THA	U-TAPHAO	12D40`00" N	101D00`E	VOR/DME	I	200/450	29		200/450	40	DME NAT; DVOR
110.850	045Y	Japan	J	MEMANBETSU	43D53`00" N	144D10`E	VOR/DME	N	200/450	29		200/450	40	DVOR
110.850	045Y	Japan	J	TOYAMA	36D39`00" N	137D11`E	VOR/DME	N	200/450	29		200/450	40	DVOR
110.900	046X	Australia	AUS	SYDNEY	33D58`24" S	151D11`E	ILS/DME	I	25/62.5	17		25/62.5	27	Runway 16L TRD - 348D



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110.900	046X	China	CHN	GUANGZHOU	23D25`00" N	113D19`E	ILS/DME	I	25/62.5	17		80/100	27	
110.900	n/a	China	CHN	LIUZHOU	24D13`00" N	109D24`E	ILS	I	25/62.5	17		n/a	n/a	
110.900	n/a	China	CHN	NANJING	31D44`00" N	118D51`E	ILS	I	25/62.5	17		n/a	n/a	
110.900	046X	China	CHN	NANNING	22D36`00" N	108D10`E	ILS/DME	I	25/62.5	17		80/100	27	
110.900	n/a	China	CHN	NINGBO	29D50`00" N	121D27`E	ILS	I	25/62.5	17		n/a	n/a	
110.900	046X	China	CHN	SHANGHAIHONGQIAO	31D11`00" N	121D20`E	ILS/DME	I	25/62.5	17		80/100	27	
110.900	n/a	China	CHN	TAIYUAN	37D44`00" N	112D39`E	ILS	I	25/62.5	17		n/a	n/a	
110.900	046X	China	CHN	TIANJIN	39D07`00" N	117D21`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.900	n/a	China	CHN	YANCHENG	33D26`00" N	120D13`E	ILS	I	25/62.5	17		n/a	n/a	
110.900	n/a	China	CHN	YANTAI	37D23`00" N	121D21`E	ILS	I	25/62.5	17		n/a	n/a	
110.900	046X	China - Hong Kong	HKG	INTERNATIONAL	22D18`34" N	113D53`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-46 AT GP 25R
110.900	046X	ICAOTEST APAC	ZZZ	Groningen	53D53`53" N	005D05`E	ILS/DME	NAT	25/62.5	17		25/100	27	
110.900	046X	India	IND	DIMAPUR	25D52`39" N	093D47`E	ILS/DME	N	25/62.5	17		80/100	27	23/7/02
110.900	046X	India	IND	DURGAPUR	23D37`28" N	087D14`E	ILS/DME	N	25/62.5	17		80/100	27	22Nov11
110.900	046X	India	IND	HYDERABAD	17D15`45" N	078D27`E	ILS/DME	I	25/62.5	17		80/100	27	2May07
110.900	046X	India	IND	INDORE	22D43`29" N	075D48`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.900	046X	India	IND	RAJKOT	22D18`48" N	070D46`E	ILS/DME	N	25/62.5	17		25/62.5	27	
110.900	046X	India	IND	TIRUCHIRAPALLI	10D45`56" N	078D43`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.900	046X	Indonesia	INS	BALIKPAPAN SULTAN	01D16`25" S	116D52`E	ILS/DME	I	25/62.5	17		25/62.5	27	RWY-25
110.900	n/a	Indonesia	INS	JAKARTA SOEKARNO HAT	06D07`11" S	106D40`E	ILS	N	25/62.5	17		n/a	n/a	RWY-25R
110.900	046X	Indonesia	INS	MEDAN BARU	03D37`26" N	098D51`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-23
110.900	046X	Japan	J	KOCHI	33D33`00" N	133D39`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME46 AT GP
110.900	046X	Japan	J	NAGASAKI	32D56`00" N	129D54`E	ILS/DME	I	25/62.5	17		25/62.5	27	
110.900	046X	Japan	J	NARITA INTL AP	35D48`00" N	140D23`E	ILS/DME	I	25/62.5	17		80/100	27	FI 24Dec13
110.900	046X	Japan	J	NEW CHITOSE	42D47`00" N	141D41`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 46 AT GP
110.900	046X	Japan	J	SHIMOJISHIMA	24D51`00" N	125D08`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 46 AT GP
110.900	046X	Japan	J	SHONAI	38D49`00" N	139D48`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 46 AT GP
110.900	046X	Lao People's Democratic	LAO	Bokeo International	20D18`43" N	100D09`E	ILS/DME	NAT	25/62.5	17		25/100	27	RWY 21
110.900	n/a	Philippines	PHL	SUBIC	14D47`43" N	120D16`E	ILS	N	25/62.5	17		n/a	n/a	RWY25
110.900	046X	Republic of Korea	KOR	POHANG	35D59`17" N	129D26`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME 46 AT LOC
110.900	046X	Republic of Korea	KOR	SEOUL SINCHONRI	37D26`00" N	127D07`E	ILS/DME	N	25/62.5	17		25/62.5	27	TAC 46 AT LOC
110.900	046X	Singapore	SNG	CHANGI	01D23`00" N	104D00`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-46 AT GP
110.900	046X	Viet Nam	VTN	DA LAT LIEN KHUONG	11D45`14" N	108D21`E	ILS/DME	N	25/62.5	17		80/100	27	9Jan15 pm
110.950	046Y	Japan	J	KUMEJIMA	26D22`00" N	126D43`E	ILS/DME	I	25/62.5	17		80/100	27	FI DME 46 LOC
111.000	047X	China	CHN	CHONGQING	29D27`00" N	106D44`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.000	047X	China	CHN	LIANCHENG	25D39`00" N	116D44`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.000	047X	Japan	J	OKAYAMA	34D45`00" N	133D50`E	VOR/DME	I	200/450	29		200/450	40	26Dec13; DVOR
111.000	047X	Micronesia, Federated States	FSM	PONAPE	06D59`00" N	158D13`E	VOR/DME	I	100/450	23		100/450	27	
111.000	047X	Republic of Korea	KOR	MUAN	34D58`12" N	126D23`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13
111.000	047X	Thailand	THA	KRABI	08D06`27" N	098D58`E	VOR/DME	N	300/450	29		300/450	40	DVOR
111.100	048X	Australia	AUS	GOLD COAST	28D10`42" S	153D30`E	ILS/DME	ICA	25/62.5	17		25/100	27	Runway 14 TRD-331D
111.100	048X	Australia	AUS	WAGGA WAGGA	35D10`04" S	147D27`E	ILS/DME	N	25/62.5	17		25/100	27	Runway 23 TRD - 62D
111.100	n/a	China	CHN	CHENGDU	30D35`00" N	103D57`E	ILS	I	25/62.5	17		n/a	n/a	



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111.100	n/a	China	CHN	DALIAN	38D58`00" N	121D31`E	ILS	I	25/62.5	17		n/a	n/a	
111.100	n/a	China	CHN	GUIYANG	26D25`00" N	106D32`E	ILS	N	25/62.5	17		n/a	n/a	
111.100	048X	China	CHN	JINZHOU	41D05`00" N	121D03`E	ILS/DME	I	25/62.5	17		80/100	27	
111.100	048X	China	CHN	KASHI	39D32`00" N	076D03`E	ILS/DME	I	25/62.5	17		80/100	27	
111.100	048X	China	CHN	MANZHOU	49D34`00" N	117D18`E	ILS/DME	I	25/62.5	17		80/100	27	
111.100	048X	China	CHN	SHANGHAIPUDONG	31D07`00" N	121D48`E	ILS/DME	I	25/62.5	17		80/100	27	
111.100	048X	China - Hong Kong	HKG	INTERNATIONAL	22D19`21" N	113D56`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-48 AT GP 07L
111.100	048X	India	IND	COCHIN (INTL)	10D09`06" N	076D24`E	ILS/DME	N	25/62.5	17		80/100	27	11OCT13
111.100	048X	India	IND	Delhi	28D33`01" N	077D03`E	ILS/DME	NAT	25/62.5	17		25/100	27	Delhi RWY 29R
111.100	048X	India	IND	HOLONGI	26D57`51" N	093D37`E	ILS/DME	I	25/62.5	17		80/100	27	
111.100	048X	India	IND	JABALPUR	23D10`23" N	080D02`E	ILS/DME	N	25/62.5	17		80/100	27	11OCT13
111.100	048X	India	IND	Tambaram	12D54`39" N	080D06`E	ILS/DME	NAT	25/62.5	17		80/100	27	
111.100	048X	India	IND	VISHAKHAPATNAM	17D43`24" N	083D14`E	ILS/DME	N	25/62.5	17		80/100	27	6Oct06
111.100	048X	Indonesia	INS	AMBON PATTIMURA	03D42`25" S	128D05`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-04
111.100	048X	Indonesia	INS	JAKARTA SOEKARNO HTA	06D07`38" S	106D39`E	ILS/DME	I	25/62.5	17		80/100	27	RWY-25L
111.100	048X	Indonesia	INS	PALEMBANG SULT.	02D53`59" S	104D41`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-11
111.100	048X	Indonesia	INS	PEKANBARU SULT.	00D28`20" N	101D26`E	ILS/DME	N	25/62.5	17		25/62.5	27	RWY-36
111.100	n/a	Japan	J	WAKKANAI	45D25`00" N	141D49`E	ILS	N	25/62.5	17		n/a	n/a	
111.100	048X	Malaysia	MLA	GONG KEDAK	04D51`16" N	103D13`E	ILS/DME	N	25/62.5	17		80/100	27	16Dec05
111.100	048X	Malaysia	MLA	KOTA KINABALU	05D56`24" N	116D03`E	ILS/DME	N	25/62.5	17		80/100	27	07Aug07 20GP
111.100	048X	New Zealand	NZL	OHAKA	40D12`08" S	175D22`E	ILS/DME	N	25/62.5	17		25/62.5	27	MIL RWY27, DME/GP
111.100	048X	New Zealand	NZL	WHENUAPAI	36D47`48" S	174D37`E	ILS/DME	N	25/62.5	17		25/62.5	27	MIL, GME/GP
111.100	048X	Republic of Korea	KOR	GWANGJU	35D08`21" N	126D49`E	ILS/DME	I	25/62.5	17		25/62.5	27	
111.100	048X	Singapore	SNG	SELETAR	01D24`22" N	103D51`E	ILS/DME	N	25/62.5	17		80/100	27	DME40X 13Aug.13
111.100	048X	Thailand	THA	U-TAPHAO	12D39`00" N	101D00`E	ILS/DME	I	25/62.5	17		25/62.5	27	
111.100	048X	Viet Nam	VTN	TUY HOA	13D02`41" N	109D20`E	ILS/DME	N	25/62.5	17		80/100	27	FI 4Apr17
111.200	049X	China	CHN	BUERJIN	48D13`00" N	087D01`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.200	049X	China	CHN	ENSHI	30D20`00" N	109D29`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.200	049X	China	CHN	TENGCHONG	24D57`00" N	098D29`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.200	049X	China	CHN	YUNHE	28D08`00" N	119D34`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.200	049X	Republic of Korea	KOR	MOKPO	34D45`35" N	126D22`E	VOR/DME	N	200/450	29		200/450	40	DVOR
111.200	049X	Thailand	THA	ROI ET	16D07`00" N	103D46`E	VOR/DME	N	300/450	29		300/450	40	DVOR
111.250	049Y	Japan	J	KOBE	34D38`00" N	135D14`E	VOR/DME	N	200/450	29		200/450	40	FI 20Dec13; DVOR
111.300	050X	China	CHN	NANTONG	32D06`00" N	120D59`E	ILS/DME	I	25/62.5	17		80/100	27	
111.300	n/a	China	CHN	SHANGHAI HONGQIAO	31D11`00" N	121D20`E	ILS	I	25/62.5	17		n/a	n/a	
111.300	050X	China	CHN	SHENZHEN	22D38`00" N	113D49`E	ILS/DME	I	25/62.5	17		25/62.5	27	
111.300	050X	India	IND	BELGAUM	15D51`23" N	074D36`E	ILS/DME	N	25/62.5	17		80/100	27	21Mar08
111.300	050X	India	IND	KOLKATA	22D38`10" N	088D26`E	ILS/DME	N	25/62.5	17		80/100	27	19Jun07
111.300	050X	India	IND	TIRUPATHI	13D37`46" N	079D31`E	ILS/DME	N	25/62.5	17		80/100	27	19Jun07
111.300	050X	Indonesia	INS	BANDA ACEH SULT	05D31`04" N	095D25`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-17
111.300	n/a	Indonesia	INS	MAKASAR SULTAN	05D03`35" S	119D32`E	ILS	N	25/62.5	17		n/a	n/a	RWY-31, OFF
111.300	n/a	Indonesia	INS	PONTIANAK SUPADIO	00D08`33" S	109D23`E	ILS	N	25/62.5	17		n/a	n/a	
111.300	n/a	Japan	J	ATSUGI	35D28`00" N	139D27`E	ILS	N	25/62.5	17		n/a	n/a	



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111.300	n/a	Japan	J	HACHINOHE	40D33`00" N	141D27`E	ILS	N	25/62.5	17		n/a	n/a	
111.300	n/a	Japan	J	NYUTABARU	32D05`00" N	131D26`E	ILS	N	25/62.5	17		n/a	n/a	
111.300	050X	Malaysia	MLA	TAWAU	04D18`20" N	118D06`E	ILS/DME	N	25/62.5	17		25/62.5	27	
111.300	n/a	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D33`06" N	072D48`E	ILS	N	25/62.5	17		n/a	n/a	6Nov.13 10R
111.300	050X	Republic of Korea	KOR	JEJU INTL	33D29`54" N	126D27`E	ILS/DME	I	25/62.5	17		25/100	27	DME 50 AT LOC
111.300	050X	Singapore	SNG	TENGAH	01D22`00" N	103D42`E	ILS/DME	N	25/62.5	17		25/62.5	27	
111.300	050X	Viet Nam	VTN	THO XUAN	19D53`50" N	105D29`E	ILS/DME	N	25/62.5	17		80/100	27	FI 9Mar14
111.300	050X	Viet Nam	VTN	TUY HOA AP	13D03`28" N	109D20`E	ILS/DME	N	25/62.5	17		80/100	27	9Mar18
111.400	051X	China	CHN	QIANZHOU	29D34`00" N	108D52`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.400	051X	Democratic People's Republic	KRE	PYONGYANG SUNAN	39D13`07" N	125D40`E	VOR/DME	NAT	150/450	27		150/450	37	27Jun08
111.4	051X	India	IND	Barrackpore	24D46`26" N	088D21`E	VOR/DME	NAT	200/450	27		200/450	37	
111.400	051X	Republic of Korea	KOR	ULSAN	35D35`54" N	129D21`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
111.400	051X	Thailand	THA	SUVARNABHUMI	15D38`00" N	100D43`E	VOR/DME	I	200/450	29		200/450	40	23May03; DVOR
111.450	051Y	Japan	J	NAKASHIBETSU	43D35`00" N	144D57`E	VOR/DME	N	200/450	29		200/450	40	DVOR
111.450	051Y	Japan	J	NOTO	37D17`00" N	136D58`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
111.450	051Y	Japan	J	TSUSHIMA	34D17`00" N	129D20`E	VOR/DME	N	200/450	29		200/450	40	DVOR
111.500	052X	Australia	AUS	BRISBANE	27D21`15" S	153D07`E	ILS/DME	I	25/62.5	17		25/100	27	Runway 01L TRD-207D
111.500	n/a	China	CHN	CHANGZHOU	31D55`00" N	119D48`E	ILS	I	25/62.5	17		n/a	n/a	
111.500	052X	China	CHN	GUANGZHOU	23D22`00" N	113D17`E	ILS/DME	I	25/62.5	17		80/100	27	
111.500	052X	China	CHN	HAIKOU	19D56`00" N	110D27`E	ILS/DME	N	25/62.5	17		25/62.5	27	
111.500	052X	China	CHN	TIANJIN	39D09`00" N	117D22`E	ILS/DME	I	25/62.5	17		80/100	27	
111.500	052X	India	IND	Bakhshi Ka Talab	26D59`21" N	080D52`E	ILS/DME	NAT	25/62.5	17		80/100	27	
111.500	052X	India	IND	BANGALORE	13D11`23" N	077D41`E	ILS/DME	N	25/62.5	17		80/100	27	9Oct18
111.500	052X	India	IND	SINDHUDURG	16D00`12" N	073D32`E	ILS/DME	NAT	25/62.5	17		80/100	27	FI 21JAN19
111.500	052X	Indonesia	INS	JAKARTA SOEKARNO HAT	06D07`46" S	106D40`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-07L
111.500	052X	Indonesia	INS	PADANG MINANGKABAU	00D47`03" S	100D16`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-33
111.500	n/a	Indonesia	INS	SOLO ADI SUMARMO	07D31`08" S	110D44`W	ILS	N	25/62.5	17		n/a	n/a	RWY-26
111.500	052X	Japan	J	NEW CHITOSE	42D46`00" N	141D42`E	ILS/DME	N	25/62.5	17		25/62.5	27	
111.500	052X	Japan	J	OITA	33D30`00" N	131D44`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-52 AT GP
111.500	052X	Japan	J	SHIMOJISHIMA	24D49`00" N	125D09`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 52 AT GP
111.500	052X	Japan	J	SHONAI	38D49`00" N	139D47`E	ILS/DME	N	25/62.5	17		80/100	27	26Dec13
111.500	052X	Japan	J	TOTTORI	35D32`00" N	134D11`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 52 AT GP
111.500	n/a	Malaysia	MLA	KUALA LUMPUR INTL	02D44`18" N	101D40`E	ILS	N	25/62.5	17		n/a	n/a	FI RWY 32L LLZ
111.500	052X	Republic of Korea	KOR	GANGNEUNG	37D44`52" N	128D55`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME 52 AT LOC
111.500	052X	Republic of Korea	KOR	YEOSU	34D49`52" N	127D37`E	ILS/DME	I	25/62.5	17		25/100	27	DME AT LOC
111.500	052X	Singapore	SNG	PAYA LEBAR	01D20`00" N	103D54`E	ILS/DME	N	25/62.5	17		25/62.5	27	
111.500	052X	Viet Nam	VTN	DANANG	16D02`37" N	108D12`E	ILS/DME	N	25/62.5	17		80/100	27	5Oct.10
111.550	052Y	Japan	J	MONBETSU	44D19`00" N	143D24`E	ILS/DME	N	25/62.5	17		80/100	27	FI 24Dec13 at GP
111.550	052Y	Japan	J	OKI	36D11`00" N	133D20`E	ILS/DME	N	25/62.5	17		200/450	37	FI 52 at LOC
111.600	053X	China	CHN	GANZHOU	25D48`00" N	114D53`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.600	053X	China	CHN	JINING	35D18`00" N	116D21`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.600	053X	China	CHN	PANLONG	25D48`00" N	114D53`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.600	053X	India	IND	Barrackpore	24D46`26" N	088D21`E	VOR/DME	NAT	200/450	27		200/450	37	



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111.600	053X	Thailand	THA	NAKHON PHANOM	17D23`17" N	104D38`E	VOR/DME	N	300/450	29		300/450	40	DVOR
111.700	n/a	China	CHN	BEIJING	40D04`00" N	116D36`E	ILS	N	25/62.5	17		n/a	n/a	
111.700	054X	China	CHN	NANCHANG	28D53`00" N	115D54`E	ILS/DME	I	25/62.5	17		80/100	27	
111.700	n/a	China	CHN	QINGDAO	36D17`00" N	120D22`E	ILS	N	25/62.5	17		n/a	n/a	
111.700	054X	China	CHN	QUANZHOU	24D49`00" N	118D36`E	ILS/DME	I	25/62.5	17		80/100	27	
111.700	054X	China	CHN	SHANGHAIHONGQIAO	31D13`00" N	121D20`E	ILS/DME	I	25/62.5	17		80/100	27	
111.700	n/a	China	CHN	WUYISHAN	27D42`00" N	118D00`E	ILS	I	25/62.5	17		n/a	n/a	
111.700	n/a	China	CHN	YANTAI	37D25`00" N	121D23`E	ILS	I	25/62.5	17		n/a	n/a	
111.700	054X	China - Macao	MAC	MACAU	22D09`00" N	113D32`E	ILS/DME	N	25/62.5	17		25/62.5	27	
111.700	054X	Indonesia	INS	BENGKULU FATMAWATI	03D51`34" S	102D19`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-13
111.700	054X	Indonesia	INS	JAKARTA HALIM	06D16`22" S	106D52`E	ILS/DME	N	25/62.5	17		25/62.5	27	RWY-24
111.700	054X	Indonesia	INS	PALANGKA RAYA TJILIK	02D12`57" S	113D56`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-34
111.700	054X	Indonesia	INS	TERNATE SULTAN	02D32`29" S	101D05`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-14
111.700	054X	Japan	J	FUKUOKA	33D34`00" N	130D28`E	ILS/DME	I	25/62.5	17		25/62.5	27	20Dec13
111.700	054X	Japan	J	IZUMO	35D24`00" N	132D53`E	ILS/DME	N	25/62.5	17		25/62.5	27	
111.700	054X	Japan	J	KAGOSHIMA	31D49`00" N	130D43`E	ILS/DME	I	25/62.5	17		25/62.5	27	20Dec13
111.700	054X	Japan	J	OBIHIRO	42D45`00" N	143D13`E	ILS/DME	N	25/62.5	17		25/62.5	27	54 at GP
111.700	054X	Japan	J	SENDAI	38D08`00" N	140D54`E	ILS/DME	I	25/62.5	17		25/62.5	27	DME-54 AT GP
111.700	054X	Japan	J	TOKYO INTL.	35D34`00" N	139D46`E	ILS/DME	I	25/62.5	17		80/100	27	FI 26Dec13
111.700	054X	Malaysia	MLA	ALOR SETAR	06D12`56" N	100D24`E	ILS/DME	I	25/62.5	17		80/100	27	
111.700	054X	Malaysia	MLA	BATU BERENDAM	02D15`36" N	102D15`E	ILS/DME	N	25/62.5	17		80/100	27	FI Rwy03GP
111.700	n/a	Nepal	NPL	POKHARA	28D11`23" N	084D00`E	ILS	N	25/62.5	17		n/a	n/a	FI 22Oct19
111.700	054X	Republic of Korea	KOR	CHEONGJU	36D42`30" N	127D29`E	ILS/DME	I	25/62.5	17		25/100	27	24R
111.700	054X	Viet Nam	VTN	TAN SON NHAT	10D48`49" N	106D38`E	ILS/DME	N	25/62.5	17		80/100	27	FI 15Mar13
111.800	055X	Japan	J	KANSAI	34D26`00" N	135D15`E	VOR/DME	I	200/450	29		200/450	40	DVOR
111.800	055X	Thailand	THA	PHRAE	18D08`02" N	100D09`E	VOR/DME	N	300/450	29		300/450	40	DVOR
111.900	n/a	Australia	AUS	PEARCE	31D39`37" S	116D00`E	ILS	N	25/62.5	17		n/a	n/a	Coordinates Updated.
111.900	056X	Australia	AUS	RICHMOND	33D36`02" S	150D46`E	ILS/DME	N	25/62.5	17		25/100	27	Runway 28 TRD - 107D
111.900	n/a	China	CHN	SHANGHAIPUDONG	31D10`00" N	121D47`E	ILS	I	25/62.5	17		n/a	n/a	
111.900	056X	Fiji	FJI	NADI	17D46`12" S	177D25`E	ILS/DME	I	25/62.5	17		80/100	27	FI 26Jan18
111.900	056X	Indonesia	INS	MADIUN ISWAHYUDI	07D37`56" S	111D26`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-17
111.900	056X	Indonesia	INS	PANGKALAN BUN	02D42`17" S	111D40`E	ILS/DME	N	25/62.5	17		80/100	27	RWY-13
111.900	056X	Japan	J	AOMORI	40D43`00" N	140D40`E	ILS/DME	N	25/62.5	17		25/62.5	27	DME56 AT GP
111.900	056X	Japan	J	CHUBU CENTRAIR	34D53`00" N	136D48`E	ILS/DME	N	25/62.5	17		80/100	27	FI 20Dec13
111.900	056X	Japan	J	NARITA INTL AP	35D47`00" N	140D22`E	ILS/DME	N	25/62.5	17		80/100	27	24Dec13
111.900	056X	Malaysia	MLA	NEW KUALA LUMPUR	02D42`54" N	101D42`E	ILS/DME	N	25/62.5	17		25/62.5	27	32 L
111.900	056X	Republic of Korea	KOR	DAEGU INT	35D54`11" N	128D38`E	ILS/DME	I	25/62.5	17		80/100	27	FI 31R DME LLZ
111.900	056X	Republic of Korea	KOR	INCHEON INTL	37D27`15" N	126D28`E	ILS/DME	I	25/62.5	17		15/100	27	15L DME 56 AT LOC
111.900	056X	Republic of Korea	KOR	MUAN	35D00`23" N	126D22`E	ILS/DME	N	25/62.5	17		80/100	27	FI 26Dec13
111.900	056X	Viet Nam	VTN	CAM RANH	12D00`50" N	109D14`E	ILS/DME	N	25/62.5	17		80/100	27	FI 20Jun17
111.900	056X	Viet Nam	VTN	HA NOI NOI BAI	21D12`52" N	105D49`E	ILS/DME	N	25/62.5	17		80/100	27	FI 8Jan15
112.000	057X	Afghanistan	AFG	KABUL	34D31`00" N	069D09`E	VOR/DME	I	300/450	29		300/450	40	
112.000	057X	Australia	AUS	PARKES	33D07`53" S	148D14`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.



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112.000	057X	Brunei Darussalam	BRU	BRUNEI	04D55`00" N	114D54`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.000	057X	China	CHN	GUANLAN	22D43`00" N	114D02`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.000	057X	China	CHN	HUAYUAN	28D35`00" N	109D27`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.000	057X	China	CHN	NANJING	31D45`00" N	118D52`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.000	n/a	Hawaii (United States)	HWA	No frequency registered	18D55`00" N	154D48`W	VDL 4	ICA	200/450	17		n/a	n/a	o registered frequency
112.000	057X	India	IND	AGRA	27D09`03" N	077D56`E	VOR/DME	N	150/450	27		150/450	37	DVOR
112.000	057X	India	IND	SHIRDI	19D41`17" N	074D23`E	VOR/DME	N	200/450	29		200/450	40	FI 21Jun17; DVOR
112.000	057X	India	IND	SULUR	11D00`47" N	077D09`E	VOR/DME	N	200/450	29		200/450	40	FI 7Feb18; DVOR
112.000	n/a	Japan	J	KADENA	26D21`00" N	127D46`E	VOR	N	300/450	29		n/a	n/a	
112.000	057X	Japan	J	KOMATSU	36D24`00" N	136D24`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
112.000	057X	Myanmar	BRM	DAWEI	14D06`00" N	098D12`E	VOR/DME	I	200/450	29		200/450	40	
112.000	n/a	Palau	XXP	No frequency assignment	07D30`33" N	134D37`E	VDL 4	ICA	200/450	17		n/a	n/a	No registered frequency assignment
112.100	n/a	China	CHN	GANZHOU	25D52`00" N	114D48`E	VOR	I	200/450	29		n/a	n/a	
112.100	058X	China	CHN	MOHE	52D55`00" N	122D25`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.100	058X	China	CHN	TIANJIN	39D07`00" N	117D21`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.100	058X	China	CHN	WANGQING	43D18`00" N	129D47`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.100	058X	China	CHN	ZIYANG	30D06`00" N	104D41`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.100	058X	India	IND	BELGAUM	15D51`22" N	074D37`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.100	058X	India	IND	JORHAT	26D42`07" N	094D08`E	VOR/DME	N	150/450	27		150/450	37	DVOR
112.100	058X	India	IND	PATNA	25D35`26" N	085D05`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.100	058X	Indonesia	INS	BANJARMASIN	03D26`39" S	114D42`E	VOR/DME	I	200/450	29		200/450	40	
112.100	058X	Indonesia	INS	PEKANBARU SULT.	02D25`32" N	101D26`E	VOR/DME	I	300/450	27		300/450	37	DVOR
112.100	058X	Japan	J	OITA	33D13`00" N	131D42`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.100	058X	New Zealand	NZL	ROTORUA	38D06`29" S	176D18`E	VOR/DME	N	200/450	29		200/450	40	
112.100	058X	Pakistan	PAK	ISLAMABAD CHAKLALA	33D36`00" N	073D07`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.100	058X	Pakistan	PAK	KARACHI INTL.	24D55`00" N	067D11`E	VOR/DME	I	300/450	29		300/450	40	
112.100	058X	Philippines	PHL	DAVAO	07D07`52" N	125D39`E	VOR/DME	I	300/450	29		300/450	40	
112.100	058X	Philippines	PHL	TUGUEGARAO	17D38`00" N	121D44`E	VOR/DME	N	300/450	29		300/450	40	
112.100	058X	Viet Nam	VTN	BUON-MA-THUOT	12D40`00" N	108D06`E	VOR/DME	N	200/450	29		200/450	40	1Q01; DVOR
112.200	059X	China	CHN	WUHAN	30D47`00" N	114D12`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.200	059X	Fiji	FJI	SUVA NAUSOR1	18D02`00" S	178D33`E	VOR/DME	I	200/450	29		200/450	40	
112.200	059X	India	IND	INS Parundu, Ramnad	09D19`36" N	078D58`E	VOR/DME	NAT	200/450	27		200/450	37	
112.200	059X	India	IND	PANTNAGAR	29D02`11" N	079D27`E	VOR/DME	N	200/450	29		200/450	40	21Mar08; DVOR
112.200	059X	India	IND	SURAT	21D06`35" N	072D44`E	VOR/DME	N	200/450	29		200/450	40	29Aug06
112.200	059X	Indonesia	INS	KERINCI DEPATI PARBO	02D06`57" S	101D23`E	VOR/DME	N	200/450	27		200/450	37	OFF,; DVOR
112.200	059X	Indonesia	INS	KUPANG ELTARI	10D09`59" S	123D41`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.200	059X	Indonesia	INS	MEDAN BARU	03D37`02" N	098D51`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.200	059X	Japan	J	TOKYO INTL.	35D34`00" N	139D46`E	VOR/DME	I	200/450	29		200/450	40	FI 26Dec13; DVOR
112.200	059X	Lao People's Democratic	LAO	LUANG NAMTHA	20D58`29" N	101D24`E	VOR/DME	N	200/450	29		200/450	40	17May2016; DVOR
112.200	059X	Malaysia	MLA	SIBU	02D14`49" N	112D00`E	VOR/DME	N	200/450	29		200/450	40	Jun05; DVOR
112.200	059X	Philippines	PHL	LEGASPI	13D09`01" N	123D43`E	VOR/DME	N	150/450	27		150/450	37	DVOR
112.200	059X	Republic of Korea	KOR	INCHEON ACC	35D48`35" N	128D35`E	VOR/TAC	N	100/450	23		100/450	27	FI 26Dec13; DVOR
112.250	059Y	Japan	J	YORON	27D03`00" N	128D24`E	VOR/DME	N	200/450	29		200/450	40	DVOR



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112.300	070X	Australia	AUS	GOLD COAST	28D10'08" S	153D30' E	VOR/DME	N	200/450	29		200/450	40	Name Change - Coordinates Updated
112.300	n/a	Australia	AUS	TINDAL	14D31'09" S	132D22' E	VOR	I	200/450	29		n/a	n/a	Coordinates Updated.
112.300	070X	Bhutan	BTN	BUMTHANG	27D33'59" N	090D44' E	VOR/DME	N	200/450	29		200/450	40	FI 6July17; DVOR
112.300	070X	China	CHN	DALIAN	38D58'00" N	121D31' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	China	CHN	GEERMU	36D24'00" N	094D45' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	China	CHN	LUXI	24D32'00" N	103D45' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	China	CHN	YICHUN	47D45'00" N	129D01' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	China	CHN	YUNCHENG	35D08'00" N	111D02' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	China	CHN	ZHOUSHAN	29D56'00" N	122D22' E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
112.300	070X	China - Hong Kong	HKG	HONGKONG CHEUNG	22D13'10" N	114D01' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	French Polynesia	OCA	RANGIROA	14D57'04" S	147D40' W	VOR/DME	I	200/450	29		200/450	40	next DME Ch. 70X
112.300	070X	India	IND	INS Rajali	13D04'23" N	079D41' E	VOR/DME	NAT	200/450	27		200/450	37	
112.300	070X	India	IND	SIRSA	29D33'36" N	075D00' E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
112.300	070X	Japan	J	HAKODATE	41D46'00" N	140D50' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	Japan	J	SHINODA	34D30'00" N	135D27' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.300	070X	Malaysia	MLA	KOTA BAHRU	06D09'49" N	102D18' E	VOR/DME	I	300/450	29		300/450	40	
112.300	070X	Myanmar	BRM	YANGON HLEGU	17D05'00" N	096D15' E	VOR/DME	I	200/450	29		200/450	40	
112.300	070X	New Zealand	NZL	WELLINGTON	41D20'14" S	174D49' E	VOR/DME	I	200/450	29		200/450	40	
112.300	070X	Viet Nam	VTN	LIEN KHUONG	11D45'30" N	108D21' E	VOR/DME	N	200/450	29		200/450	40	19Jun2007; DVOR
112.400	n/a	Afghanistan	AFG	BAGRAM	34D56'45" N	069D15' E	VOR	N	200/450	29		n/a	n/a	23Aug2011
112.400	071X	Australia	AUS	CHRISTMAS ISLAND	10D25'49" S	105D41' E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated
112.400	071X	Australia	AUS	LEARMONTH	22D14'05" S	114D05' E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
112.400	071X	Australia	AUS	NORFOLK ISLAND	29D02'50" S	167D55' E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
112.400	071X	China	CHN	KANGDING	30D09'00" N	101D44' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.400	071X	China	CHN	LILING	27D38'00" N	113D32' E	VOR/DME	I	150/450	27		150/450	37	DVOR
112.400	071X	India	IND	PORBANDAR	21D39'05" N	069D39' E	VOR/DME	N	200/450	29		200/450	40	21Mar08; DVOR
112.400	071X	India	IND	RAJAMUNDHRY	17D06'31" N	081D48' E	VOR/DME	N	200/450	29		200/450	40	21Mar08; DVOR
112.400	071X	India	IND	SIKANDRABAD	28D23'36" N	077D42' E	VOR/DME	N	200/450	29		200/450	40	
112.400	071X	Japan	J	MIYAZAKI	31D53'00" N	131D26' E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.400	071X	Malaysia	MLA	MIRI	04D20'00" N	113D59' E	VOR/DME	N	300/450	29		300/450	40	
112.400	071X	Viet Nam	VTN	CHU LAI	15D24'22" N	108D42' E	VOR/DME	N	200/450	29		200/450	40	14Apr05; DVOR
112.500	072X	American Samoa	SMA	PAGO PAGO	14D20'00" S	170D42' W	VOR/DME	I	200/450	29		200/450	40	
112.500	072X	China	CHN	ERLIANHAOTE	43D25'00" N	112D07' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	China	CHN	HARBIN	45D38'00" N	126D16' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	China	CHN	JINGHONG	21D52'00" N	100D56' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	China	CHN	LINZHI	29D26'00" N	094D27' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	China	CHN	SANYA	18D19'00" N	109D10' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	China	CHN	SHANGHAIHONGQIAO	31D13'00" N	121D12' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	China	CHN	SHANGXIAN	33D52'00" N	109D57' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	China	CHN	YANTAI	37D23'00" N	121D21' E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	Fiji	FJI	NADI	17D39'00" S	177D23' E	VOR/DME	I	200/450	29		200/450	40	
112.500	072X	India	IND	CHENNAI	12D59'36" N	080D10' E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.500	072X	India	IND	KOLKATA	22D38'43" N	088D27' E	VOR/DME	I	300/450	29		300/450	40	DVOR



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112.500	072X	India	IND	MOGA	30D47`47" N	075D07`E	VOR/DME	N	200/450	29		200/450	40	23/7/02; DVOR
112.500	072X	Indonesia	INS	BIAK FRANSKAISEPO	01D10`57" S	136D05`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.500	072X	Indonesia	INS	NATUNA RANAI	03D54`39" N	108D23`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.500	072X	Japan	J	KUSHIRO	43D02`00" N	144D12`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.500	072X	Japan	J	TATEYAMA	34D57`00" N	139D54`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.500	072X	Malaysia	MLA	SULTAN ISMAIL	01D39`50" N	103D39`E	VOR/DME	N	200/450	29		200/450	40	7Dec11; DVOR
112.500	072X	New Zealand	NZL	MOUNT MARY	44D08`06" S	170D16`E	VOR/DME	N	200/450	29		200/450	40	
112.500	072X	Philippines	PHL	BUTUAN	08D57`19" N	125D29`E	VOR/DME	N	40/100	17		40/100	27	
112.500	072X	Republic of Korea	KOR	INCHEON ACC	35D58`37" N	129D28`E	VOR/TAC	N	100/450	23		100/450	27	FI 26Dec13; DVOR
112.500	072X	Thailand	THA	RAYONG	12D46`28" N	101D40`E	VOR/DME	N	300/450	29		300/450	40	DVOR
112.600	073X	Australia	AUS	DARWIN	12D25`24" S	130D54`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated
112.600	073X	Australia	AUS	LAUNCESTON	41D32`38" S	147D12`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
112.600	073X	China	CHN	DALI	25D39`00" N	100D19`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.600	073X	China	CHN	GUYUAN	36D05`00" N	106D13`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.600	073X	China	CHN	SHANTOU	23D26`00" N	116D46`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.600	073X	China	CHN	TONGSHAN	34D06`00" N	117D12`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.600	073X	India	IND	BHUJ	23D16`15" N	069D40`E	VOR/DME	N	150/450	27		150/450	37	DVOR
112.600	073X	India	IND	DEHRADUN	30D11`24" N	078D10`E	VOR/DME	N	200/450	29		200/450	40	FI 10Apr03; DVOR
112.600	073X	India	IND	JHARSUGUDA	21D54`53" N	084D03`E	VOR/DME	N	200/450	29		200/450	40	FI 21Jun17; DVOR
112.600	073X	India	IND	KANNUR	11D55`12" N	075D32`E	VOR/DME	N	200/450	29		200/450	40	25May15; DVOR
112.600	073X	Indonesia	INS	LABUAN BAJO KOMODO	08D28`54" S	119D53`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.600	073X	Indonesia	INS	TERNATE SULTAN	00D50`27" N	127D22`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.600	073X	Japan	J	MIYAZU	35D29`00" N	135D08`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.600	073X	Malaysia	MLA	BINTULU (NEW)	03D09`00" N	113D01`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.600	073X	Malaysia	MLA	KUALA TERENGGANU	04D58`48" N	102D08`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.600	073X	Myanmar	BRM	BAGO	17D19`00" N	096D31`E	VOR/DME	N	200/450	29		200/450	40	
112.600	073X	Solomon Islands	SLM	HONIARA	09D25`00" S	160D01`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.700	074X	Australia	AUS	HOBART	42D49`58" S	147D30`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
112.700	074X	Australia	AUS	MACKAY	21D10`23" S	149D11`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
112.700	074X	Bangladesh	BGD	DHAKA ZIA INTL	23D49`00" N	090D25`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.700	074X	China	CHN	DAWANGZHUANG	39D11`00" N	116D34`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.700	074X	China	CHN	NANCHANGXIANGTAN	28D26`00" N	115D55`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.700	074X	China	CHN	QUIANG	29D03`00" N	106D39`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.700	074X	China	CHN	YUSHU	32D51`00" N	097D00`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.700	074X	India	IND	GONDIA	21D31`25" S	080D17`E	VOR/DME	N	200/450	29		200/450	40	4Jan08; DVOR
112.700	074X	India	IND	NAGPUR	21D04`53" N	079D03`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.700	074X	Indonesia	INS	TIMIKA MOZES KILANGIN	04D31`55" S	136D53`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.700	074X	Japan	J	NARITA	35D47`00" N	140D16`E	VOR/DME	I	200/450	29		200/450	40	FI 24Dec13 ; DVOR
112.700	074X	Japan	J	SAKURA	35D47`00" N	140D16`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.700	074X	Malaysia	MLA	JOHOR BAHRU	01D43`48" N	103D37`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.700	074X	New Zealand	NZL	DUNEDIN	45D47`40" S	170D28`E	VOR/DME	N	200/450	29		200/450	40	
112.700	074X	Pakistan	PAK	JIWANI	25D04`00" N	061D47`E	VOR/DME	I	200/450	29		200/450	40	DME NAT
112.700	074X	Pakistan	PAK	LAHORE	31D30`00" N	074D24`E	VOR/DME	I	300/450	29		300/450	40	



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112.700	074X	Philippines	PHL	CABANATUAN	15D28`03" N	120D58`E	VOR/DME	I	150/450	27		150/450	37	
112.700	074X	Thailand	THA	UBON RATCHATHANI	15D14`42" N	104D52`E	VOR/DME	I	300/450	29		300/450	40	DME NAT; DVOR
112.800	075X	Australia	AUS	WEIPA	12D40`25" S	141D55`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
112.800	075X	China	CHN	LIBO	25D27`00" N	107D58`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.800	075X	China	CHN	LINYI	35D03`00" N	118D25`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.800	075X	China	CHN	TIANSHUI	34D34`00" N	105D50`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.800	075X	India	IND	BELLARY	15D09`55" N	076D52`E	VOR/DME	N	200/450	29		200/450	40	
112.800	075X	India	IND	GWALIOR	26D17`08" N	078D13`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.800	075X	Indonesia	INS	POSO KASIGUNCU	01D24`29" S	120D39`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.800	075X	Indonesia	INS	YOGYAKARTA ADI	07D48`01" S	110D18`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.800	075X	Japan	J	HANAMAKI	39D26`00" N	141D09`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.800	075X	Japan	J	KUMAMOTO	32D50`00" N	130D50`E	VOR/DME	I	200/450	29		200/450	40	FI 20Dec13; DVOR
112.800	075X	Kiribati	KIR	TARAWA	01D22`59" S	173D08`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.800	075X	Lao People's Democratic	LAO	ATTAPUE	14D48`01" N	107D01`E	VOR/DME	N	200/450	29		200/450	40	16Jun14; DVOR
112.800	n/a	Malaysia	MLA	IPOH	04D28`54" N	101D01`E	VOR	N	150/450	27		n/a	n/a	DVOR
112.800	075X	Malaysia	MLA	MULU (NEW)	04D01`59" N	114D47`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.800	075X	Myanmar	BRM	MANDALAY	21D56`00" N	096D08`E	VOR/DME	I	200/450	29		200/450	40	
112.800	075X	Republic of Korea	KOR	GUNSAN	35D53`00" N	126D36`E	VOR/TAC	N	200/450	29		200/450	40	
112.900	076X	Antarctica	ATA	TERRE ADELIE	66D40`00" S	140D00`E	VOR/DME	N	200/450	29		200/450	40	FRANCE
112.900	076X	Australia	AUS	MEEKATHARRA	26D36`25" S	118D31`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
112.900	076X	Australia	AUS	OAKEY	27D23`59" S	151D44`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
112.900	076X	Australia	AUS	TENNANT CREEK	19D38`05" S	134D10`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
112.900	076X	China	CHN	FUYANG	32D53`00" N	115D44`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.900	076X	China	CHN	KUNMING	25D01`00" N	102D44`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.900	076X	China	CHN	QIQIHAER	47D15`00" N	123D55`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.900	076X	China	CHN	YINCHUAN	38D19`00" N	106D24`E	VOR/DME	I	200/450	29		200/450	40	DVOR
112.900	076X	French Polynesia	OCA	TAHITI FAAA	17D32`54" S	149D36`W	VOR/DME	I	200/450	29		200/450	40	
112.900	076X	India	IND	COIMBATORE	11D01`55" N	077D02`E	VOR/DME	N	150/450	27		150/450	37	DVOR
112.900	076X	India	IND	JAIPUR	26D49`31" N	075D48`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.900	076X	Indonesia	INS	KOTA BARU GUSTI	03D17`47" S	116D09`E	VOR/DME	N	200/450	27		200/450	37	DVOR
112.900	076X	Japan	J	KUSHIMOTO	33D27`00" N	135D48`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
112.900	076X	Japan	J	MONBETSU	44D18`00" N	143D24`E	VOR/DME	N	200/450	29		200/450	40	DVOR
112.900	076X	Malaysia	MLA	KUALA TERENGGANU	05D21`38" N	103D04`E	VOR/DME	N	200/450	29		200/450	40	21June07; DVOR
112.900	076X	Nepal	NPL	SIMRA	27D10`00" N	084D59`E	VOR/DME	I	300/450	29		300/450	40	DVOR
112.900	076X	New Caledonia	NCL	NOUMEA TONTOUTA	22D00`00" S	166D12`E	VOR/DME	I	200/450	29		200/450	40	
112.900	076X	Pakistan	PAK	NAWABSHAH	26D13`00" N	068D23`E	VOR/DME	I	300/450	29		300/450	40	
112.900	076X	Philippines	PHL	LAOAG	18D10`44" N	120D31`E	VOR/DME	I	90/450	20		90/450	27	
112.900	076X	Philippines	PHL	ROXAS	11D35`49" N	122D45`E	VOR/DME	N	100/450	23		100/450	27	
112.900	076X	Republic of Korea	KOR	INCHEON INTL	37D25`58" N	126D27`E	VOR/DME	I	25/100	17		25/100	27	T-VOR/DME
112.900	076X	Thailand	THA	CHUMPAE	16D39`00" N	101D55`E	VOR/DME	N	300/450	29		300/450	40	DVOR
113.000	077X	Australia	AUS	CAIRNS	16D51`00" S	145D44`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated
113.000	077X	Australia	AUS	CARNARVON	24D52`55" S	113D40`E	VOR/DME	N	200/450	27		200/450	37	Details Updated.
113.000	n/a	Bangladesh	BGD	JESSORE	23D11`00" N	089D09`E	VOR	N	200/450	29		n/a	n/a	



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113.000	077X	China	CHN	CONGHUA	23D10`00" N	113D15`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.000	077X	China	CHN	GUANGZHOU	23D35`00" N	113D35`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.000	077X	China	CHN	HANGZHOU	30D14`00" N	120D28`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.000	077X	China	CHN	YIJUN	35D23`00" N	109D06`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.000	077X	India	IND	NANDED	19D10`55" N	077D19`E	VOR/DME	N	200/450	29		200/450	40	20Jun08; DVOR
113.000	077X	India	IND	PATHANKOT	32D14`46" N	075D38`E	VOR/DME	N	200/450	29		200/450	40	21Mar08; DVOR
113.000	077X	Japan	J	YAMAGATA	38D23`00" N	140D21`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.000	077X	Nauru	NRU	NAURU	00D32`00" S	116D55`E	VOR/DME	I	200/450	29		200/450	40	
113.000	077X	New Caledonia	NCL	NOUMEA UERE	22D19`00" S	166D28`E	VOR/DME	N	200/450	29		200/450	40	
113.000	077X	New Zealand	NZL	OHURA	38D49`36" S	174D48`E	VOR/DME	N	200/450	29		200/450	40	
113.000	077X	Philippines	PHL	KALIBO	11D41`03" N	122D22`E	VOR/DME	N	100/450	23		100/450	27	DVOR
113.000	077X	Republic of Korea	KOR	SEOUL SINCHONRI	37D26`00" N	127D07`E	VOR/DME	N	200/450	29		200/450	40	T-VOR/DME
113.000	077X	Wallis Island	WAL	WALLIS HIHIFO	13D14`00" S	176D12`W	VOR/DME	I	200/450	29		200/450	40	
113.100	078X	China	CHN	HAMI	42D51`00" N	093D40`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.100	078X	China	CHN	HETIAN	37D02`00" N	079D52`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.100	n/a	China	CHN	HOTAN	37D02`00" N	079D52`E	VOR	I	200/450	29		n/a	n/a	HETIAN
113.100	078X	China	CHN	LASA	29D18`00" N	091D00`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.100	078X	China	CHN	MANZHOULI	49D20`00" N	117D39`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.100	078X	China	CHN	QIANXI	27D03`00" N	106D02`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.100	078X	China	CHN	TACHENG	46D40`00" N	083D21`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.100	078X	China	CHN	TAIYUAN	37D46`00" N	112D38`E	VOR/DME	I	200/450	29		200/450	40	DME NAT; DVOR
113.100	078X	China	CHN	YANJI	42D53`00" N	129D27`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.100	078X	India	IND	AHMADABAD	23D04`20" N	072D37`E	VOR/DME	I	300/450	29		300/450	40	DVOR
113.100	078X	India	IND	LUCKNOW	26D45`44" N	080D52`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.100	078X	India	IND	TIRUCHIRAPALLI	10D45`45" N	078D42`E	VOR/DME	I	300/450	29		300/450	40	
113.100	078X	Indonesia	INS	WAIKABUBAK	09D24`31" S	120D14`E	VOR/DME	N	200/450	27		200/450	37	DVOR
113.1	078X	Japan	J	ERABU	27D26`00" N	128D42`E	VOR/TAC	I	100/450	23		100/450	27	Frequency/ChannelOK? 20Dec13; DVOR
113.100	078X	Japan	J	OSHIMA	34D43`00" N	139D25`E	VOR/TAC	N	100/450	23		100/450	27	26Dec13; DVOR
113.100	078X	Malaysia	MLA	KOTA KINABALU	05D54`00" N	116D02`E	VOR/DME	I	300/450	29		300/450	40	DVOR
113.100	n/a	Pakistan	PAK	D.I.KHAN	31D54`00" N	070D53`E	VOR	N	200/450	29		n/a	n/a	
113.100	078X	Philippines	PHL	CLARK INTL. AIRPORT	15D11`00" N	120D32`E	VOR/DME	N	150/450	27		150/450	37	DVOR
113.100	078X	Thailand	THA	Betong	05D47`08" N	101D08`E	VOR/DME	ICA	200/450	27		200/450	37	15Feb19; PLI
113.100	078X	Viet Nam	VTN	VINH	18D43`08" N	105D40`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
113.200	079X	Australia	AUS	BRISBANE	27D21`58" S	153D08`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated
113.200	n/a	Australia	AUS	MANGALORE	36D53`09" S	145D11`E	VOR	N	200/450	29		n/a	n/a	
113.200	079X	China	CHN	PANZHIHUA	26D32`00" N	101D48`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.200	079X	China	CHN	TANGSHAN	39D43`00" N	118D00`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.200	079X	China	CHN	XIAN	34D33`00" N	108D38`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.200	079X	China	CHN	YIWU	29D20`00" N	120D02`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
113.200	079X	China - Hong Kong	HKG	LUNG KWU CHAU	22D22`44" N	113D53`E	VOR/DME	I	70/450	20		70/450	27	DVOR
113.200	079X	India	IND	KISHANGARH	26D35`07" N	074D48`E	VOR/DME	N	200/450	29		200/450	40	FI 22Mar17; DVOR
113.200	079X	Indonesia	INS	PONTIANAK SUPADIO	00D04`44" S	109D22`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.200	079X	Japan	J	IKI	33D45`00" N	129D47`E	VOR/DME	I	200/450	29		200/450	40	DVOR



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113.200	079X	Nepal	NPL	KATHMANDU	27D40`00" N	085D21`E	VOR/DME	I	300/450	29		300/450	40	16Oct09; DVOR
113.200	079X	Viet Nam	VTN	CAN THO	10D05`00" N	105D42`E	VOR/DME	N	200/450	29		200/450	40	7Jul08; DVOR
113.300	080X	China	CHN	CHANGDU	30D33`00" N	097D07`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.300	080X	China	CHN	CHANGSHA	28D12`00" N	113D14`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.300	080X	China	CHN	HUAIAN	33D46`00" N	119D07`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.300	080X	China	CHN	KELAMAYI	45D29`00" N	084D56`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.300	080X	China	CHN	NANYINGBINDAO	20D01`00" N	110D08`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.300	080X	China	CHN	SHACHE	38D26`00" N	077D14`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.300	080X	China	CHN	TUMUERTAI	41D51`00" N	113D09`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.300	080X	India	IND	ALLAHABAD	25D26`58" N	081D43`E	VOR/DME	N	200/450	29		200/450	40	21Mar08; DVOR
113.300	080X	India	IND	DAMAN	20D26`19" N	072D51`E	VOR/DME	N	200/450	29		200/450	40	Operated by Coast G
113.300	080X	India	IND	JAMMU	32D40`35" N	074D50`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.300	080X	India	IND	Tambaram	12D54`16" N	080D07`E	VOR/DME	NAT	200/450	27		200/450	37	DVOR
113.300	080X	Indonesia	INS	JAKARTA HALIM	06D16`19" S	106D53`E	VOR/DME	N	300/450	29		300/450	40	DVOR
113.300	080X	Indonesia	INS	P BINTANG OKSIBIL	04D54`26" S	140D37`E	VOR/DME	N	200/450	27		200/450	37	OFF OFF; DVOR
113.300	080X	Japan	J	HYAKURI	36D11`00" N	140D25`E	VOR/TAC	N	200/450	29		200/450	40	20Dec13; DVOR
113.300	080X	Japan	J	KAGOSHIMA	31D42`00" N	130D35`E	VOR/TAC	I	200/450	29		200/450	40	20Dec13; DVOR
113.300	080X	Malaysia	MLA	KERTEH	04D31`54" N	103D25`E	VOR/DME	I	200/450	29		200/450	40	8Feb13; DVOR
113.300	080X	New Caledonia	NCL	LIFOU	20D46`27" S	167D14`E	VOR/DME	N	200/450	29		200/450	40	37DBW
113.300	n/a	Pakistan	PAK	BINDO	29D40`00" N	071D01`E	VOR	I	200/450	29		n/a	n/a	
113.300	080X	Philippines	PHL	CAGAYAN DE ORO	08D24`56" N	124D36`E	VOR/DME	N	150/450	27		150/450	37	
113.300	080X	Thailand	THA	HUA HIN	12D38`00" N	099D57`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.300	080X	Tuvalu	TUV	FUNAFUTI	08D31`00" S	179D12`E	VOR/DME	N	200/450	29		200/450	40	
113.350	n/a	China - Hong Kong	HKG	Chek Lap Kok	22D19`11" N	113D52`E	GBAS	NAT	30/450	17		n/a		
113.400	081X	Bangladesh	BGD	CHITTAGONG	22D15`00" N	091D50`E	VOR/DME	I	300/450	29		300/450	40	
113.400	081X	China	CHN	QINGYANG	35D48`00" N	107D36`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.400	081X	China	CHN	SHENGZHOU	29D36`00" N	120D49`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.400	081X	India	IND	HUBLI	15D21`39" N	075D04`E	VOR/DME	N	200/450	29		200/450	40	23Jun08
113.400	081X	Indonesia	INS	BANDA ACEH	05D31`21" N	095D25`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.400	081X	Indonesia	INS	SURABAYA JUANDA	02D43`38" S	107D45`E	VOR/DME	I	300/450	29		300/450	40	DVOR
113.400	081X	Japan	J	IZUMO	35D25`00" N	132D54`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.400	081X	Malaysia	MLA	NEW LIMBANG	04D47`50" N	115D00`E	VOR/DME	N	200/450	29		200/450	40	3Jun02; DVOR
113.400	n/a	Maldives	MLD	GAN	00D41`36" S	073D09`E	VOR	I	200/450	29		n/a	n/a	CVOR
113.400	081X	New Zealand	NZL	PALMERSTON NORTH	40D19`13" S	175D38`E	VOR/DME	N	200/450	29		200/450	40	
113.400	081X	Thailand	THA	RANONG	09D46`43" N	098D35`E	VOR/DME	N	200/300	29		200/300	40	DVOR
113.400	081X	Timor-Leste	TME	DILI	08D32`38" S	125D31`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.400	081X	Viet Nam	VTN	PLEIKU	14D00`37" N	108D00`E	VOR/DME	N	200/450	29		200/450	40	7Jul08; DVOR
113.450	081Y	Japan	J	AGUNI	32D29`00" N	130D10`E	VOR/DME	N	200/450	29		200/450	40	FI 20Dec13; DVOR
113.450	081Y	Japan	J	AMAKUSA	32D29`00" N	130D10`E	VOR/DME	N	200/450	29		200/450	40	FI 20Dec13; DVOR
113.450	081Y	Japan	J	FUKUSHIMA	37D13`00" N	140D26`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.500	082X	China	CHN	DENGKOU	40D19`00" N	107D00`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.500	082X	China	CHN	GUANGHAN	30D57`00" N	104D20`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.500	082X	China	CHN	JIAMUSI	46D50`00" N	130D28`E	VOR/DME	I	200/450	29		200/450	40	DVOR



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113.500	082X	China	CHN	RIKAZE	29D21`00" N	089D16`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.500	082X	China	CHN	YINGDE	24D12`00" N	113D25`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.500	082X	Cook Islands	CKH	RAROTONGA	21D12`10" S	159D48`W	VOR/DME	I	200/450	29		200/450	40	
113.500	082X	ICAOTEST APAC	ZZZ	Amsterdam	52D52`52" N	004D04`E	VOR/DME	NAT	200/450	27		200/450	37	
113.500	082X	India	IND	BHUBANESHWAR	20D14`37" N	085D48`E	VOR/DME	I	300/450	29		300/450	40	DVOR
113.500	082X	India	IND	COCHIN INTL	10D08`58" N	076D22`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.500	082X	India	IND	LUDHIANA	30D51`21" N	075D57`E	VOR/DME	I	200/450	29		200/450	40	21Aug08; DVOR
113.500	082X	India	IND	MUNDRA	22D50`30" N	069D46`E	VOR/DME	N	200/450	29		200/450	40	22Dec14; DVOR
113.500	082X	Indonesia	INS	BAJAWA TURELELO SOA	08D42`16" S	121D02`E	VOR/DME	N	200/450	27		200/450	37	DVOR
113.500	082X	Indonesia	INS	GORONTALO	00D38`22" N	122D51`E	VOR/DME	N	200/450	27		200/450	37	DVOR
113.500	082X	Japan	J	ASAHIKAWA	43D40`00" N	142D27`E	VOR/DME	I	200/450	29		200/450	40	20Dec13; DVOR
113.500	082X	Japan	J	KOWA	34D42`00" N	136D57`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
113.500	082X	Lao People's Democratic	LAO	SAVANNAKHET	16D33`43" N	104D46`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.500	082X	Philippines	PHL	SUBIC	14D46`10" N	120D13`E	VOR/DME	N	40/100	17		40/100	27	RWY09; DVOR
113.500	082X	Republic of Korea	KOR	GANGNEUNG	37D45`32" N	128D57`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.500	082X	Singapore	SNG	LAZARUS ISLAND	01D13`00" N	103D51`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.600	083X	China	CHN	HUAIROU	40D20`00" N	116D45`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.600	083X	China	CHN	QIANZHOU	29D36`00" N	108D43`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.600	083X	China	CHN	SHANGHAIPUDONG	30D57`00" N	121D52`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.600	083X	China	CHN	SHUYUAN	30D57`00" N	121D52`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.600	083X	India	IND	GOA	15D22`47" N	073D48`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.600	083X	India	IND	JABALPUR	23D10`49" N	080D03`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.600	083X	Indonesia	INS	AMBON PATTIMURA	03D42`53" S	128D05`E	VOR/DME	N	200/450	29		200/450	39	DVOR
113.600	083X	Indonesia	INS	JAKARTA SOEKARNO HTA	06D10`25" S	106D33`E	VOR/DME	I	200/450	27		200/450	37	DVOR
113.600	083X	Japan	J	CHOSHI	35D44`00" N	140D48`E	VOR/TAC	N	200/450	29		200/450	40	DVOR
113.600	083X	Malaysia	MLA	ALOR SETAR	06D11`09" N	100D23`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.600	083X	Malaysia	MLA	Miri Airport	04D18`11" N	113D58`E	VOR/DME	NAT	200/450	27		200/450	37	2May19; PLI; DVOR
113.600	083X	New Zealand	NZL	QUEENSTOWN	44D59`03" S	168D46`E	VOR/DME	N	200/450	29		200/450	40	
113.600	083X	Republic of Korea	KOR	SEOUL GIMPO INTL	37D33`27" N	126D47`E	VOR/DME	I	25/100	17		25/100	27	DVOR
113.600	083X	Viet Nam	VTN	DIEN BIEN PHU	21D23`45" N	103D00`E	VOR/DME	N	200/450	29		200/450	40	15Mar05; DVOR
113.700	084X	Australia	AUS	MILDURA	34D13`31" S	142D04`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
113.700	084X	Australia	AUS	PERTH	31D56`42" S	115D57`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
113.700	084X	Australia	AUS	PROSERPINE	20D29`49" S	148D33`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
113.700	084X	China	CHN	ALI	31D59`00" N	080D08`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.700	n/a	China	CHN	BAOSHAN	22D55`00" N	099D50`E	VOR	I	200/450	29		n/a	n/a	FI
113.700	084X	China	CHN	BOLE	44D53`00" N	082D20`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.700	084X	China	CHN	FUYU	44D55`00" N	124D48`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.700	084X	China	CHN	HENGCHUN	21D56`00" N	120D51`E	VOR/TAC	I	200/450	29		200/450	40	TACAN-84
113.700	084X	China	CHN	JINAN	36D50`00" N	117D14`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
113.700	084X	China	CHN	JINGNING	35D32`00" N	105D43`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.700	084X	China	CHN	LAIBIN	23D45`00" N	109D13`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.700	084X	China	CHN	LIJIANG	26D46`00" N	110D16`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.700	084X	India	IND	KATHIAR	25D34`35" N	087D33`E	VOR/DME	N	200/450	29		200/450	40	23/7/02; DVOR



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113.700	084X	India	IND	MYSORE	12D13`34" N	076D39`E	VOR/DME	N	200/450	29		200/450	40	21Mar08; DVOR
113.700	084X	Indonesia	INS	KAU KUABANG	01D11`06" N	127D53`E	VOR/DME	N	200/450	27		200/450	37	DVOR
113.700	084X	Japan	J	KOCHI	33D33`00" N	133D41`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.700	084X	Malaysia	MLA	KUANTAN	03D46`36" N	103D12`E	VOR/TAC	I	200/450	29		200/450	40	
113.700	084X	Pakistan	PAK	RAHIM YAR KHAN	28D24`00" N	070D17`E	VOR/DME	I	300/450	29		300/450	40	DME NAT
113.700	084X	Philippines	PHL	COTABATO	07D10`03" N	124D12`E	VOR/DME	I	300/450	29		300/450	40	
113.700	084X	Thailand	THA	NAKHON RATCHASIMA	14D55`00" N	102D07`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.750	084Y	Japan	J	ZAO-YAMADA	38D11`00" N	140D20`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.800	085X	Cambodia	KMR	SIEM REAP AIRPORT	14D30`28" N	121D01`E	VOR/DME	N	25/100	17		25/100	27	100/1000 W; CVOR
113.800	085X	China	CHN	ANKANG	32D43`00" N	108D54`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.800	085X	China	CHN	CHANGZHOU	31D55`00" N	119D47`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.800	085X	China	CHN	XINGYI	25D04`00" N	104D58`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.800	n/a	India	IND	HYDERABAD	17D13`40" N	078D24`E	VOR	N	200/450	29		n/a	n/a	2May07; DVOR
113.800	085X	India	IND	LENGPUI	23D52`43" N	092D35`E	VOR/DME	N	200/450	29		200/450	40	FI 2Jun15; DVOR
113.800	085X	Malaysia	MLA	KOTA KINABALU	05D53`58" N	116D02`E	VOR/DME	N	200/450	29		200/450	40	07Aug07; DVOR
113.800	085X	New Zealand	NZL	NAPIER	39D27`14" S	176D52`E	VOR/DME	N	200/450	29		200/450	40	
113.800	085X	Pakistan	PAK	SIALKOT	32D31`06" N	074D20`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.800	085X	Philippines	PHL	MANILA	14D30`28" N	121D01`E	VOR/DME	I	300/450	29		300/450	40	DVOR
113.800	085X	Republic of Korea	KOR	GIMHAE INTL	35D11`56" N	128D56`E	VOR/DME	I	200/450	29		200/450	40	FI 26Dec13
113.800	085X	Republic of Korea	KOR	INCHEON INTL	37D29`42" N	126D25`E	VOR/DME	I	25/100	17		25/100	27	T-VOR/DME
113.800	085X	Viet Nam	VTN	PHU QUOC	10D13`59" N	103D57`E	VOR/DME	N	200/450	29		200/450	40	13Jan11; DVOR
113.850	085Y	Japan	J	KITAKYUSHU	33D51`00" N	131D02`E	VOR/DME	N	200/450	29		200/450	40	FI 20Dec13; DVOR
113.850	085Y	Japan	J	SUOH	33D51`00" N	131D02`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
113.900	086X	Australia	AUS	ARGYLE	16D38`04" S	128D26`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated
113.900	086X	Australia	AUS	GERALDTON	28D47`25" S	114D42`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
113.900	086X	China	CHN	DANDONG	40D15`00" N	124D17`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.900	086X	China	CHN	FUJIACHANG	29D56`00" N	104D18`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.900	086X	China	CHN	SHANGHAIHONGQIAO	31D35`00" N	121D20`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.900	086X	China	CHN	WENGYUAN	24D21`00" N	114D07`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.900	086X	China	CHN	WUHAI	39D48`00" N	106D48`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.900	086X	China	CHN	WUXI	31D35`00" N	120D21`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.900	086X	India	IND	PUNE	18D35`00" N	073D54`E	VOR/DME	N	150/450	27		150/450	37	DVOR
113.900	086X	India	IND	Thanjavur	10D43`03" N	079D06`E	VOR/DME	NAT	200/450	27		200/450	37	DVOR
113.900	086X	India	IND	VARANASI	25D27`15" N	082D51`E	VOR/DME	I	300/450	29		300/450	40	DVOR
113.900	086X	Indonesia	INS	MEDAN POLONIA	03D30`16" N	098D36`E	VOR/DME	I	300/450	29		300/450	40	
113.900	086X	Indonesia	INS	TALAUD MELONGUANE	04D01`05" N	126D40`E	VOR/DME	N	200/450	27		200/450	37	DVOR
113.900	086X	Japan	J	OSAKA INTL.	34D47`00" N	135D27`E	VOR/DME	I	200/450	29		200/450	40	DVOR
113.900	086X	Japan	J	SAPPORO	43D10`00" N	141D18`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.900	086X	Malaysia	MLA	NEW SIBU	02D15`00" N	112D00`E	VOR/DME	N	200/450	29		200/450	40	DVOR
113.900	086X	Papua New Guinea	PNG	NADZAB	06D34`00" S	146D44`E	VOR/DME	N	300/450	29		300/450	40	
113.900	086X	Philippines	PHL	ZAMBOANGA	06D55`29" N	122D03`E	VOR/DME	I	50/300	17		50/300	27	
113.900	086X	Samoa	SMO	APIA FALEOLO	13D49`00" S	171D59`W	VOR/DME	I	200/450	29		200/450	40	
113.900	086X	Viet Nam	VTN	WEST NOIBAI	21D16`13" N	105D22`E	VOR/DME	N	200/450	29		200/450	40	12Apr05; DVOR



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113.950	086Y	Japan	J	AMAMI	28D26`00" N	129D43`E	VOR/DME	N	200/450	29		200/450	40	20Dec13; DVOR
114.000	087X	China	CHN	FULING	29D42`00" N	107D23`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.000	087X	China	CHN	HEIHE	50D10`00" N	127D18`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.000	087X	China	CHN	SHANGRAO	28D25`00" N	117D58`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.000	087X	India	IND	CHABUA	27D27`42" N	095D07`E	VOR/DME	N	200/450	29		200/450	40	7Feb18; DVOR
114.000	087X	India	IND	LUNKA-2	28D10`46" N	074D06`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.000	087X	India	IND	VISAKHAPATNAM	17D40`04" N	083D15`E	VOR/DME	I	300/450	29		300/450	40	
114.000	087X	Indonesia	INS	PUTUSSIBAU PANGSUMA	00D50`21" N	112D56`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.000	087X	Japan	J	NARITA INTL AP	35D56`00" N	139D59`E	VOR/DME	I	200/450	29		200/450	40	24Dec13 ; DVOR
114.000	087X	Lao People's Democratic	LAO	XIENGKHOANG	19D27`00" N	103D08`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.000	087X	Malaysia	MLA	PULAU TULAI	02D54`59" N	104D06`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.000	087X	Malaysia	MLA	SANDAKAN	05D54`00" N	118D04`E	VOR/DME	I	150/300	27		150/300	37	DVOR
114.000	087X	New Zealand	NZL	HAMILTON	37D50`57" S	175D20`E	VOR/DME	N	200/450	29		200/450	40	
114.000	087X	Republic of Korea	KOR	INCHEON ACC	35D07`21" N	128D59`E	VOR/TAC	N	100/450	23		100/450	27	FI 26Dec13; DVOR
114.100	088X	Australia	AUS	COCOS ISLAND	12D12`02" S	096D50`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated
114.100	088X	Australia	AUS	GOVE	12D15`54" S	136D48`E	VOR/DME	I	200/450	29		200/450	40	
114.100	088X	Australia	AUS	KALGOORLIE	30D47`23" S	121D27`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
114.100	088X	Australia	AUS	MELBOURNE	37D39`37" S	144D50`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
114.100	088X	Australia	AUS	PORT HEDLAND	20D22`43" S	118D37`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
114.100	088X	Australia	AUS	TOWNSVILLE	19D14`39" S	146D45`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
114.100	088X	China	CHN	DEHONG	24D25`00" N	098D32`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.100	088X	China	CHN	LUOYNAG	34D44`00" N	112D24`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.100	088X	China	CHN	PINGZHOU	23D01`00" N	113D11`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.100	088X	China	CHN	SHENYANG	41D38`00" N	123D29`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.100	088X	China	CHN	WUXI	31D30`00" N	120D26`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.100	088X	China	CHN	YUSHU	32D48`00" N	097D16`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.100	088X	India	IND	BHAVNAGAR	21D45`00" N	072D11`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.100	088X	India	IND	SHIMLA	31D05`13" N	077D03`E	VOR/DME	N	200/450	29		200/450	40	24May11; DVOR
114.100	088X	Indonesia	INS	SUMENEP TRUNOJOYO	07D01`24" S	113D53`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.100	088X	Japan	J	AOMORI	40D44`00" N	140D42`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.100	088X	Japan	J	YONAGO	35D30`00" N	133D14`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.100	088X	Malaysia	MLA	PULAU LANGKAWI	06D21`21" N	099D44`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.100	088X	Nepal	NPL	BIRATNAGAR	26D29`00" N	087D16`E	VOR/DME	I	300/450	29		300/450	40	DVOR
114.100	n/a	Philippines	PHL	DUMAGUETE	09D20`01" N	123D18`E	VOR	N	150/300	27		n/a	n/a	
114.100	088X	Sri Lanka	SLK	KATUNAYAKE	07D09`41" N	079D52`E	VOR/DME	ICA	200/450	29		200/450	40	
114.100	088X	Thailand	THA	PHITSANULOK	16D46`13" N	100D17`E	VOR/DME	I	300/450	29		300/450	40	DVOR
114.100	088X	Viet Nam	VTN	PHAN THIET	10D55`00" N	108D04`E	VOR/DME	N	130/450	23		130/450	37	
114.200	089X	Australia	AUS	BROKEN HILL	32D00`02" S	141D28`E	VOR/DME	N	200/450	27		200/450	37	Coordinates Updated
114.200	089X	Australia	AUS	ESPERANCE	33D40`43" S	121D49`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
114.200	089X	Australia	AUS	SUNSHINE COAST	26D35`52" S	153D05`E	VOR/DME	N	200/450	29		200/450	40	Name Change. Coordinates Updated.
114.200	089X	China	CHN	FUZHOU	25D59`00" N	119D15`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.200	089X	China	CHN	XICHANG	28D00`00" N	102D11`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.200	089X	India	IND	LENGPUI	23D49`51" N	092D37`E	VOR/DME	N	200/450	29		200/450	40	DVOR



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114.200	089X	India	IND	MANGALORE	12D57`43" N	074D55`E	VOR/DME	N	200/450	29		200/450	40	
114.200	089X	Indonesia	INS	MANADO	01D33`19" N	124D55`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.200	089X	Indonesia	INS	PANGKAL PINANG	02D09`40" S	106D08`E	VOR/DME	I	300/450	29		300/450	40	DME NAT; DVOR
114.200	089X	Indonesia	INS	PANGKAL PINANG	02D09`41" S	106D08`E	VOR/DME	I	200/450	27		200/450	37	DVOR
114.200	089X	Japan	J	NAGOYA	35D16`00" N	136D55`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
114.200	089X	New Zealand	NZL	GISBORNE	38D39`38" S	177D58`E	VOR/DME	N	200/450	29		200/450	40	
114.200	089X	Thailand	THA	SAKHONNAKHON	17D12`50" N	104D08`E	VOR/DME	N	300/450	29		300/450	40	FI ; DVOR
114.300	090X	Australia	AUS	CURTIN	17D35`20" S	123D51`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated
114.300	090X	Cambodia	KMR	PHNOM PENH AIRPORT	11D33`11" N	104D50`E	VOR/DME	N	25/100	17		25/100	27	DVOR
114.300	090X	China	CHN	ALETAI	47D45`00" N	088D05`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.300	090X	China	CHN	GUIYANG	26D31`00" N	106D47`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.300	090X	China	CHN	LANZHOU	36D31`00" N	103D37`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.300	090X	China	CHN	LINZHI	29D12`00" N	094D09`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.300	090X	China	CHN	QIEMO	38D09`00" N	085D32`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.300	090X	China	CHN	XILINHAOTE	43D55`00" N	115D58`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.300	090X	China	CHN	XUZHOU	34D04`00" N	117D33`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.300	090X	India	IND	FURSATGANJ AP	26D15`04" N	081D23`E	VOR/DME	N	200/450	29		200/450	40	3Apr02; DVOR
114.300	090X	India	IND	Ratnagiri	17D00`47" N	073D19`E	VOR/DME	NAT	200/450	27		200/450	37	DVOR
114.300	090X	India	IND	TUITICORN	08D43`13" N	078D02`E	VOR/DME	NAT	200/450	27		200/450	37	11June2019; DVOR
114.300	090X	Indonesia	INS	BENGKULU FATMAWATI	03D51`41" S	102D20`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.300	090X	Indonesia	INS	PALANGKA RAYA	02D14`37" S	113D56`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.300	090X	Japan	J	KUGA	34D05`00" N	132D09`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
114.300	090X	Kiribati	KIR	TARAWA	01D22`59" S	173D08`E	VOR/DME	I	200/450	29		200/450	40	
114.300	090X	Pakistan	PAK	PANJGUR	26D57`00" N	064D08`E	VOR/DME	I	300/450	29		300/450	40	
114.300	090X	Pakistan	PAK	PESHAWAR	33D58`00" N	071D31`E	VOR/DME	I	100/450	23		100/450	27	DVOR
114.300	090X	Philippines	PHL	MACTAN	10D18`48" N	123D59`E	VOR/DME	N	300/450	29		300/450	40	DVOR
114.300	090X	Thailand	THA	UDON THANI	17D23`00" N	102D46`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.300	090X	Vanuatu	NHB	PORT VILA BAUERFIELD	17D39`00" S	168D14`E	VOR/DME	I	50/300	17		50/300	27	
114.400	091X	China	CHN	HENGSHA	31D22`00" N	121D51`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.400	091X	China	CHN	SHANGHAIPUDONG	31D22`00" N	121D51`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.400	091X	China	CHN	ZHANGJIAJIE	29D06`00" N	110D26`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.400	091X	India	IND	KISHANGANJ	26D06`00" N	087D56`E	VOR/DME	N	150/450	27		150/450	37	Planned
114.400	091X	India	IND	LATUR	18D24`59" N	076D28`E	VOR/DME	N	200/450	29		200/450	40	8Sep08; DVOR
114.400	091X	Japan	J	SHODO	34D31`00" N	134D16`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.400	091X	Lao People's Democratic	LAO	Nongkhang	20D37`51" N	104D04`E	VOR/DME	ICA	200/450	27		200/450	37	FI 09Sep19; PLI; DVOR; NC
114.400	091X	Malaysia	MLA	KUALA LUMPUR KLIA2	02D45`72" N	101D40`E	VOR/DME	N	200/450	29		200/450	40	FI 28Apr16; DVOR
114.400	091X	New Zealand	NZL	NEW PLYMOUTH	39D00`26" S	174D11`E	VOR/DME	N	200/450	29		200/450	40	
114.400	091X	Republic of Korea	KOR	GWANGJU	35D07`34" N	126D48`E	VOR/DME	N	40/100	17		40/100	27	DVOR
114.400	091X	Viet Nam	VTN	DANANG	16D03`00" N	108D12`E	VOR/DME	I	300/450	29		300/450	40	DVOR
114.500	092X	China	CHN	ALI	32D28`00" N	080D04`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.500	092X	China	CHN	CHAOYANG	41D32`00" N	120D27`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
114.500	092X	China	CHN	CHONGZHOU	30D39`00" N	103D41`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
114.500	092X	China	CHN	JIUQUAN	39D51`00" N	098D21`E	VOR/DME	I	200/450	29		200/450	40	DVOR



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114.500	n/a	China	CHN	KUQA	41D44`00" N	083D01`E	VOR	I	200/450	29		n/a	n/a	KUCHE
114.500	092X	China	CHN	NANNING	22D36`00" N	108D11`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.500	092X	China	CHN	XIAMEN	24D33`00" N	118D07`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.500	092X	China	CHN	ZHENGZHOU	34D31`00" N	113D50`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.500	092X	ICAOTEST APAC	ZZZ	Leeuwarden	52D52`52" N	020D20`E	VOR/DME	NAT	200/450	27		200/450	37	
114.500	092X	ICAOTEST APAC	ZZZ	Rotterdam	53D53`53" N	005D05`E	VOR/DME	NAT	200/450	27		200/450	37	
114.500	n/a	India	IND	BANGALORE	13D12`23" N	077D43`E	VOR	N	200/450	29		n/a	n/a	2May07; DVOR
114.500	092X	India	IND	DIMAPUR	25D52`51" N	093D46`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.500	092X	India	IND	DIU	20D42`00" N	070D54`E	VOR/DME	N	200/450	29		200/450	40	4Apr08
114.500	092X	India	IND	UTTARLAI	25D48`42" N	071D29`E	VOR/DME	N	200/450	29		200/450	40	FI 7Feb18; DVOR
114.500	092X	Indonesia	INS	MATARAM	08D33`45" S	116D06`E	VOR/DME	N	200/450	27		200/450	37	OFF; DVOR
114.500	092X	Indonesia	INS	MAUMERE FRANS SEDA	08D38`16" S	122D14`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.500	092X	Indonesia	INS	SAMPIT H. ASAN	02D30`15" S	122D58`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.500	092X	Japan	J	FUKUOKA	33D41`00" N	130D23`E	VOR/TAC	I	200/450	29		200/450	40	20Dec13; DVOR
114.500	092X	Japan	J	KISARAZU	35D24`00" N	139D54`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.500	092X	Malaysia	MLA	KUCHING	01D28`00" N	110D18`E	VOR/DME	I	300/450	29		300/450	40	DVOR
114.500	092X	Philippines	PHL	GENERAL. SANTOS	06D04`32" N	125D05`E	VOR/DME	N	40/100	17		40/100	27	16MAR11; DVOR
114.500	n/a	Philippines	PHL	SAN FERNANDO	16D43`42" N	120D21`E	VOR	N	150/450	27		n/a	n/a	
114.500	n/a	Thailand	THA	KAMPHAENG SAEN	14D09`00" N	099D57`E	VOR	N	200/450	29		n/a	n/a	
114.500	092X	Tonga	TON	TONGATAPU	21D14`00" S	175D08`W	VOR/DME	I	200/450	29		200/450	40	
114.600	n/a	Bangladesh	BGD	RAJSHAI	24D26`00" N	088D37`E	VOR	I	300/450	29		n/a	n/a	
114.600	093X	China	CHN	CENCUN	23D09`00" N	113D25`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.600	093X	China	CHN	JINZHOU	41D06`00" N	121D04`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.600	093X	China	CHN	NANHUI	31D05`00" N	121D34`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.600	093X	China	CHN	YANAN	36D41`00" N	109D38`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.600	093X	India	IND	COCHIN (NAVY)	09D56`41" N	076D16`E	VOR/DME	N	150/450	27		150/450	37	Operated by Navy; DVOR
114.600	093X	India	IND	KOLHAPUR	16D39`56" N	074D17`E	VOR/DME	N	200/450	29		200/450	40	FI 21Mar08; DVOR
114.600	093X	Indonesia	INS	JAKARTA SOEKARNO HAT	05D57`40" S	107D02`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.600	093X	Japan	J	RISHIRI	45D15`00" N	141D11`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.600	093X	Japan	J	YAO	34D36`00" N	135D36`E	VOR/DME	N	200/450	29		200/450	40	26Dec13; DVOR
114.600	093X	New Zealand	NZL	TORY	41D11`09" S	174D21`E	VOR/DME	N	200/450	29		200/450	40	
114.600	n/a	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D32`45" N	072D51`E	VOR	N	200/450	29		n/a	n/a	6Nov.13 ; DVOR
114.700	094X	China	CHN	BEIJING	40D03`00" N	116D44`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.700	094X	China	CHN	ENSHI	30D18`00" N	109D36`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.700	094X	China	CHN	GENGMA	23D32`00" N	099D35`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.700	094X	China	CHN	JINCHANG	38D33`00" N	102D20`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.700	094X	India	IND	HYDERABAD	17D27`04" N	078D27`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.700	094X	Indonesia	INS	MAKASAR SULTAN	05D02`16" S	119D31`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.700	094X	Indonesia	INS	PADANG MINANGKABAU	00D47`13" S	100D16`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.700	094X	Malaysia	MLA	SUBANG	03D19`30" N	101D27`E	VOR/DME	I	300/450	29		300/450	40	DVOR
114.700	094X	Maldives	MLD	MALE	04D11`00" N	073D30`E	VOR/DME	I	150/300	27		150/300	37	
114.700	094X	Nepal	NPL	BHAIRAWA	27D30`00" N	083D26`E	VOR/DME	I	150/300	27		150/300	37	DVOR
114.700	094X	Pakistan	PAK	HYDERABAD	25D18`00" N	068D23`E	VOR/DME	N	200/450	29		200/450	40	GROUND TRAINING



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114.700	094X	Pakistan	PAK	QUETTA	30D17`00" N	066D53`E	VOR/DME	N	100/150	23		100/150	27	DVOR
114.700	094X	Philippines	PHL	NAGA	13D35`19" N	123D16`E	VOR/DME	N	150/450	27		150/450	37	
114.700	n/a	Viet Nam	VTN	VUNGTAU	10D22`00" N	107D06`E	VOR	N	130/450	23		n/a	n/a	
114.750	094Y	Japan	J	ODATE-NOSHIRO	40D12`00" N	140D22`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
114.750	094Y	Japan	J	SAGA	33D09`00" N	130D18`E	VOR/DME	N	200/450	29		200/450	40	FI 26Dec13; DVOR
114.750	094Y	New Caledonia	NCL	TONTOUTA	21D56`41" S	166D04`E	VOR/DME	N	200/450	29		200/450	40	26Jan11
114.800	095X	China	CHN	ANDONG	30D15`00" N	121D13`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.800	095X	China	CHN	SHANGHAIPUDONG	30D15`00" N	121D13`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.800	095X	China - Hong Kong	HKG	SIU MO TO	22D20`15" N	113D58`E	VOR/DME	I	70/450	20		70/450	27	DVOR
114.800	095X	India	IND	ALLAHABAD	25D26`00" N	081D44`E	VOR/DME	N	200/450	29		200/450	40	TRAINING
114.800	095X	India	IND	DURGAPUR	23D37`28" N	087D14`E	VOR/DME	N	200/450	29		200/450	40	22Nov11; DVOR
114.800	n/a	India	IND	MANDVI	19D29`34" N	072D53`E	VOR	N	200/450	29		n/a	n/a	Planned; DVOR
114.800	095X	Indonesia	INS	MANADO	01D19`33" N	124D54`E	VOR/DME	N	200/450	29		200/450	40	
114.800	095X	Indonesia	INS	MANADO	01D19`23" N	124D57`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.800	095X	Indonesia	INS	TANJUNG PINANG	00D56`11" S	104D31`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.800	095X	New Zealand	NZL	AUCKLAND	37D00`17" S	174D48`E	VOR/DME	I	200/450	29		200/450	40	
114.800	095X	Republic of Korea	KOR	INCHEON ACC	36D37`55" N	128D19`E	VOR/DME	I	200/450	29		200/450	40	FI 26Dec13; DVOR
114.800	095X	Viet Nam	VTN	THO XUAN	19D53`50" N	105D29`E	VOR/DME	N	200/450	29		200/450	40	FI 15Mar13
114.900	096X	China	CHN	ERLIAN	43D38`00" N	111D57`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.900	n/a	China	CHN	GUILING	25D13`00" N	110D02`E	VOR	N	200/450	29		n/a	n/a	
114.900	096X	China	CHN	JINGTAI	37D12`00" N	104D05`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.900	096X	China	CHN	KAIYUAN	42D38`00" N	124D00`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.900	096X	China	CHN	LINCHANG	23D44`00" N	100D02`E	VOR/DME	I	200/450	29		200/450	40	DVOR
114.900	096X	India	IND	CHENNAI	13D00`13" N	080D09`E	VOR/DME	N	200/450	29		200/450	40	25Mar11; DVOR
114.900	096X	India	IND	HOLLONGI	26D57`56" N	093D37`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.900	096X	India	IND	PRATAPGARH	24D01`48" N	074D45`E	VOR/DME	I	150/450	27		150/450	37	DVOR
114.900	096X	Indonesia	INS	CILACAP TUNGGUL	06D45`22" S	108D32`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.900	096X	Indonesia	INS	MALI ALOR	08D07`56" S	124D35`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.900	n/a	Indonesia	INS	MAUMERE WAI OTI	08D35`00" S	122D21`E	VOR	N	200/450	29		n/a	n/a	DVOR
114.900	096X	Indonesia	INS	SILAMPARI	03D17`09" S	102D55`E	VOR/DME	N	200/450	27		200/450	37	DVOR
114.900	096X	Japan	J	TOHOKU	40D49`00" N	141D09`E	VOR/DME	N	200/450	29		200/450	40	DVOR
114.900	n/a	Japan	J	TOKUSHIMA	34D08`00" N	134D37`E	VOR	N	200/450	29		n/a	n/a	
114.900	096X	Thailand	THA	KHONKAEN	16D27`36" N	102D47`E	VOR/DME	N	150/350	27		150/350	37	DVOR
115.000	097X	Australia	AUS	WAGGA WAGGA	35D09`57" S	147D28`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
115.000	097X	China	CHN	DAZHOU	31D09`00" N	107D26`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.000	097X	China	CHN	LIANYUGANG	34D36`00" N	118D53`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.000	097X	China	CHN	MEIXIAN	24D16`00" N	116D06`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.000	097X	India	IND	BHUNTAR	31D41`04" N	077D12`E	VOR/DME	N	200/450	29		200/450	40	14Sep18; DVOR
115.000	097X	India	IND	GAYA	24D44`31" N	084D56`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.000	097X	India	IND	JAMNAGAR	22D29`00" N	070D03`E	VOR/DME	N	150/450	27		150/450	37	
115.000	n/a	India	IND	SALEM	11D46`57" N	078D03`E	VOR	N	200/450	29		n/a	n/a	Planned
115.000	097X	Indonesia	INS	BANDAR LAMPUNG	05D14`31" N	105D10`E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.000	097X	Indonesia	INS	KENDARI HALUOLEO	04D05`06" S	122D24`E	VOR/DME	N	200/450	27		200/450	37	DVOR



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115.000	097X	Indonesia	INS	NUNUKAN NUNUKAN	04D08`16" N	117D39`E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.000	097X	Japan	J	NARITA INTL AP	35D49`00" N	140D22`E	VOR/DME	I	200/450	29		200/450	40	24Dec13 ; DVOR
115.000	097X	Lao People's Democratic	LAO	PAKSE	15D11`48" N	105D44`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.050	097Y	French Polynesia	OCA	RANGIROA	14D57`02" S	147D40`W	VOR/DME	I	200/450	29		200/450	40	OPS Oct14
115.050	097Y	Japan	J	IWAMI	34D41`00" N	131D47`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.050	097Y	Japan	J	YONAGUNI	24D28`00" N	123D00`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.100	n/a	Afghanistan	AFG	KANDAHAR	32D18`00" N	065D47`E	VOR	I	300/450	29		n/a	n/a	
115.100	098X	China	CHN	AKESU	41D16`00" N	080D17`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.100	098X	China	CHN	GUANGYUAN	32D23`00" N	105D41`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.100	098X	China	CHN	HAILAER	49D12`00" N	119D49`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.100	098X	China	CHN	HAMI	42D50`00" N	093D38`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.100	098X	China	CHN	NANCHANG	28D53`00" N	115D55`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.100	098X	Fiji	FJI	LABASA	16D28`00" S	179D21`E	VOR/DME	N	200/450	29		200/450	40	Modified 27Dec09
115.100	098X	India	IND	Doom Dooma	27D33`30" N	095D34`E	VOR/DME	NAT	200/450	27		200/450	37	
115.100	098X	India	IND	SHAHBAJ	18D41`30" N	073D00`E	VOR/DME	N	200/450	29		200/450	40	Not yet commissioned; DVOR
115.100	098X	India	IND	TRIVANDRUM	08D28`31" N	076D55`E	VOR/DME	I	300/450	29		300/450	40	DVOR
115.100	098X	Indonesia	INS	BIMA S.M. SALAHUDIN	08D32`23" S	118D41`E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.100	098X	Indonesia	INS	SILANGIT SIBORONG	03D17`09" S	102D55`E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.100	098X	Japan	J	NAHA	26D12`00" N	127D39`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
115.100	098X	Nepal	NPL	NEPALGUNJ	28D06`00" N	081D40`E	VOR/DME	I	200/450	29		200/450	40	
115.100	n/a	Philippines	PHL	LIPA	13D57`22" N	121D07`E	VOR	N	150/450	27		n/a	n/a	
115.100	098X	Republic of Korea	KOR	SACHEON	35D05`51" N	128D04`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.100	098X	Singapore	SNG	PULAU UBIN	01D25`00" N	103D56`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.100	098X	Viet Nam	VTN	HAI PHONG CAT BI	20D49`03" N	106D43`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.100	098X	Viet Nam	VTN	HAI-PHONG CAT-BI	20D49`03" N	106D43`E	VOR/DME	N	200/450	29		200/450	40	1Q01; DVOR
115.100	098X	Viet Nam	VTN	RACH GIA AIRPORT	09D57`47" N	105D09`E	VOR/DME	N	200/450	29		200/450	40	FI 9Mar18; DVOR
115.200	099X	China	CHN	HANDAN	36D32`00" N	114D25`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.200	099X	China	CHN	HUANGYAN	28D34`00" N	121D26`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.200	099X	China	CHN	TONGREN	27D52`00" N	109D18`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.200	099X	India	IND	KADAPA-HYDERABAD	14D30`35" N	078D46`E	VOR/DME	N	200/450	27		200/450	37	9Sep19; NC
115.200	099X	India	IND	LENGPUI	23D51`57" N	092D44`E	VOR/DME	N	200/450	29		200/450	40	8Sep08; DVOR
115.200	099X	India	IND	Sarsawa	29D59`31" N	077D25`E	VOR/DME	NAT	200/450	27		200/450	37	
115.200	099X	Indonesia	INS	MAMUJU TAMPA	02D35`36" S	119D01`E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.200	099X	Indonesia	INS	SEMARANG AHMAD	06D59`00" S	110D23`E	VOR/DME	N	200/450	17		200/450	27	DVOR
115.200	099X	Japan	J	SHIMIZU	32D45`00" N	133D00`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
115.200	099X	Viet Nam	VTN	CHU LAI	15D24`44" N	108D42`E	VOR/DME	N	200/450	29		200/450	40	1Oct12; DVOR
115.200	n/a	Viet Nam	VTN	DONG HOI	00D00`00" N	000D00`E	VOR	N	300/450	29		n/a	n/a	
115.300	100X	China	CHN	BAOSHAN	25D03`00" N	099D10`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.300	100X	China	CHN	CHANGCHUN	43D54`00" N	125D11`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.300	100X	China	CHN	XI'AN	34D27`00" N	108D45`E	VOR/DME	I	200/450	29		200/450	40	DME NAT; DVOR
115.300	100X	China	CHN	YANCHENG	33D25`00" N	120D12`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.300	100X	Guam (United States)	GUM	GUAM AGANA	13D27`00" N	144D57`E	VOR/DME	I	200/450	29		200/450	40	
115.300	100X	ICAOTEST APAC	ZZZ	Maastricht	51D51`51" N	006D06`E	VOR/DME	NAT	200/450	27		200/450	37	



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115.300	100X	India	IND	KANPUR	26D24`21" N	080D25`E	VOR/DME	N	200/450	29		200/450	40	21Mar08; DVOR
115.300	100X	Indonesia	INS	ROTE D.C.	10D45`52" S	123D04`E	VOR/DME	N	200/450	27		200/450	37	OFF OFF; DVOR
115.300	100X	Japan	J	DAIGO	36D45`00" N	140D21`E	VOR/TAC	I	100/450	23		100/450	27	20Dec13; DVOR
115.300	100X	Japan	J	WAKKANAI	45D24`00" N	141D48`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.300	100X	Malaysia	MLA	Mukah Airport	02D53`34" N	112D30`E	VOR/DME	NAT	200/450	27		200/450	37	04Dec18; DVOR
115.300	100X	New Zealand	NZL	CHRISTCHURCH	43D30`15" S	172D30`E	VOR/DME	I	200/450	29		200/450	40	
115.300	100X	Philippines	PHL	BACOLOD	10D38`19" N	122D55`E	VOR/DME	N	59/300	20		59/300	27	16MAR11
115.300	100X	Thailand	THA	SONGKHLA HAT YAI	06D56`00" N	100D23`E	VOR/DME	I	300/450	29		300/450	40	DVOR
115.400	n/a	Australia	AUS	MELBOURNE	37D40`06" S	144D49`E	GBAS	N	25/62.5	100		25/100	n/a	G09A, G16A, G27A, G34A
115.400	101X	China	CHN	DALIAN	38D58`00" N	121D34`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.400	101X	China	CHN	JINTANG	30D52`00" N	104D23`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.400	101X	China	CHN	XISHUI	30D26`00" N	115D16`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
115.400	101X	India	IND	JAMSHEDPUR	22D48`45" N	086D10`E	VOR/DME	N	200/450	29		200/450	40	
115.400	101X	India	IND	KANCHEEPURAM	12D47`15" N	079D42`E	VOR/DME	N	200/450	29		200/450	40	
115.400	101X	India	IND	RAJKOT	22D18`47" N	070D46`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.400	101X	Indonesia	INS	BAU BAU BETOAMباري	05D29`09" S	122D34`E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.400	101X	Japan	J	MISAWA	40D42`00" N	141D23`E	VOR/TAC	N	200/450	29		200/450	40	
115.400	101X	Japan	J	NAKATANE	30D36`00" N	130D59`E	VOR/DME	N	200/450	29		200/450	40	24Dec13 ; DVOR
115.400	101X	Malaysia	MLA	KUALATERENGGANU	05D23`00" N	103D06`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.400	101X	Thailand	THA	PETCHABUN	16D40`46" N	101D11`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.400	101X	Viet Nam	VTN	VAN DON	21D07`07" N	107D25`E	VOR/DME	N	200/450	29		200/450	40	FI 17Oct17; DVOR
115.500	n/a	Bangladesh	BGD	COMILLA	23D26`00" N	091D11`E	VOR	I	200/450	29		n/a	n/a	
115.500	102X	China	CHN	CHIFENG	42D11`00" N	118D49`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.500	102X	China	CHN	DUNHUANG	40D10`00" N	094D45`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.500	102X	China	CHN	XINYUAN	43D26`00" N	083D23`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.500	102X	China	CHN	ZHAOTONG	27D19`00" N	103D45`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
115.500	102X	China	CHN	ZHOUKOU	33D40`00" N	114D38`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.500	102X	China - Hong Kong	HKG	SIU MO TO	22D20`15" N	113D58`E	VOR/DME	N	70/450	17		70/450	27	FI FOR 2022; DVOR
115.500	102X	India	IND	AMRITSAR	31D42`25" N	074D48`E	VOR/DME	I	300/450	29		300/450	40	DVOR
115.500	102X	India	IND	BANGALORE	12D56`59" N	077D40`E	VOR/DME	N	200/450	29		200/450	40	
115.500	102X	Indonesia	INS	AMBON PATTIMURA	03D36`53" S	128D11`E	VOR/DME	I	300/450	29		300/450	40	DME NAT; DVOR
115.500	102X	Indonesia	INS	PALEMBANG	02D52`43" S	104D39`E	VOR/DME	I	300/450	29		300/450	40	DME NAT; DVOR
115.500	102X	Japan	J	AMAMI	28D27`00" N	129D35`E	VOR/TAC	N	200/450	29		200/450	40	20Dec13; DVOR
115.500	102X	Japan	J	NIIGATA	37D57`00" N	139D07`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
115.500	102X	Philippines	PHL	TACLOBAN	11D14`01" N	125D01`E	VOR/DME	N	150/450	27		150/450	37	
115.500	102X	Republic of Korea	KOR	INCHEON ACC	37D24`49" N	126D55`E	VOR/TAC	I	100/450	23		100/450	27	FI 26Dec13; DVOR
115.500	102X	Thailand	THA	MAE HONG SON	19D19`10" N	097D54`E	VOR/DME	N	200/300	29		200/300	40	AIP; DVOR
115.500	102X	Viet Nam	VTN	PHU CAT	13D57`00" N	100D24`E	VOR/DME	N	200/450	29		200/450	40	
115.600	103X	Australia	AUS	ALBURY	36D04`05" S	146D57`E	VOR/DME	N	200/450	27		200/450	37	Details Updated.
115.600	103X	China	CHN	NANTONG	32D06`00" N	120D59`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.600	103X	China	CHN	NANXIONG	25D07`00" N	114D16`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
115.600	103X	China	CHN	TIANZHEN	40D25`00" N	114D03`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.600	103X	China	CHN	WENSHAN	23D33`00" N	104D19`E	VOR/DME	I	200/450	29		200/450	40	DVOR



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115.600	103X	India	IND	Phalodi	27D05'54" N	072D11' E	VOR/DME	NAT	200/450	27		200/450	37	DVOR
115.600	103X	Japan	J	AWAJI	34D16'00" N	134D43' E	VOR/DME	N	200/450	29		200/450	40	20Dec13; DVOR
115.600	103X	Malaysia	MLA	TAWAU	04D19'31" N	118D08' E	VOR/DME	I	30/100	17		30/100	27	DVOR
115.600	103X	Myanmar	BRM	PATHEIN	16D48'00" N	094D47' E	VOR/DME	I	200/450	29		200/450	40	
115.600	103X	Nepal	NPL	CHANDARGADI	26D34'11" N	088D04' E	VOR/DME	N	200/450	29		200/450	40	10Jun18; DVOR
115.600	103X	New Zealand	NZL	WOODBOURNE	41D31'11" S	173D51' E	VOR/DME	N	200/450	29		200/450	40	
115.600	103X	Republic of Korea	KOR	INCHEON ACC	37D42'02" N	128D45' E	VOR/TAC	N	100/450	23		100/450	27	FI 26Dec13; DVOR
115.600	103X	Viet Nam	VTN	CON SON	08D43'00" N	106D37' E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.700	104X	China	CHN	CHENGDU	30D34'00" N	103D56' E	VOR/DME	I	200/450	29		200/450	40	
115.700	104X	China	CHN	KASHI	39D33'00" N	076D01' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.700	104X	China	CHN	SHILONG	23D05'00" N	113D51' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.700	104X	China	CHN	URUMQI	43D55'00" N	087D28' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.700	104X	China	CHN	WEIXIAN	36D22'00" N	114D55' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.700	104X	China	CHN	WULANHAOTE	46D12'00" N	122D05' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.700	104X	China	CHN	YABULAI	39D26'00" N	102D46' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.700	104X	India	IND	KALAMB	19D06'18" N	073D23' E	VOR/DME	N	200/450	29		200/450	40	Not yet commissioned
115.700	104X	India	IND	Kushinagar	26D57'56" N	083D53' E	VOR/DME	NAT	200/450	27		200/450	37	
115.700	104X	India	IND	LEH	34D08'00" N	077D33' E	VOR/DME	N	150/450	27		150/450	37	Not yet commissioned; DVOR
115.700	104X	India	IND	PORT BLAIR	11D38'59" N	092D44' E	VOR/DME	I	300/450	29		300/450	40	
115.700	104X	India	IND	SILCHAR	24D54'57" N	092D58' E	VOR/DME	N	200/450	29		200/450	40	
115.700	104X	India	IND	TIRUPATHI	13D38'04" N	079D32' E	VOR/DME	N	150/450	27		150/450	37	DVOR
115.700	104X	Indonesia	INS	MANOKWARI RENDANI	00D53'34" S	134D03' E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.700	104X	Indonesia	INS	PALU MUTIARA	00D55'00" S	119D54' E	VOR/DME	N	200/450	27		200/450	37	DVOR
115.700	104X	Japan	J	KAJIKI	31D48'00" N	130D44' E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.700	104X	Japan	J	ONJUKU	35D11'00" N	140D22' E	VOR/TAC	N	200/450	29		200/450	40	DVOR
115.700	104X	Pakistan	PAK	ZHOB	31D21'00" N	069D27' E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.700	104X	Philippines	PHL	MASBATE	12D22'09" N	123D37' E	VOR/DME	N	150/450	27		150/450	37	
115.700	104X	Thailand	THA	NAN	18D48'32" N	100D46' E	VOR/DME	N	200/450	29		200/450	40	NOTAM; DVOR
115.700	104X	Viet Nam	VTN	PHAN THIET	10D50'00" N	108D04' E	VOR/DME	N	30/450	17		30/450	27	
115.800	n/a	Bangladesh	BGD	SAIDPUR	25D45'00" N	088D54' E	VOR	I	200/450	29		n/a	n/a	
115.800	105X	China	CHN	LONGKOU	29D56'00" N	113D42' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.800	105X	China	CHN	WEIHAI	37D11'00" N	122D14' E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.800	105X	India	IND	JALALABAD	27D41'40" N	079D39' E	VOR/DME	N	200/450	29		200/450	40	
115.800	105X	Indonesia	INS	CURUG BUDIARTO	06D17'33" S	106D34' E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.800	105X	Indonesia	INS	MERAUKE MOPAH	08D30'58" S	140D24' E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.800	105X	Japan	J	FUKUE	32D40'00" N	128D50' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.800	105X	Viet Nam	VTN	HUE PHU-BAI	16D24'00" N	107D42' E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.900	106X	Australia	AUS	ALICE SPRINGS	23D47'34" S	133D52' E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated
115.900	106X	China	CHN	BOSE	23D54'00" N	106D39' E	VOR/DME	N	200/450	29		200/450	40	BAISE
115.900	106X	China	CHN	BOTOU	38D06'00" N	116D34' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.900	106X	China	CHN	CHANGCHUN	43D46'00" N	125D51' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.900	106X	China	CHN	HANZHONG	33D04'00" N	107D01' E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.900	106X	China	CHN	KUERLE	41D37'00" N	086D08' E	VOR/DME	I	200/450	29		200/450	40	DVOR



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115.900	106X	China	CHN	SHEKOU	22D30`00" N	113D54`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.900	106X	China	CHN	TONGLU	29D46`00" N	119D40`E	VOR/DME	I	200/450	29		200/450	40	DVOR
115.900	106X	India	IND	IMPHAL	24D45`27" N	093D54`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.900	106X	India	IND	SRINAGAR	33D59`00" N	074D47`E	VOR/DME	N	200/450	29		200/450	40	DVOR
115.900	106X	India	IND	UDAIPUR	24D36`46" N	073D53`E	VOR/DME	N	200/450	29		200/450	40	
115.900	106X	Japan	J	OKAYAMA	34D40`00" N	134D01`E	VOR/TAC	N	200/450	29		200/450	40	26Dec13; DVOR
115.900	106X	Philippines	PHL	PUERTO PRINCESA	09D44`29" N	118D45`E	VOR/DME	N	150/450	27		150/450	37	DVOR
115.900	106X	Thailand	THA	LOEI	17D27`00" N	101D43`E	VOR/DME	N	300/450	29		300/450	40	DVOR
116.000	107X	Australia	AUS	TAMWORTH	31D03`58" S	150D49`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
116.000	107X	Cambodia	KMR	SIHANOUK VILLE	13D23`50" N	103D48`E	VOR/DME	N	200/450	29		200/450	40	9May08; DVOR
116.000	107X	China	CHN	HEKOU	31D19`00" N	114D25`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.000	107X	India	IND	BARAPANI	25D42`22" N	091D58`E	VOR/DME	N	200/450	29		200/450	40	Proposed
116.000	107X	India	IND	Kalaburgi	17D18`23" N	076D58`E	VOR/DME	N	200/450	29		200/450	40	Replace previous Gulbarga
116.000	107X	India	IND	NAL(BIKANER)	28D04`01" N	073D11`E	VOR/DME	NAT	200/450	27		200/450	37	
116.000	107X	Indonesia	INS	BATAM HANG NADIM	01D08`13" S	104D07`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.000	107X	Japan	J	AMI	36D01`00" N	140D12`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.000	107X	Mongolia	MON	ULAAN BAATAR	47D52`04" N	106D44`E	VOR/DME	I	300/450	29		300/450	40	
116.100	108X	Australia	AUS	AVALON	38D02`57" S	144D27`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated
116.100	n/a	Australia	AUS	SYDNEY	33D57`48" S	151D11`E	GBAS	N	25/62.5	20		25/100	n/a	G07A, G16A, G16B, G25A, G34A, G34B
116.100	108X	China	CHN	CHONGQING	29D43`00" N	106D39`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.100	108X	China	CHN	EERDUOSI	39D29`00" N	109D52`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.100	108X	China	CHN	HUANGCHENG	37D39`00" N	120D33`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.100	108X	China	CHN	TUNXI	29D44`00" N	118D15`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.100	108X	China - Hong Kong	HKG	HONGKONG TUNG LUNG	22D14`52" N	114D17`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.100	108X	India	IND	AGARTALA	23D53`22" N	091D14`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.100	108X	India	IND	DELHI	28D34`00" N	077D05`E	VOR/DME	I	300/450	29		300/450	40	DVOR
116.100	108X	India	IND	MADURAI	09D49`52" N	078D05`E	VOR/DME	I	300/450	29		300/450	40	
116.100	108X	India	IND	RAIPUR	21D10`48" N	081D44`E	VOR/DME	N	150/450	27		150/450	37	
116.100	108X	Indonesia	INS	CIREBON	06D45`22" S	108D32`E	VOR/DME	N	200/450	29		200/450	40	DME NAT; DVOR
116.100	108X	Indonesia	INS	LUWUK SYUKURAN	01D01`11" S	122D47`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.100	108X	Indonesia	INS	MALANG ABDUL	07D55`49" S	112D42`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.100	108X	Malaysia	MLA	NEW KUALA LUMPUR	02D43`28" N	101D44`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.100	108X	Viet Nam	VTN	HANOI NOI BAI	21D12`00" N	105D50`E	VOR/DME	I	200/450	29		200/450	40	
116.100	108X	Viet Nam	VTN	NOIBAI	21D12`00" N	010D55`E	VOR/DME	N	130/450	23		130/450	37	
116.200	n/a	Afghanistan	AFG	DILARAM	32D10`00" N	063D25`E	VOR	N	200/450	29		n/a	n/a	
116.200	109X	Bhutan	BTN	GELEPHU	26D53`04" N	090D27`E	VOR/DME	N	200/450	29		200/450	40	FI 6July17; DVOR
116.200	109X	China	CHN	LAOLIANGCANG	28D04`00" N	112D13`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.200	109X	India	IND	VIJAYAWADA	16D31`14" N	080D47`E	VOR/DME	N	200/450	29		200/450	40	Planned
116.200	109X	Indonesia	INS	BALI NGURAH RAI	08D45`02" S	115D09`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.200	109X	Indonesia	INS	JAYAPURA	02D34`42" S	140D30`E	VOR/DME	I	200/450	29		200/450	40	DME NAT; DVOR
116.200	109X	Indonesia	INS	PALU MUTIARA	00D53`06" S	119D53`E	VOR/DME	N	200/450	29		200/450	40	
116.200	109X	Japan	J	YOKOSUKA	35D15`00" N	139D35`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.200	109X	Malaysia	MLA	PENANG	05D16`46" N	100D15`E	VOR/DME	I	300/450	29		300/450	40	DVOR



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116.200	109X	Mongolia	MON	MUREN	49D41`32" N	100D23`E	VOR/DME	N	200/450	29		200/450	40	20Nov08; DVOR
116.200	109X	Viet Nam	VTN	DONG HOI	17D30`00" N	106D35`E	VOR/DME	N	200/450	29		200/450	40	1Apr04; DVOR
116.300	n/a	Australia	AUS	GLADSTONE	23D51`55" S	151D12`E	VOR	N	200/450	29		n/a	n/a	Coordinates Updated.
116.300	n/a	China	CHN	FUKANG	44D10`00" N	088D00`E	VOR	I	200/450	29		n/a	n/a	
116.300	110X	China	CHN	LONGMEN	23D39`00" N	114D20`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
116.300	110X	China	CHN	NINGBO	29D50`00" N	121D28`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.300	110X	China	CHN	NINGSHAN	33D19`00" N	108D19`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.300	110X	China	CHN	TONGLIAO	43D33`00" N	122D12`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.300	110X	China	CHN	XISHUANGBANNA	21D59`00" N	100D45`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.300	110X	India	IND	AURANGABAD	19D51`53" N	075D23`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.300	110X	India	IND	Charbatia	20D32`32" N	085D52`E	VOR/DME	NAT	200/450	27		200/450	37	DVOR
116.300	110X	Indonesia	INS	KAIMANA UTAROM	03D38`41" S	133D41`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.300	110X	Indonesia	INS	SOLO ADI SUMARMO	07D30`28" S	110D47`E	VOR/DME	N	150/450	29		150/450	40	DVOR
116.300	110X	Japan	J	MATSUYAMA	33D49`00" N	132D43`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.300	110X	Japan	J	SENDAI	38D08`00" N	140D55`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.300	110X	Malaysia	MLA	LABUAN	05D17`25" N	115D15`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.300	110X	Myanmar	BRM	MANDALAY NEW INTL	21D43`00" N	095D59`E	VOR/DME	N	200/450	29		200/450	40	
116.300	110X	Nepal	NPL	DHANGADHI	28D45`15" N	080D34`E	VOR/DME	N	200/450	29		200/450	40	FI 10Jun18; DVOR
116.300	110X	Papua New Guinea	PNG	MADANG	05D12`00" S	145D48`E	VOR/DME	I	300/450	29		300/450	40	
116.300	110X	Philippines	PHL	ILOILO	10D50`07" N	122D29`E	VOR/DME	N	100/450	23		100/450	27	
116.300	110X	Thailand	THA	NARATHIWAT	06D31`00" N	101D46`E	VOR/DME	N	200/450	29		200/450	40	FI 19MAR12; DVOR
116.300	110X	Viet Nam	VTN	PHU CAT	13D57`00" N	109D02`E	VOR/DME	N	130/450	23		130/450	37	
116.400	111X	Australia	AUS	ADELAIDE	34D56`49" S	138D31`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated
116.400	n/a	Bangladesh	BGD	SYLHET	24D57`00" N	091D52`E	VOR	N	200/450	29		n/a	n/a	
116.400	111X	China	CHN	LINRU	34D09`00" N	112D51`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.400	111X	China	CHN	WENZHO	27D55`00" N	120D51`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.400	111X	China - Macao	MAC	MACAU	22D08`00" N	113D35`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.400	111X	India	IND	KHAJURAHO	24D48`54" N	079D55`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.400	111X	India	IND	SRINAGAR	34D00`09" N	074D45`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.400	111X	Indonesia	INS	INDRAMAYU	01D05`00" N	117D28`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.400	111X	Indonesia	INS	PADANG TABING	00D52`47" S	100D21`E	VOR/DME	N	200/450	27		200/450	37	OFF; DVOR
116.400	111X	Japan	J	MUKAWA	42D33`00" N	141D57`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.400	111X	Japan	J	NEW CHITOSE	42D33`00" N	141D57`E	VOR/DME	I	200/450	29		200/450	40	FI 24Dec13 ; DVOR
116.400	111X	Japan	J	TOMO	34D17`00" N	135D00`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.400	111X	Mongolia	MON	GOBI-ALTAI	46D22`42" N	096D12`E	VOR/DME	N	200/450	29		200/450	40	19Dec13; DVOR
116.400	111X	New Zealand	NZL	NELSON	41D18`06" S	173D13`E	VOR/DME	N	200/450	29		200/450	40	
116.400	111X	Papua New Guinea	PNG	KAVIENG	02D36`13" S	150D50`E	VOR/DME	N	300/450	29		300/450	40	
116.500	112X	Australia	AUS	KUNUNURRA	15D46`32" S	128D42`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
116.500	112X	China	CHN	DAHUSHAN	41D39`00" N	122D08`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
116.500	112X	China	CHN	GAOYAO	23D04`00" N	112D29`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.500	112X	China	CHN	SHANGHAIHONGQIAO	30D54`00" N	120D26`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.500	112X	China	CHN	XINING	36D32`00" N	102D02`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.500	112X	China	CHN	YIBIN	28D48`00" N	104D33`E	VOR/DME	I	200/450	29		200/450	40	DVOR



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116.500	112X	India	IND	CALICUT	11D08`07" N	075D57`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.500	112X	India	IND	CHANDIGARH	30D40`04" N	076D48`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.500	112X	India	IND	HIRASAR AIRPORT	22D22`08" N	071D01`E	VOR/DME	NAT	200/450	27		200/450	37	
116.500	112X	India	IND	LILABARI	27D17`26" N	094D05`E	VOR/DME	N	200/450	29		200/450	40	Planned; DVOR
116.500	112X	Indonesia	INS	MADIUN ISWAHYUDI	07D38`00" S	111D26`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.500	112X	Japan	J	NIJIMA	34D21`00" N	139D16`E	VOR/TAC	N	100/450	23		100/450	27	26Dec13; DVOR
116.500	112X	Philippines	PHL	CAUAYAN	16D55`54" N	121D44`E	VOR/DME	N	200/450	29		200/450	40	16MAR11
116.500	112X	Republic of Korea	KOR	DAEGU INTL	35D54`13" N	128D38`E	VOR/DME	N	25/100	17		25/100	27	DVOR
116.500	112X	Singapore	SNG	PULAU TEKONG KECHIL	01D25`00" N	104D01`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.500	112X	Thailand	THA	CHIANG RAI	19D56`53" N	099D53`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.500	112X	Viet Nam	VTN	CAM RANH	11D10`49" N	109D14`E	VOR/DME	N	200/450	29		200/450	40	1Apr04; DVOR
116.600	113X	China	CHN	LIPING	26D19`00" N	109D10`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.600	113X	China	CHN	WEIFANG	36D39`00" N	119D07`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.600	113X	India	IND	BAGHDOGRA	26D41`14" N	088D19`E	VOR/DME	N	200/450	29		200/450	40	
116.600	113X	India	IND	Bakhshi Ka Talab	26D59`28" N	080D52`E	VOR/DME	NAT	200/450	27		200/450	37	Forced Input
116.600	113X	India	IND	MUMBAI	19D05`11" N	075D52`E	VOR/DME	I	300/450	29		300/450	40	DVOR
116.600	113X	India	IND	VISAKHAPATANAM	17D43`16" N	083D13`E	VOR/DME	N	200/450	29		200/450	40	10Apr03; DVOR
116.600	113X	Indonesia	INS	TARAKAN JUWATA	03D02`00" N	117D34`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.600	113X	Japan	J	MIYAKO	39D52`00" N	141D57`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.600	113X	Japan	J	OMURA	32D54`00" N	129D55`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
116.600	113X	Lao People's Democratic	LAO	LUANG PRABANG	19D54`29" N	102D10`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.600	113X	Malaysia	MLA	GONG KEDAK	05D47`50" N	102D28`E	VOR/TAC	N	200/450	29		200/450	40	
116.600	113X	Mongolia	MON	SAINSHAND	44D54`11" N	110D07`E	VOR/DME	N	300/450	29		300/450	40	20Nov08; DVOR
116.600	113X	New Zealand	NZL	CHRISTCHURCH	43D23`56" S	172D23`E	VOR/DME	N	200/450	29		200/450	40	
116.600	113X	Papua New Guinea	PNG	WEWAK	03D45`00" S	143D41`E	VOR/DME	N	200/450	29		200/450	40	
116.600	113X	Viet Nam	VTN	CHU LAI	15D24`22" N	108D42`E	VOR/DME	N	200/450	29		200/450	40	14Apr05; DVOR
116.650	113Y	Japan	J	HACHIJO JIMA	33D07`00" N	139D47`E	VOR/DME	N	200/450	29		200/450	40	20Dec13; DVOR
116.700	114X	Australia	AUS	CANBERRA	35D16`53" S	149D11`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated
116.700	114X	China	CHN	HEFEI	31D47`00" N	117D18`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.700	114X	China	CHN	XUYONG	28D10`00" N	105D25`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
116.700	114X	China	CHN	YULIN	38D23`00" N	109D35`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.700	114X	China	CHN	ZHUHAISANZAO	22D13`00" N	113D28`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.700	114X	India	IND	INDORE	22D43`22" N	075D48`E	VOR/DME	N	200/450	29		200/450	40	
116.700	114X	Indonesia	INS	TANJUNG PANDAN	02D45`12" S	107D45`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.700	114X	Japan	J	KUMEJIMA	26D22`00" N	126D43`E	VOR/TAC	N	200/450	29		200/450	40	DVOR
116.700	114X	Japan	J	MIHO	35D32`00" N	133D06`E	VOR/TAC	I	200/450	29		200/450	40	DVOR
116.700	114X	Marshall Islands	MSI	MAJURO ATOLL	00D00`00" N	000D00`E	VOR/DME	I	200/450	29		200/450	40	
116.700	n/a	Pakistan	PAK	MULTAN	30D12`00" N	071D25`E	VOR	I	200/450	29		n/a	n/a	
116.700	114X	Philippines	PHL	JOMALIG	14D42`18" N	122D19`E	VOR/DME	I	90/450	20		90/450	27	16MAR11
116.700	114X	Sri Lanka	SLK	MATTALA	06D18`14" N	081D08`E	VOR/DME	ICA	200/450	27		200/450	37	
116.700	114X	Thailand	THA	MAESOT	16D41`55" N	098D32`E	VOR/DME	N	200/450	29		200/450	40	DVOR
116.700	114X	Viet Nam	VTN	QUI-NHON	00D00`00" N	000D00`E	VOR/DME	N	300/450	29		300/450	40	
116.700	114X	Viet Nam	VTN	TAN SON NHAT	10D49`00" N	106D39`E	VOR/DME	I	300/450	29		300/450	40	15Mar05; DVOR , To be replaced by TSH



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116.800	115X	China	CHN	CHANGHAI	39D16`00" N	122D37`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.800	115X	China	CHN	FUZHOU	25D57`00" N	119D40`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.800	n/a	India	IND	BANGALORE	13D24`05" N	077D54`E	VOR	N	200/450	29		n/a	n/a	3Jun08; DVOR
116.800	115X	India	IND	CHILLARKI	28D20`51" N	076D39`E	VOR/DME	N	200/450	29		200/450	40	
116.800	115X	Indonesia	INS	KETAPANG RAHADI	01D48`59" S	109D57`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.800	115X	Indonesia	INS	TANJUNG REDEB	02D09`13" N	117D25`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.800	115X	Malaysia	MLA	MERSING	02D23`18" N	103D52`E	VOR/DME	N	250/450	29		250/450	40	DVOR
116.800	115X	Myanmar	BRM	LASHIO	22D59`00" N	097D45`E	VOR/DME	N	200/450	29		200/450	40	
116.800	115X	New Zealand	NZL	INVERCARGILL	46D24`42" S	168D19`E	VOR/DME	N	200/450	29		200/450	40	
116.800	115X	Viet Nam	VTN	TAN SON NHAT	10D49`06" N	106D39`E	VOR/DME	NAT	200/450	27		200/450	37	
116.900	116X	Australia	AUS	PARABURDOO	23D10`21" S	117D44`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
116.900	116X	Australia	AUS	ROCKHAMPTON	23D22`58" S	150D28`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
116.900	116X	China	CHN	DEQING	23D12`00" N	111D46`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.900	116X	China	CHN	HUHHOT	40D45`00" N	111D49`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.900	116X	China	CHN	PUDONG	31D10`00" N	121D47`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.900	116X	China	CHN	YICHANG	30D34`00" N	111D29`E	VOR/DME	I	200/450	29		200/450	40	DVOR
116.900	116X	India	IND	LEH	34D07`57" N	077D32`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.900	116X	India	IND	RANCHI	23D18`31" N	085D19`E	VOR/DME	N	200/450	29		200/450	40	
116.900	116X	India	IND	SINNAR	19D48`00" N	073D58`E	VOR/DME	N	200/450	29		200/450	40	Planned
116.900	116X	Pakistan	PAK	FAISALABAD	31D21`30" N	072D59`E	VOR/DME	N	200/450	27		200/450	37	DVOR
116.900	116X	Republic of Korea	KOR	INCHEON ACC	37D05`40" N	127D01`E	VOR/TAC	N	100/450	23		100/450	27	FI 26Dec13; DVOR
116.900	116X	Thailand	THA	CHIANG MAI	18D46`00" N	098D58`E	VOR/DME	I	200/300	29		200/300	40	DVOR
116.900	116X	Thailand	THA	PHUKET	08D06`00" N	098D18`E	VOR/DME	I	150/300	27		150/300	37	DVOR
117.000	117X	Australia	AUS	COFFS HARBOUR	30D19`10" S	153D07`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated
117.000	n/a	Australia	AUS	MOUNT GAMBIER	37D45`05" S	140D47`E	VOR	I	200/450	29		n/a	n/a	Coordinates Updated.
117.000	117X	China	CHN	ANSHUN	26D16`00" N	105D53`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.000	117X	China	CHN	JINJIANG	24D48`00" N	118D56`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.000	117X	China	CHN	QUANZHOU	24D48`00" N	118D36`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.000	117X	India	IND	Kumbhigram	24D54`55" N	092D59`E	VOR/DME	NAT	200/450	27		200/450	37	
117.000	117X	India	IND	SAMPLA	28D49`11" N	076D49`E	VOR/DME	N	200/450	29		200/450	40	
117.000	117X	India	IND	YELAHANKA	13D05`13" N	077D35`E	VOR/DME	N	200/450	29		200/450	40	24May11; DVOR
117.000	117X	Indonesia	INS	BANDUNG HUSEIN	06D52`55" S	107D30`E	VOR/DME	N	200/450	27		200/450	37	DVOR
117.000	117X	Japan	J	SEKIYADO	36D01`00" N	139D50`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.000	117X	Japan	J	YAKUSHIMA	30D23`00" N	130D40`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.000	117X	Nepal	NPL	Guatam Buddha	27D30`05" N	083D26`E	VOR/DME	ICA	200/450	27		200/450	37	2May19; PLI; NC
117.000	117X	Papua New Guinea	PNG	PORT MORESBY	09D31`00" S	147D03`E	VOR/DME	I	300/450	29		300/450	40	
117.000	117X	Viet Nam	VTN	TUY HOA	13D01`41" N	109D20`E	VOR/DME	N	200/450	29		200/450	40	18Dec15; DVOR
117.100	118X	China	CHN	BEIHAI	21D35`00" N	109D27`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.100	118X	China	CHN	JIUJIANG	29D28`00" N	115D47`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.100	118X	China	CHN	LUANXIAN	39D44`00" N	118D44`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.100	118X	China	CHN	MUDANJIANG	44D31`00" N	129D34`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.100	118X	China	CHN	WUFENGXI	30D36`00" N	104D29`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.100	118X	India	IND	BHOPAL	23D16`58" N	077D20`E	VOR/DME	N	200/450	29		200/450	40	DVOR



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117.100	118X	Indonesia	INS	SORONG DOMINE	00D53`46" S	131D17`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.100	118X	Japan	J	OTSU	35D01`00" N	135D50`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.100	118X	Japan	J	SHIMOJISHIMA	24D49`00" N	125D09`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.100	118X	Lao People's Democratic	LAO	Bokeo International	20D18`22" N	100D09`E	VOR/DME	NAT	200/450	27		200/450	37	
117.100	118X	Malaysia	MLA	KERTEH	04D32`54" N	103D25`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.100	118X	Philippines	PHL	SAN JOSE	12D21`37" N	121D02`E	VOR/DME	N	150/450	27		150/450	37	
117.200	119X	Australia	AUS	NEWMAN	23D25`16" S	119D48`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
117.200	119X	China	CHN	JIUZHOU DAO	22D15`00" N	113D37`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.200	119X	China	CHN	LUZHOU	28D51`00" N	105D23`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.200	119X	China	CHN	SHANGHAI HONGQIAO	31D13`00" N	121D20`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.200	119X	China	CHN	SHAZIYING	40D06`00" N	116D28`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.200	119X	India	IND	DEOGHAR	24D26`46" N	086D43`E	VOR/DME	N	200/450	27		200/450	37	05Mar20; DVOR
117.200	119X	India	IND	SAKRAS	27D50`54" N	077D00`E	VOR/DME	N	200/450	29		200/450	40	
117.200	119X	India	IND	SINDHUDURG	16D00`10" N	073D33`E	VOR/DME	NAT	200/450	27		200/450	37	FI 11June19; DVOR
117.200	119X	Indonesia	INS	BALIKPAPAN SULTAN	01D14`44" S	116D56`E	VOR/DME	N	200/450	27		200/450	37	DVOR
117.200	119X	Thailand	THA	BURIRUM	15D14`22" N	103D15`E	VOR/DME	N	200/450	29		200/450	40	NOTAM; DVOR
117.300	120X	Australia	AUS	KARRATHA	20D42`54" S	116D46`E	VOR/DME	N	200/450	29		200/450	40	Coordinates Updated.
117.300	120X	China	CHN	BAOTOU	40D33`00" N	110D00`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.300	120X	China	CHN	DIQING	27D47`00" N	099D41`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.300	120X	China	CHN	HANGZHOU	30D09`00" N	120D30`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.300	120X	China	CHN	LIUZHOU	24D12`00" N	109D24`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.300	120X	India	IND	COCHIN INTL	10D06`55" N	076D40`E	VOR/DME	N	200/450	29		200/450	40	Not Yet Commissioned; DVOR
117.300	120X	India	IND	DIBRUGARH	27D29`14" N	095D01`E	VOR/DME	N	200/450	29		200/450	40	
117.300	120X	India	IND	VADODARA	22D19`51" N	073D13`E	VOR/DME	N	200/450	29		200/450	40	
117.300	120X	Indonesia	INS	KARIMUN JAWA	05D48`01" S	110D28`E	VOR/DME	N	200/450	27		200/450	37	DVOR
117.300	120X	Indonesia	INS	NABIRE DOUW ATURURE	03D22`00" S	135D30`E	VOR/DME	N	200/450	27		200/450	37	DVOR
117.300	120X	Indonesia	INS	WAINGAPU UMBU	09D40`11" S	120D18`E	VOR/DME	N	200/450	27		200/450	37	DVOR
117.300	120X	Japan	J	KAGOSHIMA	31D39`00" N	130D51`E	VOR/DME	N	200/450	29		200/450	40	20Dec13; DVOR
117.300	120X	Malaysia	MLA	IPOH	04D34`24" N	101D05`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.300	120X	Nepal	NPL	POKHARA	28D11`23" N	084D00`E	VOR/DME	N	200/450	27		200/450	37	FI 22Oct19; DVOR
117.300	n/a	Thailand	THA	LOPBURI SAPHANNAK	14D57`00" N	100D38`E	VOR	N	200/450	29		n/a	n/a	
117.400	121X	China	CHN	FUQING	25D44`00" N	119D23`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.400	121X	China	CHN	FUZHOU	25D44`00" N	119D23`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.400	121X	China	CHN	NANCHONG	30D48`00" N	106D11`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.400	121X	India	IND	LUCKNOW	26D45`44" N	080D52`E	VOR/DME	N	200/450	29		200/450	40	28Oct.2011; DVOR
117.400	121X	India	IND	MOPA AIRPORT	15D44`49" N	073D51`E	VOR/DME	NAT	200/450	27		200/450	37	Goa; DVOR
117.400	121X	Indonesia	INS	PANGKALAN BUN	02D43`03" S	111D41`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.400	121X	Malaysia	MLA	MALACCA	02D15`23" N	102D15`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.400	121X	Thailand	THA	NAKHON SI THAMMARAT	08D32`29" N	099D56`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.400	121X	Viet Nam	VTN	CAT BI HAI PHONG	20D48`45" N	106D41`E	VOR/DME	N	200/450	29		200/450	40	20APR15
117.500	122X	Australia	AUS	MOUNT ISA	20D39`53" S	139D29`E	VOR/DME	I	200/450	29		200/450	40	Coordinates Updated.
117.500	122X	China	CHN	LINLI	29D21`00" N	111D39`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.500	122X	China	CHN	QINGDAO	36D17`00" N	120D22`E	VOR/DME	I	200/450	29		200/450	40	DVOR



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117.500	122X	China	CHN	ZHONGWEI	37D34`00" N	105D08`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.500	122X	India	IND	JALGAON	20D57`50" N	075D38`E	VOR/DME	N	200/450	29		200/450	40	24May11; DVOR
117.500	122X	India	IND	PANAGARH	23D28`41" N	087D25`E	VOR/DME	N	200/450	27		200/450	37	DVOR
117.500	122X	India	IND	THOISE	34D39`03" N	077D23`E	VOR/DME	N	200/450	27		200/450	37	FI ; DVOR
117.500	122X	Indonesia	INS	JAMBI SULT. THAHA	01D38`02" S	103D38`E	VOR/DME	N	200/450	27		200/450	37	DVOR
117.500	122X	Japan	J	MIYAKOJIMA	24D47`00" N	125D18`E	VOR/TAC	N	200/450	29		200/450	40	DVOR
117.500	122X	Lao People's Democratic	LAO	VIENTIANE	18D00`37" N	102D32`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.500	122X	Philippines	PHL	LUBANG	13D51`15" N	120D06`E	VOR/DME	I	300/450	29		300/450	40	
117.600	123X	China	CHN	BAISE	23D43`00" N	106D58`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.600	123X	China	CHN	FUZHOU	26D13`00" N	119D33`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.600	123X	China	CHN	JIUZHAI	32D51`00" N	103D41`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.600	123X	China	CHN	LIANJIANG	26D13`00" N	119D32`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.600	n/a	India	IND	CHENNAI	12D59`34" N	080D09`E	GBAS	N	23/100	17		n/a	n/a	FI GBAS 22Aug13
117.600	123X	India	IND	GUWAHATI	26D06`07" N	091D35`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.600	123X	India	IND	LUNKA-1	28D34`13" N	073D47`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.600	123X	Japan	J	MATSUMOTO	36D09`00" N	137D55`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.600	123X	Thailand	THA	SAMUI	09D33`00" N	100D04`E	VOR/DME	N	300/450	29		300/450	40	DVOR
117.700	124X	China	CHN	JINGDEZHEN	29D20`00" N	117D10`E	VOR/DME	N	200/450	29		200/450	40	FI ; DVOR
117.700	124X	China	CHN	NANLANG	22D32`00" N	113D34`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.700	124X	China	CHN	ZHENGDDING	38D17`00" N	114D42`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.700	n/a	India	IND	ALLAHABAD	25D26`00" N	081D44`E	VOR	N	200/450	29		n/a	n/a	TRAINING
117.700	124X	India	IND	KANDLA	23D06`42" N	070D06`E	VOR/DME	N	200/450	29		200/450	40	FI 25May15; DVOR
117.700	124X	India	IND	KANGRA GAGGAI	32D10`09" N	076D15`E	VOR/DME	N	200/450	29		200/450	40	22Apr15; DVOR
117.700	124X	Japan	J	ISHIGAKI	24D20`00" N	124D11`E	VOR/DME	N	200/450	29		200/450	40	DVOR
117.700	124X	Japan	J	IWAKI	37D09`00" N	140D59`E	VOR/DME	I	200/450	29		200/450	40	
117.700	124X	Japan	J	OITA	33D29`00" N	131D44`E	VOR/DME	I	200/450	29		200/450	40	FI ; DVOR
117.700	124X	Thailand	THA	DON MUEANG INTL	13D53`36" N	100D35`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.800	125X	China	CHN	HUAIHUA	27D27`00" N	109D42`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.800	125X	India	IND	JAISALMER	26D53`23" N	070D52`E	VOR/DME	N	200/450	29		200/450	40	10Apr03; DVOR
117.800	125X	India	IND	KOCHI	09D56`34" N	076D16`E	VOR/DME	N	200/450	29		200/450	40	4MAR13; DVOR
117.800	125X	India	IND	Navi Mubai	18D58`56" N	073D03`E	VOR/DME	NAT	200/450	27		200/450	37	
117.800	125X	India	IND	PAKYONG	27D13`39" N	088D35`E	VOR/DME	N	200/450	29		200/450	40	25May15; DVOR
117.800	125X	Japan	J	CHUBU CENTRAIR	34D51`00" N	136D48`E	VOR/DME	N	200/450	29		200/450	40	FI 20Dec13; DVOR
117.800	125X	Japan	J	MINAMIDAITO	25D51`00" N	131D16`E	VOR/DME	N	200/450	29		200/450	40	24Dec13 ; DVOR
117.800	125X	Lao People's Democratic	LAO	Nongkhang	20D36`48" N	104D03`E	VOR/DME	ICA	200/450	27		200/450	37	NC
117.800	n/a	Malaysia	MLA	KUALA LUMPOR	02D44`53" N	101D41`E	GBAS	N	23/100	17		n/a	n/a	FI 14KOG7DET
117.900	126X	China	CHN	BOHESI	30D31`00" N	104D12`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.900	126X	China	CHN	WUYISHAN	27D41`00" N	117D59`E	VOR/DME	I	200/450	29		200/450	40	DVOR
117.900	126X	India	IND	ALIGARH	27D49`46" N	078D10`E	VOR/DME	N	200/450	29		200/450	40	
117.900	126X	India	IND	DUNDIGUL	17D37`41" N	078D24`E	VOR/DME	N	200/450	29		200/450	40	FI 7Feb18; DVOR
117.900	126X	India	IND	TEZPUR	26D42`37" N	092D46`E	VOR/DME	N	150/450	27		150/450	37	DVOR
117.900	126X	Japan	J	HIROSHIMA	34D26`00" N	132D55`E	VOR/DME	I	200/450	29		200/450	40	FI 20Dec13; DVOR
117.900	126X	Japan	J	NARITA	35D47`00" N	140D22`E	VOR/DME	I	200/450	29		200/450	40	DVOR



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Frequency	DME ch	Country	Ctry	Location	Latitude	Longitude	Facility	Cat.	VHFDOC	VHFpwr	TRD	DMEDOC	DMEPwr	Remarks
117.900	126X	Republic of Korea	KOR	JEJU JUNGSKUK	33D23`32" N	126D42`E	VOR/DME	N	40/100	17		40/100	27	
n/a	034X	Australia	AUS	ALBANY	34D57`00" S	117D48`E	DME	N	n/a	n/a		200/450	40	Coordinates Updated
n/a	094X	Australia	AUS	AMBERLEY	27D38`00" S	152D42`E	TACAN	N	n/a	n/a		200/450	40	
n/a	073X	Australia	AUS	ARMIDALE	30D31`40" S	151D36`E	DME	N	n/a	n/a		200/450	40	
n/a	118X	Australia	AUS	AYERS ROCK	25D10`17" S	130D58`E	DME	N	n/a	n/a		200/450	40	11OCT00
n/a	100X	Australia	AUS	BROOME	17D56`48" S	122D14`E	DME	N	n/a	n/a		80/100	27	
n/a	087X	Australia	AUS	COOMA	36D21`16" S	148D57`E	DME	N	n/a	n/a		80/100	27	Coordinates Updated
n/a	084X	Australia	AUS	DARWIN	12D24`49" S	130D52`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated
n/a	094X	Australia	AUS	EDINBURGH	34D42`17" S	138D36`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated
n/a	095X	Australia	AUS	GROOTE EYLANDT	13D58`31" S	136D27`E	DME	N	n/a	n/a		80/100	27	Name Updated.
n/a	090X	Australia	AUS	LORD HOWE IS.	31D31`44" S	159D04`E	DME	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	124X	Australia	AUS	MERIMBULA	36D54`52" S	149D53`E	DME	N	n/a	n/a		200/450	40	
n/a	057X	Australia	AUS	MOOMBA	28D06`15" S	140D11`E	DME	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	111X	Australia	AUS	NOWRA	34D57`00" S	150D32`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	075X	Australia	AUS	PEARCE	31D40`26" S	116D01`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	044X	Australia	AUS	RICHMOND	33D36`27" S	150D47`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	058X	Australia	AUS	SYDNEY	33D56`38" S	151D10`E	DME	I	n/a	n/a		200/450	37	Details Updated.
n/a	070X	Australia	AUS	TINDAL	14D31`24" S	132D22`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	082X	Australia	AUS	TOWNSVILLE	19D16`44" S	146D44`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	080X	Australia	AUS	WILLIAMTOWN	32D47`49" S	151D50`E	TACAN	N	n/a	n/a		200/450	40	Coordinates Updated.
n/a	085X	French Polynesia	OCA	HAO	18D04`55" S	140D56`W	DME	N	n/a	n/a		200/450	40	
n/a	023X	ICAOTEST APAC	ZZZ	Henglo	51D51`51" N	005D05`E	TACAN	ICA	n/a	n/a		200/450	37	
n/a	106X	India	IND	AGATTI	10D49`54" N	072D10`E	DME	N	n/a	n/a		200/450	40	Colocated with NDB
n/a	105X	Indonesia	INS	KAREL SADSUITUBUN	05D45`22" S	132D45`E	DME	N	n/a	n/a		200/450	37	
n/a	111X	Indonesia	INS	LARANTUKA	08D16`29" S	122D59`E	DME	N	n/a	n/a		200/450	37	
n/a	085X	Indonesia	INS	LONG BAWAN YUVAI	03D53`00" N	115D42`E	DME	N	n/a	n/a		200/450	37	OFF
n/a	078X	Indonesia	INS	MUKO MUKO MUKO	02D32`32" S	101D05`E	DME	N	n/a	n/a		200/450	37	OFF
n/a	055X	Indonesia	INS	PULAU BANDA	04D31`19" S	129D54`E	DME	N	n/a	n/a		200/450	37	OFF
n/a	055X	Indonesia	INS	SAMARINDA	00D28`55" N	117D09`E	DME	N	n/a	n/a		200/450	37	OFF
n/a	057Y	Japan	J	AKENO	34D32`00" N	136D41`E	TACAN	N	n/a	n/a		200/450	40	FI 20Dec13
n/a	108X	Japan	J	AKITA	39D43`00" N	140D04`E	DME	I	n/a	n/a		200/450	40	20Dec13
n/a	023X	Japan	J	ASHIYA	33D53`00" N	130D39`E	TACAN	N	n/a	n/a		200/450	40	
n/a	098X	Japan	J	ATSUGI	35D27`00" N	139D27`E	TACAN	N	n/a	n/a		200/450	40	
n/a	089X	Japan	J	CHINEN	26D10`00" N	127D48`E	TACAN	N	n/a	n/a		200/450	40	
n/a	029X	Japan	J	CHITOSE	42D46`00" N	141D40`E	TACAN	N	n/a	n/a		200/450	40	NOT CO LOC VOR 116.9
n/a	042X	Japan	J	FUTENMA	26D16`00" N	127D45`E	TACAN	N	n/a	n/a		200/450	40	
n/a	059Y	Japan	J	GIFU	35D23`00" N	136D52`E	TACAN	N	n/a	n/a		200/450	40	FI 20Dec13
n/a	116X	Japan	J	GOBOH	33D55`00" N	135D06`E	DME	N	n/a	n/a		200/450	40	
n/a	023X	Japan	J	HACHINOHE	40D33`00" N	141D28`E	TACAN	N	n/a	n/a		200/450	40	
n/a	037X	Japan	J	HAMAMATSU	34D45`00" N	137D41`E	DME	N	n/a	n/a		200/450	40	20Dec13
n/a	094X	Japan	J	HAMAMATSU	34D45`00" N	137D43`E	TACAN	N	n/a	n/a		200/450	40	
n/a	077X	Japan	J	HOFU	34D02`00" N	131D33`E	TACAN	N	n/a	n/a		200/450	40	
n/a	043X	Japan	J	IRUMA	35D50`00" N	139D25`E	TACAN	N	n/a	n/a		200/450	40	



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n/a	035X	Japan	J	IWAKUNI	34D10`00" N	132D15`E	TACAN	N	n/a	n/a		200/450	40	
n/a	035X	Japan	J	IWOTO	24D47`00" N	141D19`E	TACAN	N	n/a	n/a		200/450	40	
n/a	057X	Japan	J	KADENA	26D21`00" N	127D46`E	TACAN	N	n/a	n/a		200/450	40	CO LOCATED WITH VOR
n/a	085X	Japan	J	KANOYA	31D22`00" N	130D50`E	TACAN	N	n/a	n/a		200/450	40	
n/a	082Y	Japan	J	KOMATSUSHIMA	34D00`00" N	134D38`E	TACAN	N	n/a	n/a		200/450	40	FI 20Dec13
n/a	033Y	Japan	J	MAIZURU	35D33`00" N	135D26`E	TACAN	N	n/a	n/a		200/450	40	FI 20Dec13
n/a	058X	Japan	J	MATSUMAE	41D26`00" N	140D05`E	TACAN	N	n/a	n/a		200/450	40	
n/a	090X	Japan	J	MATSUSHIMA	38D24`00" N	141D14`E	TACAN	N	n/a	n/a		200/450	40	
n/a	023X	Japan	J	MINAMITOISHIMA	24D18`00" N	153D95`E	TACAN	N	n/a	n/a		200/450	40	FI 24Dec13
n/a	043X	Japan	J	MISHIMA	34D46`00" N	131D08`E	TACAN	N	n/a	n/a		200/450	40	FI 24Dec13
n/a	087X	Japan	J	MORIYA	35D56`00" N	139D59`E	DME	N	n/a	n/a		200/450	40	
n/a	095X	Japan	J	NASU	36D47`00" N	140D02`E	DME	N	n/a	n/a		200/450	40	
n/a	097X	Japan	J	NYUTABARU	32D05`00" N	131D27`E	TACAN	N	n/a	n/a		200/450	40	
n/a	095Y	Japan	J	OMINATO	41D14`00" N	141D08`E	TACAN	N	n/a	n/a		200/450	40	FI 52 at LOC
n/a	087Y	Japan	J	OMURA	32D56`00" N	129D56`E	TACAN	N	n/a	n/a		200/450	40	FI 26Dec13
n/a	058Y	Japan	J	OZUKI	34D03`00" N	131D03`E	TACAN	N	n/a	n/a		200/450	40	FI 26Dec13
n/a	053X	Japan	J	SHIGI	34D38`00" N	135D40`E	DME	N	n/a	n/a		200/450	40	26Dec
n/a	019X	Japan	J	SHIMOFUSA	35D48`00" N	140D01`E	TACAN	N	n/a	n/a		200/450	40	
n/a	115Y	Japan	J	SHIMOTSUSHIMA	34D08`00" N	129D17`E	TACAN	N	n/a	n/a		200/450	40	
n/a	029X	Japan	J	SHIZUHAMA	34D49`00" N	138D18`E	TACAN	N	n/a	n/a		200/450	40	
n/a	105X	Japan	J	TACHIKAWA	35D43`00" N	139D24`E	TACAN	N	n/a	n/a		200/450	40	FI 26Dec13
n/a	122X	Japan	J	TAKAMATSU	34D20`00" N	133D57`E	TACAN	N	n/a	n/a		200/450	40	
n/a	025X	Japan	J	TATEYAMA	34D58`00" N	139D50`E	TACAN	N	n/a	n/a		200/450	40	
n/a	096X	Japan	J	TOKUSHIMA	34D08`00" N	134D37`E	TACAN	N	n/a	n/a		200/450	40	
n/a	119X	Japan	J	TOYOTA	34D11`00" N	131D01`E	DME	N	n/a	n/a		200/450	40	26Dec13
n/a	041X	Japan	J	TSUIKI	33D41`00" N	131D02`E	TACAN	N	n/a	n/a		200/450	40	
n/a	058Y	Japan	J	UTSUNOMIYA	36D31`00" N	139D53`E	TACAN	N	n/a	n/a		200/450	40	FI 26Dec13
n/a	085X	Japan	J	YOKOTA	35D45`00" N	139D21`E	TACAN	N	n/a	n/a		200/450	40	
n/a	080X	Malaysia	MLA	BUTTERWORTH	05D28`00" N	100D24`E	TACAN	N	n/a	n/a		300/350	27	Range modified from 30/8
n/a	084X	Malaysia	MLA	TANJUNG SEPAT	02D39`44" N	101D33`E	DME	N	n/a	n/a		200/450	40	21Apr17
n/a	111X	Micronesia, Federated States	FSM	CHUUK	07D27`00" N	151D50`E	DME	I	n/a	n/a		200/450	40	
n/a	100X	Micronesia, Federated States	FSM	KOSRAE	05D21`00" N	162D58`E	DME	I	n/a	n/a		200/450	40	
n/a	047X	Micronesia, Federated States	FSM	POHNPEI	06D58`00" N	158D21`E	DME	I	n/a	n/a		200/450	40	
n/a	122X	Micronesia, Federated States	FSM	YAP	09D29`00" N	138D05`E	DME	I	n/a	n/a		200/450	40	
n/a	075X	Nepal	NPL	POKHARA	28D12`00" N	083D59`E	DME	N	n/a	n/a		200/450	40	
n/a	118X	New Zealand	NZL	ALEXANDRA	45D10`00" S	169D29`E	DME	N	n/a	n/a		200/450	40	
n/a	104X	New Zealand	NZL	DUNEDIN HENLEY	45D56`45" S	170D09`E	DME	N	n/a	n/a		200/450	40	FI 29NOV12
n/a	122X	New Zealand	NZL	HOKITIKA	42D43`46" S	170D57`E	DME	N	n/a	n/a		200/450	40	
n/a	105X	New Zealand	NZL	KAITAIA	35D01`46" S	173D14`E	DME	N	n/a	n/a		200/450	40	
n/a	108X	New Zealand	NZL	KERI KERI	35D15`45" S	173D54`E	DME	N	n/a	n/a		200/450	40	29NOV12
n/a	125X	New Zealand	NZL	MANAPOURI	45D29`49" S	167D43`E	DME	N	n/a	n/a		200/450	40	
n/a	120X	New Zealand	NZL	PARAPARAUMU	40D54`10" S	174D58`E	DME	N	n/a	n/a		200/450	40	
n/a	114X	New Zealand	NZL	TAUPO	38D44`36" S	176D04`E	DME	N	n/a	n/a		200/450	40	



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n/a	079X	New Zealand	NZL	TAURANGA	37D40`39" S	176D11`E	DME	N	n/a	n/a		200/450	40	
n/a	106X	New Zealand	NZL	TIMARU	44D18`30" S	171D13`E	DME	N	n/a	n/a		200/450	40	
n/a	107X	New Zealand	NZL	WANGANUI	39D57`33" S	175D01`E	DME	N	n/a	n/a		200/450	40	
n/a	116X	New Zealand	NZL	WESTPORT	41D44`26" S	171D34`E	DME	N	n/a	n/a		200/450	40	
n/a	124X	New Zealand	NZL	WHAKATANE	37D55`29" S	176D54`E	DME	N	n/a	n/a		200/450	40	
n/a	120X	New Zealand	NZL	WHANGAREI	35D46`17" S	174D21`E	DME	N	n/a	n/a		200/450	40	
n/a	074X	Niue Island	NII	ALOFI NIUE	19D05`34" S	169D54`W	DME	I	n/a	n/a		200/450	40	
n/a	095X	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D32`48" N	072D50`E	DME	N	n/a	n/a		200/450	40	24Dec13-TDME28LT-DME
n/a	100X	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D33`05" N	072D48`E	DME	N	n/a	n/a		200/450	40	24Dec13-TDME10RT-DME
n/a	109X	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D32`46" N	072D51`E	DME	N	n/a	n/a		200/450	40	24Dec13
n/a	081X	Pakistan	PAK	BENZIR BHUTTO-BBIAP	33D32`54" N	072D50`E	DME	N	n/a	n/a		200/450	40	24Dec13-TDME28RT-DME
n/a	103X	Papua New Guinea	PNG	VANIMO	02D40`52" S	141D18`E	DME	I	n/a	n/a		25/100	27	
n/a	107X	Philippines	PHL	BASCO	20D27`00" N	121D58`E	DME	N	n/a	n/a		300/450	40	
n/a	097X	Philippines	PHL	SANGA SANGA	05D04`00" N	119D46`E	DME	N	n/a	n/a		150/300	37	
n/a	058X	Philippines	PHL	TUGUEGAO	17D38`00" N	121D44`E	DME	N	n/a	n/a		300/450	40	FI
n/a	125X	Republic of Korea	KOR	DAEGU	35D54`00" N	128D39`E	TACAN	N	n/a	n/a		200/450	40	CO LOCATED WITH VOR
n/a	117X	Republic of Korea	KOR	GIMHAE	35D11`00" N	128D56`E	TACAN	N	n/a	n/a		200/450	40	
n/a	056X	Republic of Korea	KOR	KANGNUNG	37D45`00" N	128D58`E	TACAN	N	n/a	n/a		200/450	40	
n/a	088X	Republic of Korea	KOR	KWANGJU	35D08`00" N	126D48`E	TACAN	N	n/a	n/a		200/450	40	
n/a	087X	Republic of Korea	KOR	PUSAN	35D07`00" N	129D00`E	TACAN	N	n/a	n/a		200/450	40	CO LOCATED WITH VOR
n/a	037X	Republic of Korea	KOR	SACHEON	35D05`00" N	128D05`E	TACAN	N	n/a	n/a		200/450	40	
n/a	046X	Republic of Korea	KOR	SEOUL SINCHONRI	37D26`00" N	127D07`E	TACAN	N	n/a	n/a		200/450	40	
n/a	022X	Republic of Korea	KOR	SUWON	37D14`00" N	127D01`E	TACAN	N	n/a	n/a		200/450	40	
n/a	100X	Republic of Korea	KOR	ULJIN	36D46`35" N	129D27`E	TACAN	N	n/a	n/a		200/450	40	FI 26Dec13
n/a	053X	Republic of Korea	KOR	WONJU	37D28`00" N	127D58`E	TACAN	N	n/a	n/a		200/450	40	
n/a	026X	Republic of Korea	KOR	YECHON	36D37`00" N	128D19`E	TACAN	N	n/a	n/a		200/450	40	
n/a	116X	Singapore	SNG	CHANGI	01D21`02" N	104D00`E	TACAN	N	n/a	n/a		200/450	40	harm not ok
n/a	110X	Singapore	SNG	PAYA LEBAR	01D22`00" N	103D55`E	TACAN	N	n/a	n/a		200/450	40	
n/a	086X	Singapore	SNG	TENGAH	01D24`00" N	103D43`E	TACAN	N	n/a	n/a		200/450	40	
n/a	075X	Solomon Islands	SLM	GRACIOSA BAY	10D44`00" S	165D47`E	DME	N	n/a	n/a		200/450	40	
n/a	074X	Solomon Islands	SLM	MUNDA	08D20`00" S	157D15`E	DME	N	n/a	n/a		200/450	40	
n/a	077X	Thailand	THA	BANGKOK	13D55`00" N	100D36`E	TACAN	N	n/a	n/a		200/450	40	
n/a	109X	Thailand	THA	CHIANG MAI	18D49`00" N	098D58`E	TACAN	N	n/a	n/a		200/450	40	
n/a	100X	Thailand	THA	LOEI	17D26`00" N	101D43`E	TACAN	N	n/a	n/a		200/450	40	NOTAM C3030/96 14.11
n/a	089X	Thailand	THA	NAKHON PHANOM WEST	17D22`00" N	102D48`E	TACAN	N	n/a	n/a		200/450	40	
n/a	125X	Thailand	THA	NAKHON RATCHASIMA	14D56`00" N	102D05`E	TACAN	N	n/a	n/a		200/450	40	
n/a	099X	Thailand	THA	PHITSANULOK	16D46`00" N	100D17`E	TACAN	N	n/a	n/a		200/450	40	MIL
n/a	111X	Thailand	THA	Prachinburi	14D07`07" N	101D22`E	DME	NAT	n/a	n/a		200/450	37	
n/a	084X	Thailand	THA	PRACHUAP KHIRIKHAN	00D00`00" N	000D00`E	TACAN	N	n/a	n/a		200/450	40	
n/a	105X	Thailand	THA	SAKHONNAKHON	07D11`00" N	104D06`E	TACAN	N	n/a	n/a		200/450	40	
n/a	077X	Thailand	THA	SONGKHLA HAT YAI	00D00`00" N	000D00`E	TACAN	N	n/a	n/a		200/450	40	
n/a	031X	Thailand	THA	Sukhorthai	17D14`08" N	099D49`E	DME	NAT	n/a	n/a		200/450	37	
n/a	040X	Thailand	THA	SUKHOTHAI	17D13`00" N	099D41`E	DME	N	n/a	n/a		200/450	40	



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n/a	079X	Thailand	THA	SURATTHANI	09D06`00" N	099D07`E	TACAN	N	n/a	n/a		200/450	40	
n/a	058X	Thailand	THA	Tak	16D53'59" N	099D15'E	DME	NAT	n/a	n/a		200/450	37	
n/a	095X	Thailand	THA	TAKHLI	15D16`00" N	100D18`E	TACAN	N	n/a	n/a		200/450	40	
n/a	105X	Thailand	THA	U-TAPHAO	12D41`00" N	101D00`E	TACAN	N	n/a	n/a		200/450	40	
n/a	093X	Thailand	THA	UBON RATCHATHANI	15D14`00" N	104D52`E	TACAN	N	n/a	n/a		200/450	40	
n/a	086X	Thailand	THA	UDON THANI	17D23`00" N	102D48`E	TACAN	N	n/a	n/a		200/450	40	
n/a	092X	Vanuatu	NHB	SANTO PEKOA	15D32`00" S	167D08`E	DME	N	n/a	n/a		200/450	40	DME CO-LOCATED WITH



Asia/Pacific Regional Aeronautical Radio Frequency Management Guidance Material

Edition 1.0

International Civil Aviation Organization

AMENDMENTS

Amendments are announced in the supplements to the *Publications Catalogue*; the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS, CORRIGENDA AND ADDENDA

[illegible]

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GLOSSARY

SYMBOLS AND UNITS

ABBREVIATIONS

AAC	Aeronautical administrative communications
AOC	Aeronautical operational control
AM(R)S	The aeronautical mobile (route) service
ANSP	Air Navigation Service Provider
ARNS	The aeronautical radionavigation service
ATC	Air traffic control
CAA	Civil Aviation Authority/Administration
CNS	Communication, Navigation and Surveillance
DME	Distance Measuring Equipment
DOC	Designated Operational Coverage
DVOR	Doppler VHF Omni-Directional Range
FSMP	Frequency Spectrum Management Panel (successor of ACP WG/F (frequency))
GBAS	Ground-based augmentation system
HF	High frequency
ICAO	The International Civil Aviation Organization
ILS	Instrument Landing System
ITU	International Telecommunication Union
NDB	Non-directional radio beacon
PAR	Precision approach radar
SARPs	Standards and Recommended Practices
SST	The Supersonic Transport
VDB	VHF data broadcast (used with GBAS)
VDL	VHF digital link
VHF	Very High Frequency

Chapter 1

INTRODUCTION

This guidance material has been developed under a recommendation from the fourth meeting of the spectrum review working group (SRWG/4) of APANPIRG which was held via video conferencing from 09 to 10 June 2020. It is for States/Administrations in the APAC region to implement the frequency assignments in a coordinated manner with ANSP, CAA and national frequency Authorities to satisfy future operational needs or the introduction of new technologies, with emphasis on communication and navigation systems. (SRWG-4 Final report)

1.1 OBJECTIVE and SCOPE

1.1.1 Aeronautical services are recognized internationally to be prime users of radio frequencies. [Doc 9718, Volume I, chapter 1, paragraph 1.2] The civil aviation community must accordingly develop and present, as necessary, its agreed policies and its quantified and qualified statements of requirement for radio frequency spectrum to ensure the continuing availability of adequate radio spectrum and, ultimately, the ongoing viability of air navigation services throughout the world. [Doc 9718, Volume I, chapter 1, paragraph 1.4]

1.1.2 For the APAC Region, the Secretariat is developing, with the support of ICAO contracting states, material to support frequency assignment planning in the region.

1.1.3 In accordance with above, the prime objectives of this document are:

- a) to provide background information on the international spectrum management institutional framework. [Doc 9718, Volume I, chapter 2, paragraph 2.3.d]
- b) to provide a convenient record for important frequency planning principles and coordination procedure.
- c) to provide frequency assignment planning criteria to secure that aeronautical radio communication and navigation systems are protected from harmful interference on a uniform basis. [Doc 9718 II Background and purpose]

1.1.4 This guidance material describes general reference in aeronautical frequency management of APAC region, including the introduction and relationships between the main participants, overview of the framework and process of aeronautical spectrum management, etc.

1.1.5 This document is suitable for national authorities, telecommunication authorities (or telecommunication administrations), ATCs, aerodromes, and airlines which will management or use aeronautical frequencies.

1.1.6 This Guidance Material is not intended to and shall not replace the relevant requirements stipulated in Annex 10 and Doc 9718. In the event of any inconsistency or conflict between this document and Annex 10 and Doc 9718, Annex 10 and Doc 9718 shall take precedence.

Chapter 2

BACKGROUND

2.1 Institutional framework

2.1.1 ITU

2.1.1.1 The International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies (ICTs). To facilitate international connectivity in communications networks, ITU allocate global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect.

Note: Other specialized agencies, such as ICAO, would not be barred from any kind of work touching upon aeronautical telecommunications including standardization activities.

2.1.1.2 The legal framework of ITU comprises the basic instruments of the Union, which have treaty status and are binding on ITU Member States. These instruments are the Constitution and Convention of the International Telecommunication Union and the Administrative Regulations, which complement the Constitution and the Convention. The Radio Regulations (RR) form an integral part of the Administrative Regulations.

2.1.1.3 The RR include allocations, provisions on licensing, interference resolution, safety and distress procedures and other aspects. Within the RR, the finite useable radio spectrum, from approximately 8.3 kHz to 275 GHz, is allocated to user services in response to their recognized demands, and among three ITU world Regions in accordance with the major regional spectrum requirements for these services in the relevant region. [Doc 9718, Volume I, chapter 3, paragraph 3.3] To enable new technologies and changes in spectrum usage, an ITU World Radiocommunication Conference (WRC) is held every 4 years where parts of the Radio Regulations are revised and updated.

2.1.1.4 Aviation services are recognized important users of radio spectrum to create safe and expeditious conditions to support air operations. The AM(R)S, the ARNS and their satellite service counterparts are important components in the mobile and radiodetermination families of users with (normally) exclusive allocations made on a worldwide basis to ensure global harmonization. The RR are used as the framework for the relevant ICAO Annexes and the Standards and Recommended Practices (SARPs) contained therein. [Doc 9718, Volume I, chapter 3, paragraph 3.5]

2.1.2 ICAO

2.1.2.1 Pursuant to the provisions in Art 37 of the Convention on International Civil Aviation, ICAO develops Standards and Recommended Practices (SARPs) for Communication, (radio) Navigation and Surveillance (CNS) systems. These standards include technical characteristics and protection requirements to secure interference free operation of these systems and are incorporated in Annex 10. [DOC 9718, V1, 5.1]

2.1.2.2 In order to provide for more detailed guidance material on the provisions in Annex 10 for CNS systems, ICAO has developed Doc 9718. Doc 9718 is (currently) published in two parts:

- Volume I which contains material relevant to the allocation and use of aeronautical frequency bands by the ITU.
- Volume II which contains material relevant to the frequency assignment planning for CNS systems.

2.1.2.3 ICAO is accorded observer status at relevant ITU WRCs and also participates at meetings of the ITU-R study groups, including the Conference Preparatory Meetings (CPMs) which prepare the technical and regulatory basis for WRCs. [DOC 9718, V1, 5.2] Within ICAO, the necessary activity to support these ITU-generated functions exists at two levels:

- (a) At the worldwide level, through the work of the Air Navigation Commission, with the assistance of the FSMP (and communication divisional meetings or air navigation conferences, as required), to prepare the coordinated ICAO policies, spectrum estimates and technical inputs for ITU conferences and ITU-R study groups. The ICAO spectrum strategy, policy statements and the ICAO Position for WRCs are approved by the Council; and
- (b) At the regional level, by the ICAO Regional Offices, through coordination of frequency assignment plans with states/administrations, using agreed ICAO planning criteria. This activity is supported by the Regional Planning and Implementation Groups (PIRGs).

2.1.2.4 At a Regional level, Air Navigation Plans have been developed. These ANPs contain, based on Regional Air Navigation Agreements, provisions that States have agreed to apply on the use of aeronautical radio communication, navigation and surveillance systems, including material relevant to frequency assignment planning.

2.1.3 National and regional authorities

2.1.3.1 Within ITU Member States, the telecommunication authorities / administrations normally control and operate the mechanism which develops the national proposals for amending the Radio Regulations for submission to the ITU WRCs. [Doc 9718 volume 1 3.4] The outcome of these discussions in the WRCs normally results in material being incorporated in the ITU Radio Regulations or in ITU-R Recommendations and subsequently being applied through national regulation by national telecommunication authorities. [DOC 9718, V1, 5.2]

2.1.3.2 To develop and maintain the ICAO Spectrum Strategy and Policy on Radio Frequency Spectrum, a coordinated aeronautical position (the ICAO Position) and other materials must be established for every ITU WRC to support the update of the ITU Radio Regulations (RR). All ICAO Member States and relevant international organizations are encouraged to present proposals to develop the ICAO Position.

2.1.3.3 National and international (regional) preparatory committees function as the coordination medium to which the aeronautical requirements and proposals, either ICAO coordinated or nationally derived, are presented by the national aviation authorities for consideration. [Modify from Doc 9718 volume 1 3.4]

2.1.3.4 It is essential that aeronautical participation in these national and regional activities be ensured in order to support and defend aviation requirements. [Doc 9718 volume 1 3.4]

2.1.4 Relationship between ITU RR and other material and ICAO SARPS

2.1.4.1 The Radio Regulations have treaty status, and there is an inherent obligation on States to comply, unless an exception is stated and embodied in the Final Acts of the Conference which created the regulation. Aeronautical services are obliged to operate within the framework established by the Radio Regulations.

2.1.4.2 ICAO is recognized internationally as the competent international body to coordinate a worldwide policy for the operational use of the specified systems. Furthermore, the ICAO Annexes contain procedures for regular and emergency communications that are specifically developed for aviation purposes, taking account of the operational conditions. These procedures supplement the basic requirements of the Radio Regulations for procedures in aeronautical communications. [Doc 9718 volume 1 4.4.3]

2.1.4.3 The Radio Regulations and ICAO SARPs together thus form a complementary set of regulatory provisions without any overlap. The Radio Regulations must evolve within the general telecommunications environment with its many and diverse users of the radio frequency spectrum, while the ICAO SARPs respond to the operational safety aspects of air navigation and are developed and agreed by aviation within the ICAO organizational framework. [Doc 9718 volume 1 4.4.4]

2.2 Spectrum coordination and management

2.2.1 General

2.2.1.1 In using frequency bands for radio services, ITU Members States shall bear in mind that radio frequencies are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of these regulations of Radio Regulations, Annex 10 to the ICAO Convention and national and regional planning. [RR 0.3]

2.2.1.2 Any new assignment or any change of frequency or other basic characteristic of an existing assignment shall be made in such a way as to avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with this guidance material. [RR 4.3]

2.2.1.3 Frequency assignment planning should ensure the availability and protection from harmful interference of the frequencies provided for distress and safety purposes. [RR 0.7]

2.2.2 Frequency coordination and registration [doc 9718 volume 1 4.5]

2.2.2.1 The coordination and registration of frequency assignments is the prerogative of the ITU and must be performed in accordance with procedures laid down in the Radio Regulations. Frequencies are registered in the Master International Frequency Register (MIFR) maintained at ITU Headquarters in Geneva. However, Incorporation of aeronautical frequencies in the MIFR is not subject to a technical analysis of the assignment for protecting other assignments in the COM lists from harmful interference

2.2.2.2 In exclusive aeronautical bands, actual (day-to-day) coordination of frequency assignments is being undertaken by ICAO, through the ICAO Regional Offices. [DOC 9718, V1, 4.5.2]. The Regional Office's frequency coordination role includes the coordination with the ICAO regional offices of regions that may be affected by the proposed frequency assignments, or, if bilateral coordination is required in the region(s), the State(s)/ Administration(s) that may be affected.

2.2.2.3 To support this coordination, the ICAO Regional Offices have developed the necessary procedures, including the relevant frequency assignment planning criteria. Coordination of frequency assignments is taking place (in most cases) in coordination with the national civil aviation authorities. [DOC 9718, V1, 4.5.2]

2.2.2.4 Although in some cases aeronautical frequency assignments, notably those in HF and LF/MF bands, are registered with the ITU by the countries operating these services, other frequency assignments, particularly those in bands above 100 MHz, tend to be recorded only in national registers or in the ICAO Regional Air Navigation Plans. Because of this, de facto, the ICAO frequency register within ICAO forms the basis for international coordination of frequency assignments. [DOC 9718, V1, 4.5.3]

2.2.2.5 This does not dispense with the more general requirement for the coordination of a frequency assignment within the ITU and the registration of this frequency assignment in the MIFR, if international protection of that assignment is necessary.

2.2.2.6 Coordination and registration of frequency assignments in the HF bands (between 2850 kHz and 22000 kHz) is only taking place through the ITU. However, ICAO is considering developing, in parallel, a relevant ICAO list of HF frequency assignments. [DOC 9718, V1, 4.5.4]

2.2.2.7 Coordination and registration of frequency assignments for radar stations and on-board autonomous radio navigation systems is however NOT being coordinated through ICAO. [DOC 9718, V1, 4.5.5]

2.2.2.8 List of frequency bands coordinated by ICAO is given in Table 2.1.

Table 2.1 List of frequency bands

Symbols	Frequency range	Facility
LF/MF	190 – 495 kHz and 505 – 526.5 kHz	NDB and locator
VHF	108 – 117.975 MHz 117.975 – 137 MHz	ILS localizer (below 112 MHz), VOR and GBAS Air-ground communications (e.g., VDL Mode 4)
UHF	328.6 – 335.4 MHz 960 – 1215 MHz	ILS glide path DME/TACAN SSR

2.2.3 Procedure of Coordination for aeronautical frequency in APAC Region

2.2.3.1 The ICAO Third Asia/Pacific Regional Air Navigation (ASIA/PAC/3 RAN) Meeting in 1993 agreed that The ICAO APAC Regional Office would continue to maintain its frequency selection and coordination role, including the maintenance and promulgation of Frequency List Nos.1, 2 and 3 in a timely and periodic manner.

Note1: with the successful implementation of Frequency Finder, there is no more Frequency List No. 3 published by the ICAO APAC Regional Office after the 29th Edition in January 2016, replaced by the up-to-date database in Frequency Finder.

Note2: Frequency Finder is the ICAO aeronautical radio frequency management tool for VHF COM and NAV frequency assignments.

2.2.3.2 The Thirty-first Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/31) in 2020 agreed that the database in Frequency Finder is visible to all Frequency Finder users. And the maintenance and promulgation of Frequency List Nos. 1 and 2 are still being conducted by the Regional Office in a timely and periodic manner. It proposes to request States/Administrations to update specific characteristics for NAV facilities in the Frequency List No. 2 as well as to secure that the information in the Frequency Lists is up-to-date.

2.2.3.3 The updated Frequency Lists of Nos. 1 and 2 are published on the APAC website under – CNS More Documents through secure portal of ICAO APAC website webpage, or can be downloaded from the ICAO database with Frequency Finder.

2.2.3.4 Currently, States/Administrations can submit to the Regional Office their requests for new or modified frequency assignments in any format (e.g., letter, email). [SRWG4 WP2 2.3]

(a) The administrative aspects of the frequency coordination can be improved by States/Administrations using Frequency Finder to generate electronic submissions for new or modified frequency assignments. This option permits States/Administrations to check a selected frequency to satisfy any operational need and to check the

compatibility of this (proposed) frequency with other frequency assignments in the Frequency List No.2 or No.3. It greatly facilitates the final coordination that is performed by the ICAO Regional Office. The electronic submission(s) as generated with Frequency Finder, in the format of an Excel file, can be sent to the ICAO Regional Office through email.

- (b) The second option for States/Administrations to submit to the Regional Office requests for registering new or modified frequency assignments, also by electronic means, through a locally generated Excel or Word file that follows the template as in **Appendix A**.
- (c) The third option is for States/Administrations to submit to the Regional Office requests for new of modified frequency assignment by letter. The preferred format of the characteristics for these submissions is in **Appendix B**.

2.2.3.5 The basic aeronautical coordination procedure is depicted as Figure 2-1.

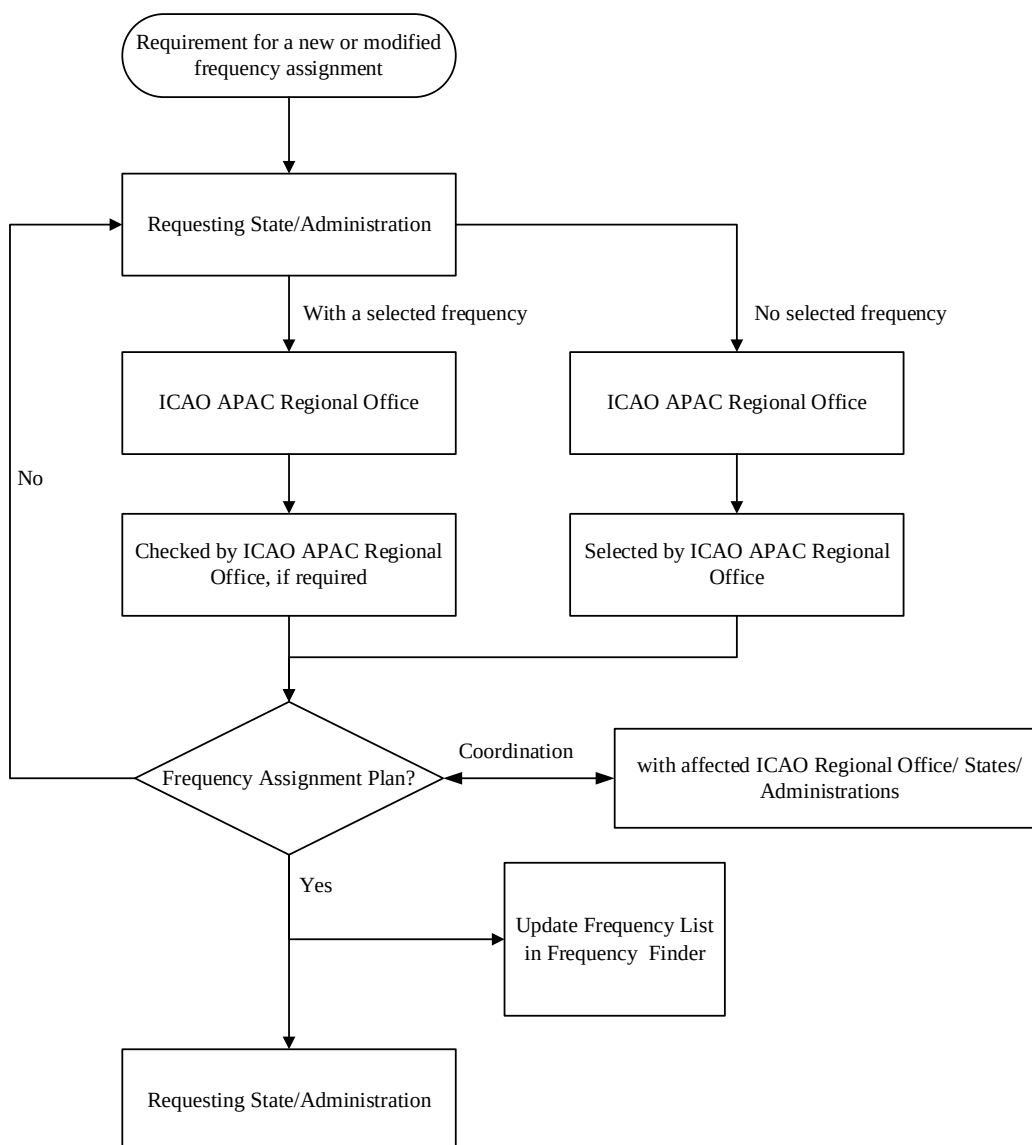


Figure 2-1 The basic aeronautical coordination procedure

Chapter 3

AIR-GROUND COMMUNICATION FREQUENCY MANAGEMENT

3.1 HF Air-ground Communication Frequency bands

3.1.1 HF bands (between 2850 kHz and 22 000 kHz) coordination is recommended to be carried out between States. Coordination and registration of HF frequencies is undertaken by the ITU, through the Radio Regulatory Authorities in each country. ICAO does not coordinate assignments for HF frequencies. [SRWG/1 wp04 2.3] ICAO is considering developing, in parallel, a relevant ICAO list of HF frequency assignments. [9718 volume 1 4.5.4] Pre-coordination of HF frequencies could be arranged through the ICAO ASIA/PAC Office in Bangkok. However, the national radio regulator is required to develop a proposal for the registering required frequency assignments with the ITU. Such proposals should be based on the provisions of Appendix 27 to the ITU Radio Regulations, together with the information contained in the ITU International Frequency List (IFL) taking into consideration the protection requirements for HF as contained in Appendix 27. [SRWG/1 wp04]

3.1.2 Appendix 27 to the Radio Regulations (RR) contains the frequency allotment plan for the AM(R)S in the HF bands. This appendix contains the plan for HF frequency allotments to major world air route areas and to regional and domestic air route areas as well as VOLMET areas. It also includes worldwide frequency allotments, which are for the use of aircraft operating agencies for AOC, to be assigned in accordance with RR 27/217. [DOC9718 volume 1 4.2.6]

3.1.3 The technical characteristics for HF aviation equipment in Appendix 27 of the Radio Regulations, since they form part of the Radio Regulations, enjoy the same status as compulsory treaty obligations. [DOC9718 volume 1 4.6]

3.2 VHF Air-ground Communication Frequency bands

3.2.1 The general allotment of frequency band 117.975 – 137.000 MHz shall be as shown in Table 3.1. Specific allotments to services are to be determined regionally. [ANN10, VOL 5, 4.1.1.1]

Table 3.1 Allotment table

Block allotment frequencies (MHz)	Worldwide utilization	Remarks
118.000 –121.450 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in the light of regional agreement. National assignments are covered by the provisions in Annex 10, Volume V, 4.1.4.8 and 4.1.4.9.
121.500	Emergency frequency	See Annex 10, Volume V, 4.1.3.1. Channels 121.475 and 121.525 are not assignable.
121.550 –121.9917inclusive	International and National Aerodrome Surface Communications	Reserved for ground movement, pre-flight checking, air traffic services clearances, and associated operations.
122.000 –123.050 inclusive	National Aeronautical Mobile Services	Reserved for national allotments. National assignments are covered by the provisions in Annex 10, Volume V, 4.1.4.8 and 4.1.4.9.
123.100	Auxiliary frequency SAR	See Annex 10, Volume V, 4.1.3.4. Channels 123.075 and 123.125 are not assignable.
123.150 –123.425inclusive	National Aeronautical Mobile Services	Reserved for national allotments. National assignments are covered

		by the provisions in Annex 10, Volume V, 4.1.4.8 and 4.1.4.9.
123.450	Air-to-air communications	Reserved for air-to-air communication. Designated for use as provided for in Annex 10, Volume V, 4.1.3.2.
123.475-123.6917 inclusive	National Aeronautical Mobile Services	Reserved for national allotments. National assignments are covered by the provisions in Annex 10, Volume V, 4.1.4.8 and 4.1.4.9.
123.700 –129.6917 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in the light of regional agreement. National assignments are covered by the provisions in Annex 10, Volume V, 4.1.4.8 and 4.1.4.9.
129.700 –130.8917 inclusive	National Aeronautical Mobile Services	Reserved for national allotments but may be used in whole or in part, subject to regional agreement. National assignments are covered by the provisions in Annex 10, Volume V, 4.1.4.8 and 4.1.4.9.
130.900 –136.875 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in light of regional agreement. National assignments are covered by the provisions in Annex 10, Volume V, 4.1.4.8 and 4.1.4.9.
136.900 –136.975 inclusive	International and National Aeronautical Mobile Services	Reserved for VHF air-ground data link communications.

3.2.2 In accordance with the provisions of Annex 10, the emergency channel (121.500 MHz) shall be used only for genuine emergency purposes, and where a requirement is established for the use of a frequency auxiliary to 121.500 MHz, the frequency 123.100 MHz shall be used.

3.2.3 Common signalling channels for VDL [ANN10, VOL 5, 4.1.3.3]

3.2.3.1 The frequency 136.975 MHz is reserved on a worldwide basis to provide a common signalling channel (CSC) to the VHF digital link Mode 2 (VDL Mode 2).

3.2.3.2 In areas where VDL Mode 4 is implemented, the frequencies 136.925 MHz and 113.250 MHz shall be provided as common signalling channels (CSCs) to the VHF digital link Mode 4 (VDL Mode 4).

3.2.4 Frequencies should be assigned to all VHF Aeronautical Mobile Service (AMS) facilities in accordance with the principles laid out in Annex 10, Volume V and ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc 9718) Volumes I and II, and take into account:

- (a) agreed geographical separation criteria based on 25 kHz or 8.33 kHz interleaving between channels;
- (b) agreed geographical separation criteria for the implementation of VDL services;
- (c) the need for maximum economy in frequency demands and in radio spectrum utilization; and
- (d) a deployment of frequencies which ensures that international services are planned to be free of interference from other services using the same band. [APAC ANP VOLII 2.41]

3.2.5 The priority order to be followed in the assignment of frequencies to service is:

- (a) ATS channels serving international services (ACC, APP, TWR, FIS);
- (b) ATS channels serving national purposes;

- (c) channels serving international VOLMET services;
- (d) channels serving ATIS and PAR; and
- (e) channels used for other than ATS purposes. [APAC ANP VOLII 2.42]

Note: suggested to delete this article

3.2.6 The criteria used for frequency assignment planning for VHF AMS facilities serving international requirements should, to the extent practicable, also be used to satisfy the need for national VHF AMS facilities. [APAC ANP VOLII 2.43]

Note: suggested to delete this article

3.2.7 Special provisions should be made, by agreement between the States concerned, for the sharing and the application of reduced protection of non-ATS frequencies in the national sub-bands, so as to obtain a more economical use of the available frequency spectrum consistent with operational requirements. [APAC ANP VOLII 2.44]

3.2.8 States should ensure that no air/ground frequency is utilized outside its designated operational coverage and that the stated operational requirements for coverage of a given frequency can be met for the transmission sites concerned, taking into account terrain configuration. [APAC ANP VOLII 2.45]

3.2.9 APAC region has agreed to base frequency assignment planning on 25 kHz frequency separation. According to the conclusions of ASIA/PAC/3 RAN(DOC9614), APANPIRG/26, etc., The complete regional 117.975MHz-137MHz frequency band utilization plan is shown in **Appendix C**, including the allocation of specific services to 12 unallocated frequencies which are 132.050 MHz, 132.075 MHz, 134.525 MHz, 134.550 MHz, 134.575 MHz, 135.825 MHz, 135.850 MHz, 135.875 MHz, 135.900 MHz, 135.925 MHz, 135.950 MHz, 135.975 MHz.

3.2.10 For co-frequency assignments, the minimum geographical separation between facilities shall be such that the DOC of each facility is separated by a distance not less than: [DOC 9718, 2.3.1.2]

- (a) that required to provide a D/U ratio of 20 dB; or
- (b) the sum of the distance to the radio horizon of the DOC area of each facility.

Alternatively, in areas where the frequency congestion is severe, a protection ratio of 14 dB can be used on the basis of a regional air navigation agreement.

3.2.11 For adjacent frequency assignments, the minimum geographical separation between facilities shall be such that points at the edge of the designated operational coverage of each facility are separated by a distance sufficient to ensure operations free from harmful interference. [DOC 9718, 2.3.1.3]

Note : The edge of the DOC is at the maximum range and maximum height.

3.2.12 Services and designated operational coverage (DOC) [DOC 9718, V2, 2.6]

3.2.12.1 Frequencies for aeronautical radio communication services are (normally) implemented to satisfy the operational need for specific services. These services, and their uniform DOC areas, are as in Table 3.2.

Table 3.2 Table of uniform designated operational coverage

Service	SYMBOL	Designated Operational Coverage (DOC)		Comments	Mode
		Range (NM)	Height (ft)		
Aerodrome					
Aerodrome control tower	TWR	25	4000	Height above ground	A/G
Aerodrome flight information service	AFIS	25	4000	Height above ground	A/G
Aerodrome surface communications	AS	Limits of aerodrome	Surface		A/G
Approach					
Precision approach radar	PAR	25	4000	Height above ground	A/G
Approach control service (lower)	APP-L	50	12000		A/G
Approach control service (intermediate)	APP-I	75	25000		A/G
Approach control service (upper)	APP-U	150	45000		A/G
En-Route					
Area control centre (lower)	ACC-L	Area	25000	Within specified area;	A/G

Service	SYMBOL	Designated Operational Coverage (DOC)		Comments	Mode
		Range (NM)	Height (ft)		
				max range 155 NM	
Area control centre (intermediate)	ACC-I	Area	25000	Within specified area; max range 130 NM	A/G
Area control centre (upper)	ACC-U	Area	45000	Within specified area; max range 200 NM	A/G
Flight information service (lower)	FIS-L	Area	25000	Within specified area; max range 155 NM	A/G
Flight information service or Flight information service (upper)	FIS or FIS-U	Area	45000	Within specified area; max range 200 NM	A/G
Meteorological information for aircraft in flight	VOLMET	200	45000	Maximum range 200 NM	BC
Other functions					
Automatic terminal information service	ATIS	200	45000		BC
Air-to-air	A/A	200	45000	Maximum range 200 NM	A/G
Air-to-ground	A/G	200	45000	Maximum range 200 NM	A/G
Aeronautical operational control	AOC	100	250	Not protected; max. range 100 NM	A/G
Emergency	EM	N/A	N/A	No frequency coordination required	A/G
Search and rescue	SAR	N/A	N/A	No frequency coordination required	A/G
VHF En-Route General Purpose	GP	200	45000	Maximum range 200 NM	A/G

Note 1: Different DOC areas may be specified by States.

Note 2: DOC for AOC-only provided to enable compatibility assessment when frequencies for AOC are shared with air traffic control (ATC) services; different DOC may be specified.

Note 3: For area services, no frequency protection is provided outside the specified area.

Note 4: Unless specified by States, the DOC for A/A and A/G is assumed at 45 000 ft/200 NM.

Note 5: Mode: A/G: air-ground communications; BC: (ground) broadcast communications.

Note 6: No coordination of frequency assignment planning is necessary for the emergency frequency 121.500 MHz and the SAR frequency 123.100 MHz as these services are available globally at each station where this service is required.

3.2.12.2 Non-standard DOC (range and height) may be implemented as and when required. Reduced DOC, where operationally acceptable, may alleviate frequency congestion.

3.2.13 The criteria of Geographical separation

3.2.13.1 Applying the methodology as described in Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc 9718), Volume II, paragraph 2.7, separation distances between the edges of the designated coverage areas are shown in Table 3.3. [DOC 9718, V2, 2.8.2.1]

Table 3.3 Minimum geographical co-frequency separation distances between the edges of the DOC

		VICTIM											
	Service	TWR 25/4000	AFIS 25/4000	AS Surface	APP-U 150/450	APP-I 75/250	APP-L 50/120	ACC-U Area/450	ACC-L Area/250	FIS-U Area/450	FIS-L Area/250	VOLMET 260/450	ATIS 200/450
INTERFERE	TWR	156	156		338	273	212	338	273	338	273	338	338
	AFIS	156	156		338	273	212	338	273	338	273	338	338
	AS (Note 2)			25									
	APP-U	338	338		520	455	394	520	455	520	455	520	520
	APP-I	273	273		455	390	329	325	390	455	390	455	455
	APP-L	212	212		394	329	268	394	329	394	329	394	394
	ACC-U (Note 1)	338	338		520	455	394	520	455	520	455	520	520

		VICTIM											
	Service	TWR 25/4000	AFIS 25/4000	AS Surface	APP-U 150/450	APP- I 75/250	APP-L 50/120	ACC-U Area/450	ACC-L Area/250	FIS-U Area/450	FIS- L Area/250	VOLMET 260/450	ATIS 200/450
	ACC-L (Note 1)	273	273		455	390	329	455	390	455	390	455	455
	FIS-U (Note 1)	338	338		520	455	394	520	455	520	455	520	520
	FIS-L (Note 1)	273	273		455	390	329	455	390	455	390	455	455
	VOLMET	338	338		520	455	394	520	455	520	455	15	15
	ATIS	338	338		520	455	394	520	455	520	455	15	15

Note 1: All distances are in NM.

Note 2: Frequencies for aerodrome surface communications should be selected from the band 121.600 – 121.975 MHz. This band is reserved exclusively for aerodrome surface communications. No separation distances with other services are provided. Should it be necessary to share frequencies for AS with air/ground communication services, the minimum geographical separation distance can be calculated as shown in paragraph 2.7.2.1.1 and assuming a designated operational coverage for aerodrome surface communications of 5 NM/100 ft.

3.2.13.2 For stations operating on the first adjacent frequency with the same characteristics, a separation distance of 10 NM is to be maintained between the ground transmitter and the ground receiver. This is considered to be not a frequency assignment planning constraint but rather an implementation issue for States to consider when implementing or modifying frequency assignments. A practical measure may be to avoid assigning a first adjacent frequency to the same location. [DOC 9718, Vol 2, 2.7.3.1.3]

3.2.13.3 The designated coverage for VDL Mode 2 and VDL Mode 4 facilities need to be separated from the designated coverage of a co-frequency VHF-COM voice (DSB-AM) system with at least the distance to the radio horizon of each service. [DOC 9718, V2, 2.9.1]

Note: This applies also to frequency assignments between VDL facilities.

3.2.13.4 Table 3.4 present the guard band (channels) between VDL operating on adjacent frequencies with other VDL or VHF COM voice (DSB-AM) systems. [DOC 9718, V2, 2.9.2]

Table 3.4 25 kHz guard band (channels) between DSB-AM, VDL mode 2 and VDL mode 4 (air-air)

		Interference source		
		DSB-AM	VDL 2	VDL 4
Victim	DSB-AM		1	2
	VDL 2	1	1	1
	VDL 4	2	1	1

Note: The numbers in Table are guard-bands (channels). The next frequency that can be used without frequency planning constrain is 1 channel higher (e.g., a desired DSB-AM station that is interfered by a VDL Mode 2 aircraft station requires one 25 kHz guard band. The next frequency, 50 kHz away, can be used in the same designated operational coverage without any frequency assignment planning constraint.

3.2.13.5 Table 3.5 present the guard band (channels) for VDL Mode 2, VDL Mode 4 and VHF COM voice (DSB-AM) systems, when operating with aircraft on the surface of an airport. [DOC 9718, V2, 2.9.3]

Table 3.5 25 kHz guard band (channels) between DSB-AM and VDL (modes 2 and 4) on the surface of an airport

		Interference source		
		DSB-AM	VDL 2	VDL 4
Victim	DSB-AM	-	4	4
	VDL 2	4	1	1
	VDL 4	4	1	1

Chapter 4

RADIO NAVIGATION AID FREQUENCY MANAGEMENT

4.1 Non-Directional Radio Beacons (NDB)

4.1.1 Frequency band – The radio frequencies assigned to NDBs shall be selected from those available in that portion of the spectrum between 190 kHz and 1 750 kHz. The coordination and registration of bands 190–495 kHz and 505– 526.5kHz take place in ICAO Regional office.

4.1.2 NDB frequency management should take into account the following:

- (a) the interference protection required at the edge of the rated coverage;
- (b) the application of the figures shown for typical ADF equipment;
- (c) the geographical spacings and the respective rated coverages;
- (d) the possibility of interference from spurious radiation generated by non-aeronautical sources (e.g., electric power services, power line communication systems, industrial radiation, etc.). [Annex 10 · vol 5, Chapter3, paragraph 3.2.1]

4.1.3 The 1979 World Administrative Radio Conference adopted regulations concerning the assignment of frequencies for aeronautical radio beacons operating in the LF/MF frequency bands. A minimum protection ratio (wanted/ unwanted signal ratio) of 15 dB is to be used as the basis for frequency assignment planning (RR Appendix 12).

4.1.4 The minimum value of field strength in the rated coverage of an NDB should be 70^omicrovolts per metre. In order to obtain a satisfactory service within the rated coverage of an NDB located in latitudes between 40°N and 50°S, a minimum value of field strength of 120 microvolts per metre would be required, except where practical experience in the operation of NDBs over several years has revealed that a minimum field strength of 70 microvolts per metre would be adequate to meet all the operational needs. In some specific areas, field strength values considerably in excess of 120 microvolts per metre would be required. Such areas are: Indonesia and Papua New Guinea, Myanmar, Malay Peninsula, Thailand, Lao People's Democratic Republic, Democratic Kampuchea, Viet Nam and Northern Australia [Annex 10, vol 1, Chapter3, paragraph 3.4.2.1and Attachment C, paragraph 6.1.1, RR Appendix 12, DOC 9614,ASIA/PAC/3]

Note: Based on the latest propagation and noise data available to the ITU, studies of minimum field strengths required at the boundary of the rated coverage was shown in 6.3 of Attachment C, Annex 10. Attention is called particularly to the assumptions made.

4.1.5 NDB Frequency assignments should be based on the criteria contained in Annex 10, Volume I, Chapter 3 paragraph 3.4.3 and the guidance material contained in Attachment C paragraph 6 of Annex 10, Volume I.

4.1.6 Where locators associated with ILS facilities serving opposite ends of a single runway are assigned a common frequency, provision shall be made to ensure that the facility not in operational use cannot radiate. [Annex 10 vol 1, Chapter3, paragraph 3.4.4.4]

4.1.7 To alleviate frequency congestion problems at locations where two separate ILS facilities serve opposite ends of a single runway, the assignment of a common frequency to both of the outer locators should be permitted, and the assignment of a common frequency to both of the inner locators should be permitted, provided that:

- (a) the operational circumstances permit;
- (b) each locator is assigned a different identification signal; and
- (c) arrangements are made whereby locators using the same frequency cannot radiate simultaneously. [Annex 10 vol 5, Chapter3, paragraph 3.2.2]

4.2 Instrument Landing System (ILS)

4.2.1 Frequency band and channel spacing

4.2.1.1 Frequency band – The Localizer is operating in the frequency band 108 – 112MHz. This band is also used for VOR and GBAS/VDB systems. Localizers cannot be assigned a frequency allotted for a VOR and vice versa. The Glide Path is operating in the frequency band 328.6–335.4MHz. The Localizer and Glide Path frequencies are paired as shown in Appendix E. [DOC 9718, V2, 3.3.1.1]

4.2.1.2 Channel spacing 100 kHz – The channel spacing for the Localizer is 100 kHz and for the Glide Path is 300 kHz. The Localizer operates on odd 100 kHz channels in the VHF band. [DOC 9718, V2, 3.3.1.2]

4.2.1.3 Channel spacing 50 kHz – The use of 50 kHz channels for the localizer (and 150 kHz for the glide path) is permitted as stipulated in Annex 10, Volume V, paragraph 4.2.2.1. [DOC 9718, V2, 3.3.1.3]

Note: Such use shall not cause harmful interference to ILS receivers not capable of tuning to these (50/150 kHz) channels and is subject to the condition that the operational service to international operators using airborne equipment designed for 100 kHz channel spacing (150 kHz for the Glide Path) is not derogated. [DOC 9718 V2, 3.3.1.3]

4.2.1.4 When the ILS is associated with a DME, the DME channels must be selected as **Appendix E**. Further guidance on DME frequency assignment planning, including the ILS/DME channel pairing, is in section 4.5.

4.2.2 Designated Operational Coverage (DOC)

4.2.2.1 The horizontal Designated Operational Coverage of the Localizer and Glide Path is shown in Figure 4-1. The DOC can be extended (optional) with a range of 10 NM outside the clearance sector of the Localizer as promulgated by States/Administrations. [DOC 9718, V2, 3.2.1, and 3.2.2.1]

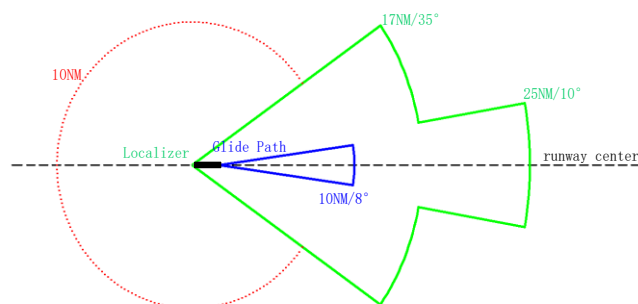


Figure 4-1. DOC of the ILS Localizer and Glide Path

4.2.2.2 The maximum protection height of the localizer DOC is 6250 ft and for the Glide Path 2500 ft. This height is relative to the elevation of the Localizer transmitter. [DOC 9718 V2, 3.2.2]

4.2.2.3 States/Administrations may modify the coverage to meet specific operational requirements. Unless a (modified) DOC is provided, the standard DOC as in paragraph 4.2.2.1 is used in the frequency assignment planning process. [DOC 9718 V2, 3.2.3]

4.2.2.4 When the ILS is associated with a DME, the DOC of the DME is typically the same as for the Localizer. However, States/Administrations may require the associated DME to provide coverage in a larger area. [DOC 9718 V2, 3.2.4]

Note: In practice, many frequency assignments for a DME, associated with an ILS, have a DOC of 10.000 ft/100 NM. Frequency assignment planning criteria for DME are in section 4.5.

4.2.3 [PFD limit] The minimum field strength for a Localizer is 40 $\mu\text{V/m}$ (or 32 dB $\mu\text{V/m}$ or - 116 dBW) throughout the DOC. For a Glide Path the minimum field strength is 400 $\mu\text{V/m}$ (or 52 dB $\mu\text{V/m}$ or - 106 dBW). [DOC 9718 Vol2, 3.2.4.2]

4.2.4 ILS serving both ends of the same runway. [DOC 9718, V2, 3.2.7]

To alleviate frequency congestion problems at locations where two separate ILS facilities serve opposite ends of the same runway or different runways at the same airport, the assignment of identical ILS localizer and glide path paired frequencies should be permitted provided that:

- (a) the operational circumstances permit;

- (b) each localizer is assigned a different identification signal; and
- (c) arrangements are made whereby the localizer and glide path not in operational use cannot radiate.

4.2.5 [Facility Code] Information on the planning of identifications can be found in section 4.6.

4.2.6 A compatibility assessment for potential interference that can be caused by FM broadcasting stations operating in the frequency band 87 – 108 MHz is necessary before a Localizer frequency can be put into operational use. The FM immunity performance requirements for Localizer receivers are contained in Annex 10, Volume I, paragraph 3.1.4. Additional information on the process to assess compatibility with FM broadcast stations is in Recommendation ITU-R SM.1009. [DOC 9718, V2, 3.6]

4.2.7 Frequency Assignment Planning Principles

4.2.7.1 When the main direction of radiation of the ILS system is not known, for frequency assignment planning purposes, the coverage is assumed to be omnidirectional. The localizer coverage is originated from the location of the Localizer; the Glide Path coverage is originated from the location of the Glide Path. [DOC 9718 Vol2, 3.2.5]

4.2.7.2 The criteria must be applied in respect of each localizer installation, in the sense that while of two localizers, the first may not cause interference to the use of the second, nevertheless the second may cause interference to the use of the first. [Annex 10, ATT C 2.6.1]

4.2.7.3 The DOC for the Localizer is much larger than that for the Glide Path. When a localizer frequency has been assigned, the associated Glide Path frequency is automatically protected from harmful interference from other co-channel ILS facilities. However, when non-co-channel Localizer frequency has been assigned, a separate adjacent channel compatibility assessment is necessary for the Glide Path frequency with regard to other nearby ILS facilities operating on adjacent Glide Path frequencies. Therefore, the frequency assignment planning for Localizer and Glide Path has to be performed separately. [DOC 9718, V2, 3.3.1.5]

4.2.7.4 In so far as the wanted and unwanted carriers may produce a heterodyne note, the protection ratio ensures that the instrumentation is not affected. However, in cases where a voice facility is used, the heterodyne note may interfere with this facility. [DOC 9718 V2, 3.2.6]

4.2.8 Required Distance Separations of ILS/ILS Facilities

4.2.8.1 The minimum required separation distances between the desired ILS system and potentially interfering ILS systems are based on the assumption that protection against interference is afforded to the desired signal from the undesired signal is 20 dB. This corresponds to a disturbance of not more than 15 microamperes at the limit of the service distance of the ILS. [DOC 9718, V2, 3.4.1]

4.2.8.2 The minimum D/U ratios requirements within the DOC and different frequency separation to protect different receivers of Localizer / Glide Path can be referred to Annex 10, Volume I, Attachment C 2.6.2.1, 2.6.2.2.

4.2.8.3 Table 4.1 provides the minimum geographical separation distances (D) between the edge of coverage of a desired ILS facility and the location of an undesired ILS facility, established using the method in **Appendix D**.

Table 4.1 Separation distances between the edge of coverage of a desired ILS and an undesired ILS

Undesired Facility:					
Localizer (e.i.r.p = 17 dBW)	Δf :	Distance for 100 kHz receiver (desired facility)	D/U	Distance for 50 kHz receiver (desired facility)	D/U
	0 kHz	135 NM	36 dB	135 NM	36 dB
	0 kHz	112 NM	20 dB	112 NM	20 dB
	50 kHz	44 NM	-7 dB	10 NM	-34 dB
	100 kHz	n/a	n/a	n/a	n/a
	150 kHz	1 NM	-50 dB	1 NM	-50 dB
Glide Path (e.i.r.p. = 14 dBW)	Δf :	300 kHz receiver	D/U	150 kHz receiver	D/U
	0 kHz	88 NM	36 dB	74 NM	36 dB
	0 kHz	71 NM	20 dB	58 NM	20 dB
	150 kHz	36 NM	-0 dB	11 NM	-20 dB
	300 kHz	11 NM	-20 dB	1 NM	-40 dB
	450 kHz	1	-40	- - -	- - -

4.2.8.4 In Regions where both 100 kHz and 50 kHz Localizer channels are being used (300 kHz and 150 kHz channels for the Glide Path), the protection of the Localizer is based on receivers designed for 100 kHz channel spacing.

4.2.9 Geographical separation distances between (desired) Localizer and (undesired) adjacent frequency VOR facilities as Table 4.2.

Table 4.2 Geographical separation distances between (desired) Localizer and (undesired) VOR

VOR Tx (dBW)	ΔF (kHz)	D/U(dB)	D (NM)	Remarks
17	50	-7	72	Undesired VOR; 100 kHz receiver;
17	50	-34	15	Undesired VOR; 50 kHz receiver;
17	100	-46	5	Undesired VOR; 50/100 kHz receiver;
17	150	-50	3	Undesired VOR; 50/100 kHz receiver;
20	50	-7	80	Undesired VOR; 100 kHz receiver;
20	50	-34	19	Undesired VOR; 50 kHz receiver;
20	100	-46	7	Undesired VOR; 50/100 kHz receiver;
20	150	-50	4	Undesired VOR; 50/100 kHz receiver;
30	50	-7	107	Undesired VOR; 100 kHz receiver;
30	50	-34	36	Undesired VOR; 50 kHz receiver;
30	100	-46	16	Undesired VOR; 50/100 kHz receiver;
30	150	-50	13	Undesired VOR; 50/100 kHz receiver;

Note: ITU-R aeronautical propagation curve for Localizer: 108 MHz, $h_1 = 20$ ft, $h_2 = 6250$ ft; 5% of the time.

4.2.10 Geographical separation distance between (desired) Localizer and the location of an (undesired) GBAS/VDB as Table 4.3.

Table 4.3 Geographical separation distances between a desired Localizer and an undesired GBAS/VDB

GBAS/VDB Tx (dBW)	ΔF (kHz)	D/U(dB)	D (NM)	Remarks
17	0	26	187	
17	25	0	108	
17	50	-34	20	
17	75	-46	5	
17	100	-65	0	Planning freedom

Note: ITU-R aeronautical propagation curve for Localizer: 108 MHz, $h_1 = 45$ ft, $h_2 = 6250$ ft; 5% of the time.

4.2.11 Practical experience in the operation of ILSs over several years has revealed that the minimum required separation distances of Annex 10, Volume I, Table C-3 can protect against interference to the desired signal. Required Localizer and Glide Path separation distances is shown in Table 4.4.

Table 4.4 Required distance separations

	Frequency separation	Minimum separation between second facility and the protection point of the first facility km (NM)	
		List A	List B
Localizer	Co-channel	148(80)	148(80)
	50kHz	37(20)	9(5)
	100kHz	9(5)	0
	150kHz	0	0
	200kHz	0	0
Glide path	Co-channel	93(50)	93(50)
	150kHz	20(11)	2(1)
	300kHz	2(1)	0
	450kHz	0	0
	600kHz	0	0
List A refers to the use of localizer receivers designed for 100 kHz channel spacing coupled with glide path receivers designed for 300 kHz channel spacing.			

List B refers to the use of localizer receivers designed for 50 kHz channel spacing coupled with glide path receivers designed for 150 kHz channel spacing.

Note 1. The above figures are based on the assumption of protection points for the localizer at 46 km (25 NM) distance and 1900 m (6250 ft) height and for the ILS glide path at 18.5 km (10 NM) distance and 760 m (2500 ft) height.

Note 2. States, in applying the separations shown in the table, have to recognize the necessity to site the ILS and VOR facilities in a manner which will preclude the possibility of airborne receiver error due to overloading by high unwanted signal levels when the aircraft is in the initial and final approach phases.

Note 3. States, in applying the separations shown in the table, have to recognize the necessity to site the ILS glide path facilities in a manner which will preclude the possibility of erroneous glide path indications due to reception of adjacent channel signals when the desired signal ceases to radiate for any reason while the aircraft is in the final approach phase.

Note: The application of the figures given in Table 4.4 will only be correct within the limitations set by the assumptions. If more precise determination of separation distances is required in areas of frequency congestion, this may be determined for each facility from appropriate propagation curves, taking into account the particular directivity factors, radiated power characteristics and the operational requirements as to coverage. Where reduced separation distances are determined by taking into account directivity, etc., flight measurements at the ILS protection point and at all points on the approach path should be made wherever possible to ensure that a protection ratio of at least 20 dB is achieved in practice. [Annex 10, ATT C 2.6.7]

4.3 VHF Omnidirectional Range (VOR)

4.3.1 Frequency band and channel spacing

4.3.1.1 VOR is operating in the frequency band 108–117.975 MHz. Within band 108–111.975 MHz, frequencies ending in either even tenths or even tenths plus a twentieth of a megahertz are used only by VOR that should no harmful adjacent channel interference to ILS. [DOC 9718, 4.3.1.1 and ANN10, V5, 4.2.1]

4.3.1.2 The channel spacing is 100 kHz. The use of 50 kHz VOR channels is permitted as stipulated in Annex 10, Volume V, paragraph 4.2.3.1.

Note: The use of 50 kHz VOR channels shall not cause harmful interference to VOR receivers not capable of tuning to these channels and the operational service to international operators using airborne 100 kHz equipment is not derogated. [DOC 9718, 4.3.1.2]

4.3.1.3 In aera where VDL Mode 4 is implemented, the frequency 113.250 is reserved as common signalling channel for VDL Mode 4 (Annex 10, Volume V, paragraph 4.1.3.3.2).

4.3.1.4 VOR facilities are often associated with DME facilities. The associated DME channels shall be selected in Appendix E. Further guidance on DME frequency assignment planning, including the VOR/DME channel pairing, is in section 4.5.

Note: A separate compatibility assessment for the DME facilities associated with a VOR facility is required in all cases.

4.3.2 [DOC] The designated operational coverage (DOC) of the VOR is determined through the operational requirement as promulgated by States/Administrations. In many cases the DOC is circular and can typically vary from 25 NM to approximately 200 NM and the protected altitude up to between 10 000 feet and 60 000 feet. Protection from harmful interference is only provided within the DOC. [DOC 9718 Vol2, 4.2.1]

Note: When the VOR is associated with a DME, the DOC of the DME is typically the same as for the VOR.

4.3.3 [PFD limit] The field strength or power density in space of VOR signals required should be 90 $\mu\text{V/m}$ (39 dB $\mu\text{V/m}$) or 107 dBW/m² (or - 110 dBW at 118 MHz) throughout the DOC. [ANN10, V1, 3.3.4.2 and DOC 9718 4.2.2.1]

4.3.4 [With FM] A compatibility assessment for potential interference that can be caused by FM broadcasting stations operating in the frequency band 87 – 108 MHz is necessary. The FM immunity performance requirements for VOR receivers are contained in Annex 10, Volume I, paragraph 3.3.8. Additional information on the process to assess compatibility with FM broadcast stations is in Recommendation ITU-R SM.1009.

4.3.5 [Facility Code] Information on the planning of identifications can be found in section 4.6.

4.3.6 Protection criteria for a desired VOR and an undesired VOR or Localizer or GBAS/VDB

4.3.6.1 Localizer and VOR facilities cannot operate on the same frequency. Adjacent channel compatibility with an (undesired) Localizer is assessed in the same way as adjacent channel interference from a VOR assessed. [DOC 9718, Vol 2, 4.3.4.2]

4.3.6.2 The protection of VOR facilities operating on the same frequency is based on a desired to undesired (D/U) signal ratio of 20dB. This corresponds to a bearing error of less than 1 degree due to unwanted signals. [DOC 9718, Vol 2, 4.4.1]

4.3.6.3 Protection requirement for a desired VOR and undesired localizer or VOR facility is contained in Annex 10, Volume I, Attachment C, paragraph 3.6.4. [and DOC 9718, Volume II, paragraph 3.4].

4.3.6.4 Protection criteria for a desired VOR and an undesired GBAS/VDB is contained in Annex 10, Volume I, Attachment D, paragraph 7.2.1.1, [and DOC 9718, Volume II, paragraph 3.5]. [DOC 9718, V2, 3.5]

4.3.6.5 Where both 100 kHz and 50 kHz VOR channels are being used, the protection of the VOR is based on receivers designed for 100 kHz channel spacing.

4.3.7 Sectorized coverage

4.3.7.1 Application of the calculation methods described above may produce incorrect results if sectorization (key-holing) is used. Figure 4-2 can be used to explain the problem:

4.3.7.2 Consider A to be the desired VOR facility and B the undesired one. The “Critical Point” is most exposed to interference from facility B because it is the point of the DOC of facility A which is nearest to transmitter B.

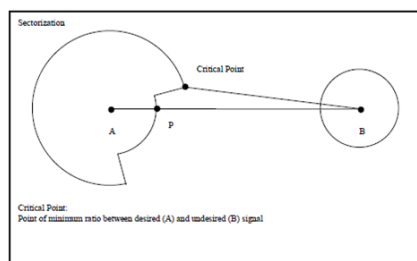


Figure 4-2 Geometry for determining the test points

4.3.8 Table 4.5 to Table 4.7 present the co- and adjacent frequency separation distance between the edge of the DOC of the (desired) VOR and the location of the (undesired) VOR or ILS-Localizer.

Table 4.5 Minimum separation distances between desired VOR and undesired VOR or LOC

ΔF (kHz)	D/U (dB)	Tx = 17 dBW		Tx = 20 dBW		Tx=30 dBW		Remarks
		L (dB)	D (NM)	L (dB)	D (NM)	L (dB)	D (NM)	
0	20	147	268	150	271	160	284	Desired VOR at 45000 ft 50/100 kHz receiver
50	-7	120	134	123	174	133	231	100 kHz receiver
50	-34	93	5	96	11	106	43	50 kHz receiver
100	-46	81	<0.5	84	<0.5	94	7	50/100 kHz receiver
150	-50	77	<0.5	80	<0.5	90	<0.5	50/100 kHz receiver

Table 4.6 Minimum separation distances between desired VOR and undesired VOR or LOC

ΔF (kHz)	D/U (dB)	Tx = 17 dBW		Tx = 20 dBW		Tx=30 dBW		Remarks
		L (dB)	D (NM)	L (dB)	D (NM)	L (dB)	D (NM)	
0	20	147	208	150	212	160	225	Desired VOR at 25000 ft 50/100 kHz receiver
50	-7	120	115	123	131	133	175	100 kHz receiver
50	-34	93	9	96	13	106	42	50 kHz receiver
100	-46	81	<0.5	84	<0.5	94	10	50/100 kHz receiver
150	-50	77	<0.5	80	<0.5	90	5	50/100 kHz receiver

Table 4.7 Minimum separation distances between desired VOR and undesired VOR or LOC

ΔF (kHz)	D/U (dB)	Tx = 17 dBW		Tx = 100 W		Tx=30 dBW		Remarks
		L (dB)	D (NM)	L (dB)	D (NM)	L (dB)	D (NM)	Desired VOR at 10000 ft
0	20	147	143	150	147	160	161	50/100 kHz receiver
50	-7	120	71	123	82	133	115	100 kHz receiver
50	-34	93	10	96	14	106	29	50 kHz receiver
100	-46	81	1	84	3	94	11	50/100 kHz receiver
150	-50	77	<0.5	80	1	90	7	50/100 kHz receiver

Note1: The separation distances are between the edge of coverage for a desired VOR and the location of an undesired VOR (or Localizer) facility. The EIRP of the undesired VOR (or Localizer) is as specified in column "Tx".

Note2: ITU-R aeronautical propagation curve for 108 MHz and 5% of the time. The antenna height of the desired aircraft receiver is indicated in the "Remarks" column, and the antenna height of undesired Localizer is 6 ft, undesired VOR is 20 ft.

4.3.9 Table 4.8 presents the co- and adjacent frequency separation distance between the edge of the DOC of the (desired) VOR and the location of the (undesired) GBAS/VDB station.

Table 4.8 Distance between the edge of the DOC of the desired VOR (50 kHz receiver) from GBAS/VDB

VOR Height (ft)	Co-frequency D/U = 26 dB L = 153 dB	1st adj freq. (+/-25 kHz) D/U = 0 dB L = 126 dB	2nd adj freq. (+/- 50 kHz) D/U = - 34 dB L = 92 dB	3rd adj freq. (+/-75 kHz) D/U = -46 dB L = 87 dB	4th adj freq. (+/- 100 kHz) D/U = -65 dB L = 61 dB
5 000	127 NM	80 NM	9 NM	5 NM	Frequency assignment planning freedom
10 000	161 NM	111 NM	8 NM	5 NM	
15 000	186 NM	135 NM	8 NM	4 NM	
20 000	206 NM	155 NM	8 NM	3 NM	
25 000	225 NM	172 NM	8 NM	2 NM	
30 000	242 NM	189 NM	7 NM	Frequency assignment planning freedom	
35 000	237 NM	203 NM	6 NM		
40 000	271 NM	217 NM	5 NM		
45 000	284 NM	228 NM	3 NM		
50 000	297 NM	242 NM	Planning freedom		
60 000	320 NM	264 NM			

Note 1: With minimum separation distances less than 0.5 NM frequency assignment planning freedom is assumed.

Note 2: Separation distances ≤ 5 NM may be considered as operational insignificant.

Note3: ITU-R aeronautical propagation curve for 108 MHz and 5% of the time. The antenna height of undesired GBAS/VDB is 45 ft.

4.4 Ground Based Augmentation System (GBAS)

4.4.1 [Frequency band and channel spacing] The GNSS ground-based augmentation system (GBAS) VHF data broadcast (VDB) frequency band is 108 to 117.975MHz. The lowest assignable frequency is 108.025 MHz and the highest assignable frequency is 117.950 MHz, the channel spacing is 25 kHz.

4.4.2 Designated Operational Coverage (DOC)

4.4.2.1 The DOC of the GBAS/VDB to provide the approach service is as shown in Figure 4-3.

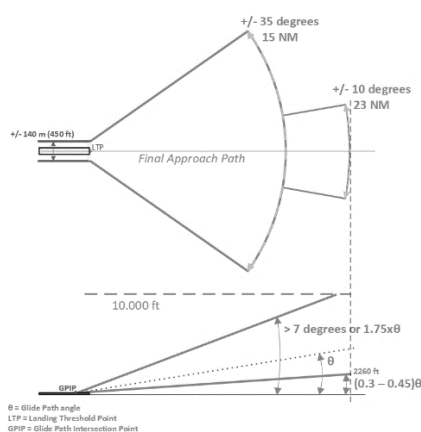


Figure 4-3 Minimum required DOC of GBAS

4.4.2.2 Typically, the DOC for GBAS/VDB facilities is referenced to the location and the elevation of the threshold of the runway. It is recommended to use an omnidirectional coverage that extends to 23 NM from the runway threshold and up to a level of 10,000 ft above runway threshold. [DOC 9718, Vol 2, 6.2]

4.4.2.3 The vertical coverage is limited by a plane that extends from the glide path intersection point with an angle of 0.3 times the Glide Path angle. The upper limit of coverage is 10000 ft that follows the Earth curvature. [DOC 9718, Vol 2, 6.2]

4.4.2.4 When GBAS supports multiple approaches, use of a single omnidirectional VDB may be considered, if geographically feasible. In this case, frequency coordination should include all GBAS coverage areas. [DOC 9718, Vol 2, 6.2]

4.4.2.5 Figure 4-3 presents the minimum approach DOC, States/Administrations may specify different (larger) DOC areas. More information on establishing the DOC is in Annex 10, Volume I, Attachment D, paragraph 7.3. [DOC 9718, Vol 2, 6.2]

4.4.3 GBAS/VDB positioning service ERIP

4.4.3.1 The ERIP for the GBAS/VDB when providing the approach service is typically 17dBW (50 W) to provide service down to about 2 000 ft at the lower edge of the DOC. [DOC 9718, Vol 2, 6.2.4.1]

4.4.3.2 The EIRP for the GBAS/VDB when providing the positioning service is in Table 4.9. [DOC 9718, Vol 2, 6.2.4.2]

Table 4.9 Typical EIRP for GBAS/VDB positioning service

Range (NM)	EIRP (dBW)	EIRP (W)
50	14	25
100	20	100
150	23	200
200	26	400

Note: The EIRP of a GBAS/VDB system shall be provided as Peak Envelope Power. Since MOPS specify the output power to be measured as mean power over a bit-sequence in the preamble, care must be taken that the PEP is used for calculation. [EUR 011, 4.1.10]

4.4.4 [PFD limit] For frequency assignment planning purposes, it is assumed the field strength of the desired corresponds to the minimum field strength, as defined in Annex10, Volume I, throughout the designated operational coverage. The minimum field strength is 215 $\mu\text{V/m}$ (-99dBW/m²) which is equivalent to a power level at the aircraft antenna output of -102dBW with an ideal isotropic antenna (for the horizontal component of the GBAS/VDB signal). The maximum field strength is (SIS max) 0.879 V/m (-27dBW/m² or -29dBW). [DOC 9718, Vol 2, 6.3.4]

4.4.5 For use in civil aviation, the GBAS signal is horizontally polarized. The value for cross polarization isolation between horizontal and vertical polarization assumed to be 10 dB (Re. Annex 10, V1, Attachment D, 7.2.4).

4.4.6 [With FM] The risk of interference from FM broadcasting stations in the band 87 – 108 MHz caused by unwanted emissions into the aeronautical band or generated in the airborne receiver should be taken into account. The relevant Recommendation for GBAS is ITU-R SM.1841. [EUR 011, 4.1.4]

4.4.7 [Facility code] Information on the planning of identifications can be found in section 4.6.

4.4.8 Besides the frequency, co-ordination must also take into account reference path data selectors (RPDS) and reference station data selectors (RSDS) and time slots. More information on the use and coordination of RPDSs and RSDSs is in Annex 10, Volume I, Appendix B. [EUR 011, 4.1.6 and DOC 9718 VOL2, 6.5]

4.4.9 Protection requirements

4.4.9.1 Protection requirements for GBAS/VDB receivers.

The GBAS/VDB receiver shall be capable to achieve a message failure rate of not more than one failed message per 1000 data messages. The D/U ratios in Table 4.10 will meet this requirement.

Table 4.10 Co- and adjacent channel protection requirements for GBAS/VDB receivers

Frequency offset	VDB/VDB	VDB/VOR	VDB/ILS	VDB/VHF-COM
Co-frequency	26 dB	26 dB	26 dB	n/a
+/- 25 kHz	-18 dB	0 dB	0 dB	n/a
+/- 50 kHz	-43 dB	-34 dB	-34 dB	-32 dB
+/- 58.33 kHz	n/a	n/a	n/a	-37 dB
+/- 66.66 kHz	n/a	n/a	n/a	-41 dB
+/- 75 kHz – +/- 975 kHz	-46 dB	-46 dB	-46 dB	-44 dB
+/- 83.33 kHz	n/a	n/a	n/a	-47 dB
+/- 91.66 kHz	n/a	n/a	n/a	-49 dB
+/- 100 kHz	-46 dB	-46 dB	-46 dB	
≥ 1000 kHz	-46 dB	-60 dB	-60 dB	

4.4.9.2 Airborne Contribution Factor

- (a) With the view to protect the desired VDB signals in space, an airborne contribution factor has been added. This airborne contribution factor compensates for antenna gain variations in the horizontal plane (between the directions of the desired versus the undesired transmitter) and on-board transmission line loss variation (between the frequency of the desired and the undesired signal. The airborne contribution factor can be calculated with $15 + \text{Min}(6, 6 \times \text{Frequency Offset (in kHz)} / 1000)$ with a maximum frequency offset of 1000 kHz.
- (b) Table 4.11 contains the protection ratios that are to be observed in frequency assignment planning to protect a desired GBAS/VDB from interference that can be caused by an undesired GBAS/VDB, VOR or ILS or VHF COM facility.

Table 4.11 Co- and adjacent channel protection requirements for GBAS/VDB; signal-in-space

Frequency offset	VDB/VDB	VDB/VOR	VDB/ILS	VDB/VHF-COM
Co-frequency	41 dB	41 dB	41 dB	n/a
+/- 25 kHz	-3 dB	15 dB	15 dB	n/a
+/- 50 kHz	-27 dB	-18 dB	-18 dB	
+/- 58.33 kHz	n/a	n/a	n/a	
+/- 66.66 kHz	n/a	n/a	n/a	
+/- 75 kHz	-30 dB	-30 dB	-30 dB	
+/- 83.33 kHz	n/a	n/a	n/a	
+/- 91.66 kHz	n/a	n/a	n/a	
+/- 100 kHz				
+/- 975 kHz	-25 dB	-25 dB	--25 dB	
≥ 1000 kHz	-25 dB	-39 dB	-39 dB	

4.4.10 The separation distances between desired and undesired GBAS stations in Table 4.12 were calculated for desired GBAS facilities providing approach services.

Table 4.12 Minimum separation distances between desired and undesired GBAS stations

Frequency offset	D/U (dB)	L (dB)	Distance from DOC of desired station to undesired station	D/U (dB)	L (dB)	Distance from DOC of desired station to undesired station
0 (Co- channel)	41	160	213 NM	26	145	149 NM
25 kHz	-3	116	81 NM	-18	101	24 NM

50 kHz	-27	92	9 NM	-43	76	0
75 kHz – 975 kHz	-30 to -25	89 to 94	6 to 11 NM	-46	73	0
≥ 1000 kHz	-25	94	11 NM	-46	73	0

4.4.11 The calculation of the minimum separation distances between the edge of coverage (DOC) of a desired GBAS VDB facility and the location of an undesired VOR or Localizer in Table 4.13 and Table 4.14.

Table 4.13 Minimum separation distances between the DOC of the desired GBAS and the location of the undesired VOR or localizer

D/U (dB)	L(dB) 5%	VOR (17dBW) Distance (NM)	Localizer (17dBW) Distance (NM)	L(dB) 5%	VOR (27dBW) Distance (NM)	L(dB) 5%	VOR (30 dBW) Distance (NM)
26 ($\Delta f = 0$)	145	140	125	155	154	158	158
0 ($\Delta f = 25$)	119	68	38	129	101	132	111
-34 ($\Delta f = 50$)	85	4	4	95	12	98	17
-46 ($\Delta f = 75$)	73	0	0	83	3	86	4
-46 ($\Delta f = 100$)	73	0	0	83	3	86	4
-46 ($\Delta f = 975$)	73	0	0	83	3	86	4
-60 ($\Delta f \geq 1000$)	59	0	0	69	0	72	0

Table 4.14 Minimum separation distances between the DOC of the desired GBAS and the location of the undesired VOR or localizer, consider Airborne Contribution Factor

D/U (dB)	L(dB) 5%	VOR (17dBW) Distance (NM)	Localizer (17dBW) Distance (NM)	L(dB) 5%	VOR (27dBW) Distance (NM)	L(dB) 5%	VOR (30 dBW) Distance (NM)
41 ($\Delta f = 0$)	160	160	146	170	243	173	260
15 ($\Delta f = 25$)	134	118	85	144	138	147	143
-18 ($\Delta f = 50$)	101	21	14	111	43	114	51
-30 ($\Delta f = 75$)	89	6	6	99	18	102	23
-30 ($\Delta f = 100$)	89	6	6	99	18	102	23
-25 ($\Delta f = 975$)	94	11	8	104	26	107	31
-39 ($\Delta f \geq 1000$)	80	1	1	90	7	93	10

Note: The parameters used in the calculations below are:

Height of the antenna of the (undesired) VOR is 20 ft above local terrain.

Height of the antenna of the (undesired) Localizer is 6 ft above local terrain.

Height of the (desired) VDB aircraft is 10.000 ft.

ITU-R aeronautical propagation curves (Recommendation P.528-4) for 112 MHz, 5% of the time

4.4.12 Interference from VHF-COM signals

4.4.12.1 On-board compatibility

No frequency assignment planning constraints have been identified to secure the compatibility between the on-board transmission of VHF-COM signals and the reception of GBAS/VDB signals on the same aircraft.

Air-to-air interference can be expected as in Table 4.15.

Table 4.15 Minimum separation distances between aircraft

ΔF (kHz)	D/U	10dBW		14 dBW		17dBW		20 dBW	
		L (dB)	D(NM)	L (dB)	D(NM)	L (dB)	D(NM)	L (dB)	D(NM)
50	-34 dB	78	< 1	82	1.5	85	3	88	4.5
75	-39 dB	73	< 1	77	< 1	80	< 1	83	2
100	-42 dB	70	< 1	76	< 1	77	< 1	80	1
125	-46 dB	66	< 1	70	< 1	79	< 1	76	< 1

The minimum separation distances as in Table 4.15 were calculated assuming isotropic antennas on board the desired and the undesired aircraft. Taking into account that the effect of the actual antenna diagram of the VHF-COM and the GBAS/VDB antenna as well as the transient effect of air-to-air interference, at a frequency separation greater than 100 kHz no air-to-air interference is expected.

Note: An aircraft EIRP. of 20 dBW (100 W) is not normally used. For aircraft EIRP. of 17dBW (50 W) or less, a minimum frequency separation between the aircraft VHF-COM and the GBAS/VDB receiver of 50 [58.3] kHz may be recommended.

4.4.12.2 Ground-to-air interference

At short distances, as shown in Table 4.15, interference from a VHF-Ground facility can be expected when the EIRP of the ground station is between 14 dBW (25W) to 20 dBW (100W). Maintaining a minimum frequency separation of 100 kHz between the assigned GBAS/VDB and VHF-COM frequency would avoid such interference. One option is to ensure in the frequency assignment planning process that a guard band of 100 kHz is introduced which would exclude the frequencies between 117.900 – 117.975 MHz to be used for GBAS/VDB.

Note: This condition seems to be extremely conservative. Taking into account the actual antenna diagram and the geography of short distances to the (interfering) VHF COM station, it may be sufficient to only exclude the frequency 117.950 MHz from being assigned to a GBAS/VDB station.

4.5 Distance Measuring Equipment (DME)

4.5.1 Frequency band and channel spacing

4.5.1.1 The DME operates on paired interrogation and reply frequencies (each combination of these frequencies is a “channel”) in the frequency band 960 – 1215MHz. A number of these channels are in turn paired with ILS or VOR frequencies. The DME channelling arrangement is shown in Appendix D. [DOC 9718, V2, 5.3.1]

Note: The frequency band 960 – 1215 MHz is also used for TACAN. TACAN operates with the same channeling scheme as the DME and can be paired with a VOR (VOR/TAC). From the frequency assignment planning point of view TACAN is equivalent to DME.

4.5.1.2 The spacing between DME channels is 1MHz. DME X and Y channels with the same channel number use the same interrogator frequency but with different pulse coding. The reply frequency for the X and Y channel is different as well as the pulse coding. The Y channels reuse the reply frequencies within the interrogation frequency block (1025 – 1150 MHz).

4.5.2 [DOC] The Designated Operational Coverage (DOC) of the DME is normally as promulgated by States/Administrations. When the DME is associated with an ILS or a VOR, the DOC of the DME is normally not less than the DOC of the ILS or VOR. [DOC 9718, 5.2.1]

4.5.3 [PFD limit] The peak equivalent isotopically radiated power shall not be less than that required to ensure a peak pulse power density of minus 89 dBW/m² under all operational weather conditions at any point within coverage. Minus 111 dBW at the antenna corresponds to a power flux density of minus 89 dBW/m² at the mid-band frequency.

4.5.4 [Facility code] Information on the planning of identifications can be found in section 4.6.

4.5.5 Protection requirements

Notes: For frequency planning purposes,

- 1) There is no difference between DME/N and DME/P.*
- 2) TACAN facilities are treated in the same way as DME stations.*
- 3) No criteria are defined for DME/W and DME/Z.*

4.5.5.1 The necessary desired to undesired (D/U) signal ratios needed to protect the desired transponder reply signal at an airborne receiver from the various co-frequency/adjacent frequency, same code/different code, undesired transponder reply signal combinations that may exist. [ANN 10, V1, Attachment C, 7.1.8.1]

4.5.5.2 The prerequisite for any D/U calculation to be valid is that the minimum signal of the (desired) DME (-111dBW) at the aircraft antenna is achieved at all points throughout the coverage.

4.5.5.3 In making an assignment, each DME facility must be treated as the desired source with the other acting as the undesired. If both satisfy their unique D/U requirement, then the channel assignment may be made. This “reverse” check is necessary if the DME facilities being considered radiate with different EIRP or have a different DOC. [DOC 9718, Vol 2, 5.7.7.1]

4.5.5.4 To each X or Y DME channel corresponds a specific reply frequency within the band 960 - 1215 MHz. X and Y DME channels do not have reply frequencies in common. Hence, for the protection of the desired transponder replies from other co-channel transponder replies, it is sufficient to consider only DME facilities with the same channel designation

(including the pulse code). However, for DME facilities operating on Y channels, the reply frequency may be the same as the interrogator frequency of another DME X facility. [DOC 9718, Vol 2, 5.7.1.3]

4.5.5.5 For co-channel assignments, the D/U signal ratio should be at least 8 dB throughout the service volume. [ANN10, V1, ATT D, 7.1.8.2]

4.5.5.6 For Adjacent frequency assignments, the minimum required D/U ratio within the operational service volume shall be in accordance with the values given in Table 4.16. [ANN10, V1, ATT D, 7.1.8.2]

The following values are assumed for the adjacent-channel emissions of the transponder (P_u):

200 mW (-7 dBW) on the first adjacent frequency;

2 mW (-27 dBW) on the second adjacent frequency.

Table 4.16 Minimum separation distances between aircraft

Type of assignment	A	B
Co-frequency:		
Same pulse code	8	8
Different pulse code	8	-43
First adjacent frequency:		
Same pulse code	$-(P_u - 1)$	-42
Different pulse code	$-(P_u + 7)$	-75
Second adjacent frequency:		
Same pulse code	$-(P_u + 19)$	-75
Different pulse code	$-(P_u + 27)$	-75
<i>Note 1: The D/U ratios in column A protect those DME/N interrogators operating on X or Y channels. Column A applies to decoder rejection of 6 microseconds.</i> <i>Note 2: The D/U ratios in column B protect those DME/N or DME/P interrogators utilizing discrimination in conformance with 3.5.5.3.4.2 and 3.5.5.3.4.3 of Chapter 3, Annex 10, Volume I and providing a decoder rejection conforming to 3.5.5.3.5 of Chapter 3, Annex 10, Volume I</i> <i>Note 3: P_u is the peak effective radiated power of the undesired signal in dBW.</i> <i>Note 4: The frequency protection requirement is dependent upon the antenna patterns of the desired and undesired facility and the EIRP of the undesired facility.</i> <i>Note 5: In assessing adjacent channel protection, the magnitude of D/U ratio in column A should not exceed the magnitude of the value in column B.</i>		

4.5.5.7 Separation requirement for DME reply frequencies which are separated by 63MHz. The channel assignment plan for DME is such that the transponder reply frequency for each Y channel is the same as the interrogation frequency of another DME channel. When the reply frequency of one DME matches the interrogation frequency of a second DME, a minimum separation distance of 15 NM (28km) between these (ground) facilities would be required, in general.

4.5.5.8 Table 4.17 to Table 4.19 present the co- and adjacent frequency separation distance between the edge of the DOC of the (desired) DME and the location of the (undesired) DME.

Table 4.17 Minimum separation distances between desired DME and undesired DME

ΔF (MHz)	D/U (dB)	Tx = 27 dBW		Tx = 30 dBW		Tx=37 dBW		Remarks
		L (dB)	D (NM)	L (dB)	D (NM)	L (dB)	D (NM)	
0	8	146	256	149	260	156	265	co-channel
1	8	112	3	112	3	112	3	first adjacent channel
63			15		15		15	

Table 4.18 Minimum separation distances between desired DME and undesired DME

ΔF (MHz)	D/U (dB)	Tx = 27 dBW		Tx = 30 dBW		Tx=37 dBW		Remarks
		L (dB)	D (NM)	L (dB)	D (NM)	L (dB)	D (NM)	
0	8	146	197	149	200	156	204	co-channel
1	8	112	6	112	6	112	6	first adjacent channel
63			15		15		15	

Table 4.19 Minimum separation distances between desired DME and undesired DME

ΔF (MHz)	D/U (dB)	Tx = 27 dBW		Tx = 30 dBW		Tx=37 dBW		Remarks
		L (dB)	D (NM)	L (dB)	D (NM)	L (dB)	D (NM)	Desired DME at 10000 ft
0	8	146	131	149	133	156	137	co-channel
1	8	112	5	112	5	112	5	first adjacent channel
63			15		15		15	

Note1: The separation distances are between the edge of coverage for a desired DME and the location of an undesired DME. The EIRP of the undesired DME is as specified in column "Tx".

Note2: ITU-R aeronautical propagation curve for 1080 MHz and 5% of the time. The antenna height of the desired aircraft receiver is indicated in the "Remarks" column, and the antenna height of undesired DME is 20 ft.

4.5.6 Sectorized DOC of the DME [DOC 9718, Vol 2, 5.11]

Similar to VOR (as described in section 4.3), the DME DOC may be sectorized (instead of circular). In this case, compatibility of the DME with other DME assignments needs to be assured at the critical point which is the closest point of the DOC of the desired DME (with sectorized DOC) and any potential interfering DME transponder.

4.5.7 Use of directional antenna [DOC 9718, Vol 2, 5.12]

4.5.7.1 When omnidirectional DOC is not required, the use of a DME with directional antenna is encouraged, subject to the proviso that the operational requirements for the service to be provided by this facility are met. In Particular, they are useful for the replacement of ILS marker beacons. The directional DME could provide a means to mitigate frequency congestion.

4.5.7.2 The compatibility of DMEs with directional antennas can be examined basically along the same lines as those developed for omnidirectional DME. However, because of the variable antenna gain of a DME with directional antenna, the value of the quantity K (EIRP of the desired minus the EIRP of the undesired facility) in the above formulas depends in general on the position of the airborne receiver. It is noted in particular that because of the orientation of a DME with directional antenna, the minimum D/U value is not necessarily attained along the direct line connecting desired and undesired facilities, as opposed to the case of compatibility between omnidirectional DME.

4.5.7.3 In the presence of at least one DME with directional antenna, the following method should be applied. At first an appropriate number of points is selected along the edge of the DOC of the desired DME, regardless of the type of its antenna. Subsequently at all such points the required D/U criteria are checked. Compatibility is ensured if at all such points the required D/U criteria are met.

4.6 Identifications of Radio Navigation Aids

4.6.1 Identifications of navigation aids shall be so composed, if possible, as to facilitate association with the name of the point in plain language. The Table 4.20 provides an overview of the requirements which have to be taken into account for identifications.

Table 4.20 The requirements have to be taken into account for identifications

Facility	Identification	Remarks
NDB and Locator	2 or 3 letters of the International Morse Code.	
ILS	2 or 3 letters of the International Morse Code which may be preceded by the letter I.	Transmitted by the localizer.
ILS/DME	ILS: 2 or 3 letters of the International Morse Code which may be preceded by the letter I. DME: Identical to associated ILS.	Associated DME identification signal.
VOR	2 or 3 letters of the International Morse Code.	
VOR/DME (VOR/TACAN also called VORTAC)	VOR: 2 or 3 letters of the International Morse Code. DME: Identical to associated VOR.	Associated DME identification signal.

DME (TACAN)	Letters and numerals of the International Morse Code.	Independent DME identification signal for stand-alone DME facility.
GBAS	4 characters (Only upper case letters, numeric digits and IA-5 “space” are used. The rightmost character is transmitted first. For a three-character GBAS ID, the rightmost (first transmitted) character shall be IA-5 “space”).	

4.6.2 The identification TST is reserved for radio navigation facilities on test and should not be used for other purposes.

4.6.3 Coded identification shall not be duplicated within 1 100 km (600 NM) of the location of the radio navigation aid concerned, except as noted hereunder. [ANN 11, APP 2, 2.2.2]

Note: When two radio navigation aids operating in different bands of the frequency spectrum are situated at the same location, their radio identifications are normally the same.

4.6.4 States/Administrations’ requirements for identifications shall be notified to the Regional Offices for coordination.

Appendix A

TEMPLATE FOR AN EXCEL OR WORD FILE THAT CAN BE USED FOR ELECTRONIC SUBMISSION OF ONE (OR MORE) NEW OR MODIFIED FREQUENCY ASSIGNMENTS FOR NAV SYSTEMS TO THE REGIONAL OFFICE

Essential characteristics should to be included in the submission to the Regional Office:

Country	
Location	
Latitude	
Longitude	
Frequency	
Channel	
VHFDOC	
VHFPwr	
DMEDOC	
DMEPwr	
Cat	
Remarks	
TRD	

In the table, the following format should be used:

Country	Country name as per ICAO directory	
Location	Name of the location of the NAV facility	
Latitude	Latitude in the format xxDyy'zz'' (e.g. 32D44'55'')	
Longitude	Longitude in the format xxxDyy'zz'' (e.g.054D55'56'')	
Facility	Select one of the following facilities	
	- ILS - ILS/DME - VOR - VOR/DME - DME - TACAN - GBAS	
Frequency	xxx.yyy (e.g. 109.200 or 113.450) [MHz]	
	<i>A frequency can be proposed by a State or selected by the Regional Office and is subject to a compatibility assessment with or frequency assignments in the COM list 2</i>	
Channel	DME channel (e.g. 36X or 45Y)	
VHFDOC	xxx/yyy e.g. 200/250	xxx is the range of the coverage (e.g. 200 is 200 NM) yyy is the height (FL) of the coverage (e.g. 250 is FL 250 or 25000ft)
DMEDOC	xxx/yyy e.g. 200/250	xxx is the range of the DME coverage (e.g. 200 is 200 NM) yyy is the height (FL) of the DME coverage (e.g. 250 is FL 250 or 25000ft)
Remarks	Optional, as provided by the State	
Cat	Category; either ICAO or NAT	
VHFPwr	As provided by the State	
DMEPwr	As provided by the State	

Note: The values for VHFPwr and DMEPwr are for the effective isotopically radiated power (e.i.r.p) of the relevant facility. In the absence of such information, the following values are assumed in the frequency assignment planning process:

Appendix A

ILS/Localizer	30 dBW	
ILS/DME	27 dBW (e.i.r.p for the associated DME)	
VOR	Range <50 NM	e.i.r.p 17 dBW
	Range 50 – 100 NM	e.i.r.p 20 dBW
	Range 100 – 150 NM	e.i.r.p 23 dBW
	Range > 150 NM	e.i.r.p 30 dBW
VOR/DME	Range <50 NM	e.i.r.p 27 dBW (landing DME)
	Range 150 -150 NM	e.i.r.p 30 dBW (terminal DME)
	Rnage >150 NM	e.i.r.p 37 dBW (en route DME)
DME only	as for DME associated with VOR.	
<i>The e.i.r.p values for DME apply also for TACAN facilities</i>		
TRD	Runway azimuth	

Appendix B

PREFERRED FORMAT OF THE CHARACTERISTICS OF SUBMISSIONS

Reference of submission:

Date:

Subject: Application for xx, at xx (location name)

Contact information of the civil aviation authority of States

Suggested basic information of a submission:

Function of the proposed assignments,

Details of the facility: Manufacturer & Model (if possible),

Frequency Range (if request RO for proposal) or proposed frequency,

Transmit Power or DOC

Latitude/Longitude:

Minimum information required with reference to the following screenshot:

Country, Location, Latitude/Longitudes, Service.

The screenshot shows a software interface for entering station data. The title bar reads "Station" and "a draft frequency assignment in your". The interface includes several input fields and buttons:

- Region:** A dropdown menu with "APAC" selected.
- Key:** A text field containing "D 420458".
- Cat:** A dropdown menu.
- Channel spacing:** Two buttons labeled "25 kHz" and "8.33 kHz".
- Country:** A text field with a "Ctry" label.
- Location:** A text field.
- Latitude:** A text field with a dropdown menu showing "D", "N", and "S".
- Longitude:** A text field with a dropdown menu showing "D", "E", and "W".
- Frequency:** A text field containing "0.000".
- Service:** A dropdown menu.
- Stat:** A dropdown menu.
- DOC:** A dropdown menu with options: "Drop down disabled", "MOD Range (NM)", and "MOD Height (feet)".
- ER family:** A dropdown menu with an example "ER-BOT-1".
- PolyID:** A dropdown menu.
- Required fields:** A section with a label "FIR SECTORNAME" and a text field.
- Remarks:** A text field.
- Upload Status:** A button labeled "DN".
- TEST:** A button.

Appendix C

REGIONAL 117.975-137MHz FREQUENCY ALLOTMENT PLAN

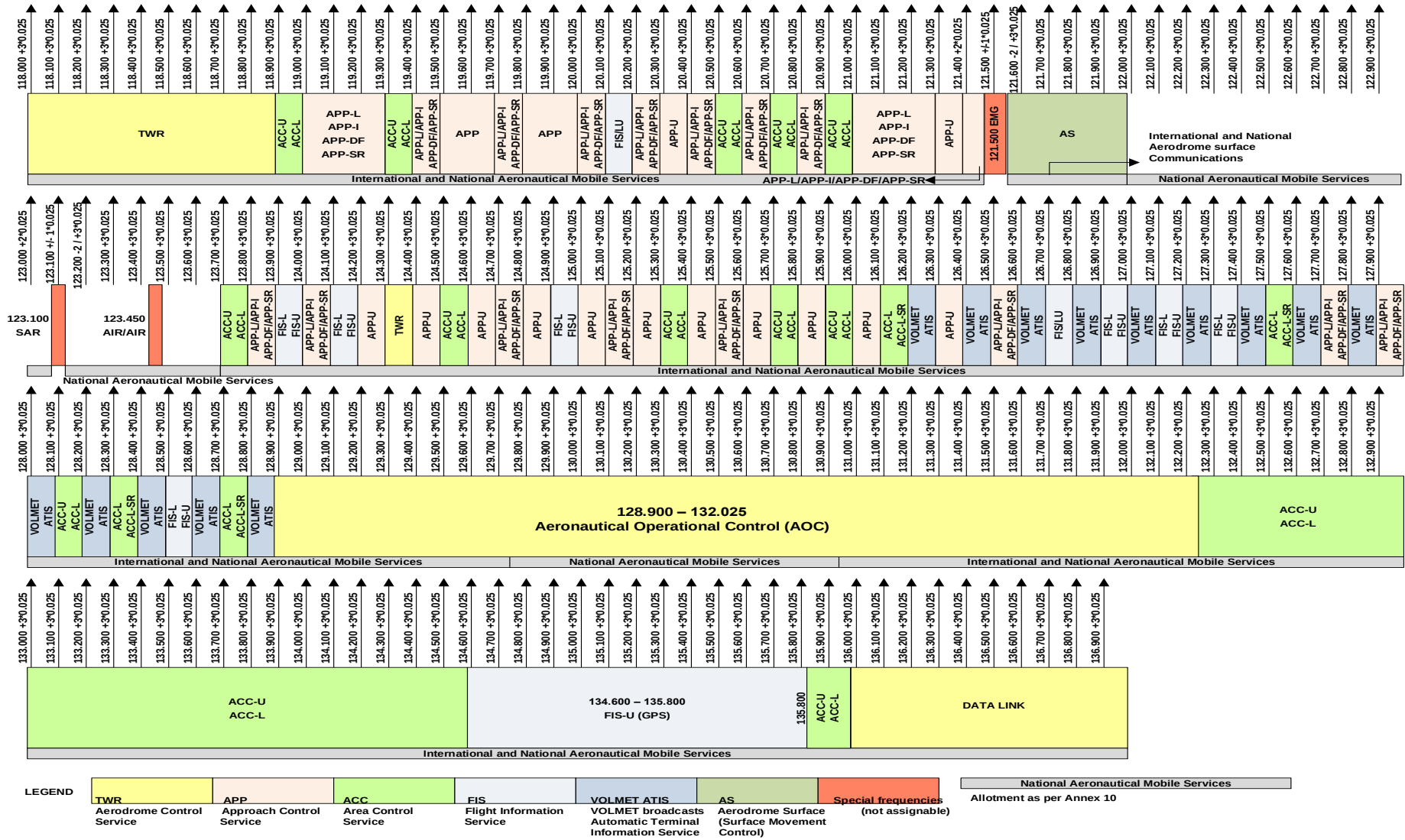
Function	Frequencies (MHz)
TWR	118.000 118.025 118.050 118.075 118.100 118.125 118.150 118.175 118.200 118.225 118.250 118.275 118.300 118.325 118.350 118.375 118.400 118.425 118.450 118.475 118.500 118.525 118.550 118.575 118.600 118.625 118.650 118.675 118.700 118.725 118.750 118.775 118.800 118.825 118.850 118.875 124.300 124.325 124.350 124.375
AS	121.550 121.575 121.600 121.625 121.650 121.675 121.700 121.725 121.750 121.775 121.800 121.825 121.850 121.875 121.900 121.925 121.950 121.975
APP	119.500 119.525 119.550 119.575 119.600 119.625 119.650 119.675 119.800 119.825 119.850 119.875 119.900 119.925 119.950 119.975
APP-L, APP-I, Also used for APP Direction finding or APP Surveillance radar	119.000 119.025 119.050 119.075 119.100 119.125 119.150 119.175 119.200 119.225 119.250 119.275 119.400 119.425 119.450 119.475 119.700 119.725 119.750 119.775 120.000 120.025 120.050 120.075 120.200 120.225 120.250 120.275 120.400 120.425 120.450 120.475 120.600 120.625 120.650 120.675 120.800 120.825 120.850 120.875 121.000 121.025 121.050 121.075 121.100 121.125 121.150 121.175 121.200 121.225 121.250 121.275 121.400 121.425 121.450 123.800 123.825 123.850 123.875 124.000 124.025 124.050 124.075 124.700 124.725 124.750 124.775 125.100 125.125 125.150 125.175 125.500 125.525 125.550 125.575 126.500 126.525 126.550 126.575 127.700 127.725 127.750 127.775 127.900 127.925 127.950 127.975
APP-U	120.300 120.325 120.350 120.375 121.300 121.325 121.350 121.375 124.200 124.225 124.250 124.275 124.400 124.425 124.450 124.475

	124.600 124.625 124.650 124.675 124.800 124.825 124.850 124.875 125.000 125.025 125.050 125.075 125.200 125.225 125.250 125.275 125.400 125.425 125.450 125.475 125.600 125.625 125.650 125.675 125.800 125.825 125.850 125.875 126.000 126.025 126.050 126.075 126.300 126.325 126.350 126.375
ACC-L Also used for ACC-L Surveillance Radar	126.100 126.125 126.150 126.175 127.500 127.525 127.550 127.575 128.300 128.325 128.350 128.375 128.700 128.725 128.750 128.775
ACC-U ACC-L	118.900 118.925 118.950 118.975 119.300 119.325 119.350 119.375 120.500 120.525 120.550 120.575 120.700 120.725 120.750 120.775 120.900 120.925 120.950 120.975 123.700 123.725 123.750 123.775 124.500 124.525 124.550 124.575 125.300 125.325 125.350 125.375 125.700 125.725 125.750 125.775 125.900 125.925 125.950 125.975 128.100 128.125 128.150 128.175 132.050 132.075 132.100 132.125 132.150 132.175 132.200 132.225 132.250 132.275 132.300 132.325 132.350 132.375 132.400 132.425 132.450 132.475 132.500 132.525 132.550 132.575 132.600 132.625 132.650 132.675 132.700 132.725 132.750 132.775 132.800 132.825 132.850 132.875 132.900 132.925 132.950 132.975 133.000 133.025 133.050 133.075 133.100 133.125 133.150 133.175 133.200 133.225 133.250 133.275 133.300 133.325 133.350 133.375 133.400 133.425 133.450 133.475 133.500 133.525 133.550 133.575 133.600 133.625 133.650 133.675 133.700 133.725 133.750 133.775 133.800 133.825 133.850 133.875 133.900 133.925 133.950 133.975 134.000 134.025 134.050 134.075 134.100 134.125 134.150 134.175 134.200 134.225 134.250 134.275 134.300 134.325 134.350 134.375 134.400 134.425 134.450 134.475 134.500 134.525 134.550 134.575 135.825 135.850 135.875 135.900 135.925 135.950 135.975
FIS-L FIS-U	120.100 120.125 120.150 120.175 123.900 123.925 123.950 123.975

	124.100 124.125 124.150 124.175 124.900 124.925 124.950 124.975 126.700 126.725 126.750 126.775 126.900 126.925 126.950 126.975 127.100 127.125 127.150 127.175 127.300 127.325 127.350 127.375 128.500 128.525 128.550 128.575
FIS-U Also used for General purpose communications	134.600 134.625 134.650 134.675 134.700 134.725 134.750 134.775 134.800 134.825 134.850 134.875 134.900 134.925 134.950 134.975 135.000 135.025 135.050 135.075 135.100 135.125 135.150 135.175 135.200 135.225 135.250 135.275 135.300 135.325 135.350 135.375 135.400 135.425 135.450 135.475 135.500 135.525 135.550 135.575 135.600 135.625 135.650 135.675 135.700 135.725 135.750 135.775 135.800
AOC	128.900 128.925 128.950 128.975 129.000 129.025 129.050 129.075 129.100 129.125 129.150 129.175 129.200 129.225 129.250 129.275 129.300 129.325 129.350 129.375 129.400 129.425 129.450 129.475 129.500 129.525 129.550 129.575 129.600 129.625 129.650 129.675 129.700 129.725 129.750 129.775 129.800 129.825 129.850 129.875 129.900 129.925 129.950 129.975 130.000 130.025 130.050 130.075 130.100 130.125 130.150 130.175 130.200 130.225 130.250 130.275 130.300 130.325 130.350 130.375 130.400 130.425 130.450 130.475 130.500 130.525 130.550 130.575 130.600 130.625 130.650 130.675 130.700 130.725 130.750 130.775 130.800 130.825 130.850 130.875 130.900 130.925 130.950 130.975 131.000 131.025 131.050 131.075 131.100 131.125 131.150 131.175 131.200 131.225 131.250 131.275 131.300 131.325 131.350 131.375 131.400 131.425 131.450 131.475 131.500 131.525 131.550 131.575 131.600 131.625 131.650 131.675 131.700 131.725 131.750 131.775 131.800 131.825 131.850 131.875 131.900 131.925 131.950 131.975 132.000 132.025
VOLMET/ATIS	126.200 126.225 126.250 126.275 126.400 126.425 126.450 126.475

	126.600 126.625 126.650 126.675 126.800 126.825 126.850 126.875 127.000 127.025 127.050 127.075 127.200 127.225 127.250 127.275 127.400 127.425 127.450 127.475 127.600 127.625 127.650 127.675 127.800 127.825 127.850 127.875 128.000 128.025 128.050 128.075 128.200 128.225 128.250 128.275 128.400 128.425 128.450 128.475 128.600 128.625 128.650 128.675 128.800 128.825 128.850 128.875
DATA LINK	136.000-136.975
AIR-TO-AIR	123.450
NOT ALLOTTED	122.000-123.675

GRAPHICAL PRESENTATION OF REGIONAL 117.975-137MHz FREQUENCY ALLOTMENT PLAN



Appendix D

GENERIC CALCULATION METHOD FOR GEOGRAPHICAL SEPARATION DISTANCES

- a. For the calculation of minimum separation distances with a (desired) facility and an (undesired) facility the generic model as described in Chapter 1 of DOC 9718 has been established.
- b. To establish minimum geographical separation distances between a desired facility and an undesired facility, the following parameters are used:
 - a) The minimum received desired power P_d of the desired facility (dBW).
 - b) D/U ratio. The prerequisite for any D/U calculation to be valid is that the minimal receive power is achieved at all points throughout the coverage.
 - c) ERIP of the undesired facility T_x (dBW).
 - d) Designated operational range of the desired facility.
 - e) ITU-R aeronautical propagation curve for 5% of the time.
- c. The generic method establishes the minimum geographical separation distance between the edge of the DOC of the desired facility and undesired facility. This distance provides for the transmission loss (attenuation) of the undesired signal to a level that meets the D/U requirement for the desired signal, $L = T_x - P_d + D/U$. This distance is obtained with using the relevant (frequency) ITU propagation curve applicable for the maximum height of the DOC of the desired facility and the site elevation of the undesired facility.
- d. When the minimum distance from the edge of coverage from the desired facility to the undesired facility has been established, the station-to-station separation distance can be obtained by adding the DOR to the minimum distance from the edge of coverage to the undesired facility.
- e. These steps need to be undertaken in the reverse direction whereby the desired facility becomes the undesired facility and the undesired facility becomes the desired facility. The maximum distance between the two processes determine the minimum separation between the two facilities.

Appendix E

PAIRING OF ILS/VOR/DME CHANNELS

Source: Annex 10, Volume 1, Table A			DME parameters					
			Interrogation				Reply	
				Pulse codes				
Channel pairing					DME/P mode			
DME channel number	VHF frequency MHz	GS frequency MHz	Frequency MHz	DME/N μ s	Initial approach μ s	Final approach μ s	Frequency MHz	Pulse codes μ s
* 1X	–	–	1 025	12	–	–	962	12
** 1Y	–	–	1 025	36	–	–	1 088	30
* 2X	–	–	1 026	12	–	–	963	12
** 2Y	–	–	1 026	36	–	–	1 089	30
* 3X	–	–	1 027	12	–	–	964	12
** 3Y	–	–	1 027	36	–	–	1 090	30
* 4X	–	–	1 028	12	–	–	965	12
** 4Y	–	–	1 028	36	–	–	1 091	30
* 5X	–	–	1 029	12	–	–	966	12
** 5Y	–	–	1 029	36	–	–	1 092	30
* 6X	–	–	1 030	12	–	–	967	12
** 6Y	–	–	1 030	36	–	–	1 093	30
* 7X	–	–	1 031	12	–	–	968	12
** 7Y	–	–	1 031	36	–	–	1 094	30
* 8X	–	–	1 032	12	–	–	969	12
** 8Y	–	–	1 032	36	–	–	1 095	30
* 9X	–	–	1 033	12	–	–	970	12
** 9Y	–	–	1 033	36	–	–	1 096	30
* 10X	–	–	1 034	12	–	–	971	12
** 10Y	–	–	1 034	36	–	–	1 097	30
* 11X	–	–	1 035	12	–	–	972	12
** 11Y	–	–	1 035	36	–	–	1 098	30
* 12X	–	–	1 036	12	–	–	973	12
** 12Y	–	–	1 036	36	–	–	1 099	30
* 13X	–	–	1 037	12	–	–	974	12
** 13Y	–	–	1 037	36	–	–	1 100	30
* 14X	–	–	1 038	12	–	–	975	12
** 14Y	–	–	1 038	36	–	–	1 101	30

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*	15X	—	—	1 039	12	—	—	976	12
**	15Y	—	—	1 039	36	—	—	1 102	30
*	16X	—	—	1 040	12	—	—	977	12
**	16Y	—	—	1 040	36	—	—	1 103	30
?	17X	108		1 041	12	—	—	978	12
	17Y	108.05		1 041	36	36	42	1 104	30
	18X	108.1	334.7	1 042	12	12	18	979	12
	18Y	108.15	334.55	1 042	36	36	42	1 105	30
	19X	108.2		1 043	12	—	—	980	12
	19Y	108.25		1 043	36	36	42	1 106	30
	20X	108.3	334.1	1 044	12	12	18	981	12
	20Y	108.35	333.95	1 044	36	36	42	1 107	30
	21X	108.4		1 045	12	—	—	982	12
	21Y	108.45		1 045	36	36	42	1 108	30
	22X	108.5	329.9	1 046	12	12	18	983	12
	22Y	108.55	329.75	1 046	36	36	42	1 109	30
	23X	108.6		1 047	12	—	—	984	12
	23Y	108.65		1 047	36	36	42	1 110	30
	24X	108.7	330.5	1 048	12	12	18	985	12
	24Y	108.75	330.35	1 048	36	36	42	1 111	30
	25X	108.8		1 049	12	—	—	986	12
	25Y	108.85		1 049	36	36	42	1 112	30
	26X	108.9	329.3	1 050	12	12	18	987	12
	26Y	108.95	329.15	1 050	36	36	42	1 113	30
	27X	109		1 051	12	—	—	988	12
	27Y	109.05		1 051	36	36	42	1 114	30
	28X	109.1	331.4	1 052	12	12	18	989	12
	28Y	109.15	331.25	1 052	36	36	42	1 115	30
	29X	109.2		1 053	12	—	—	990	12
	29Y	109.25		1 053	36	36	42	1 116	30
	30X	109.3	332.0	1 054	12	12	18	991	12
	30Y	109.35	331.85	1 054	36	36	42	1 117	30
	31X	109.4		1 055	12	—	—	992	12
	31Y	109.45		1 055	36	36	42	1 118	30

32X	109.5	332.6	1 056	12	12	18	993	12
32Y	109.55	332.45	1 056	36	36	42	1 119	30
33X	109.6		1 057	12	–	–	994	12
33Y	109.65		1 057	36	36	42	1 120	30
34X	109.7	333.2	1 058	12	12	18	995	12
34Y	109.75	333.05	1 058	36	36	42	1 121	30
35X	109.8		1 059	12	–	–	996	12
35Y	109.85		1 059	36	36	42	1 122	30
36X	109.9	333.8	1 060	12	12	18	997	12
36Y	109.95	333.65	1 060	36	36	42	1 123	30
37X	110		1 061	12	–	–	998	12
37Y	110.05		1 061	36	36	42	1 124	30
38X	110.1	334.4	1 062	12	12	18	999	12
38Y	110.15	334.25	1 062	36	36	42	1 125	30
39X	110.2		1 063	12	–	–	1 000	12
39Y	110.25		1 063	36	36	42	1 126	30
40X	110.3	335.0	1 064	12	12	18	1 001	12
40Y	110.35	334.85	1 064	36	36	42	1 127	30
41X	110.4		1 065	12	–	–	1 002	12
41Y	110.45		1 065	36	36	42	1 128	30
42X	110.5	329.6	1 066	12	12	18	1 003	12
42Y	110.55	329.45	1 066	36	36	42	1 129	30
43X	110.6		1 067	12	–	–	1 004	12
43Y	110.65		1 067	36	36	42	1 130	30
44X	110.7	330.2	1 068	12	12	18	1 005	12
44Y	110.75	330.05	1 068	36	36	42	1 131	30
45X	110.8		1 069	12	–	–	1 006	12
45Y	110.85		1 069	36	36	42	1 132	30
46X	110.9	330.8	1 070	12	12	18	1 007	12
46Y	110.95	330.65	1 070	36	36	42	1 133	30
47X	111		1 071	12	–	–	1 008	12
47Y	111.05		1 071	36	36	42	1 134	30
48X	111.1	331.7	1 072	12	12	18	1 009	12

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	48Y	111.15	331.55	1 072	36	36	42	1 135	30
	49X	111.2		1 073	12	–	–	1 010	12
	49Y	111.25		1 073	36	36	42	1 136	30
	50X	111.3	332.3	1 074	12	12	18	1 011	12
	50Y	111.35	332.15	1 074	36	36	42	1 137	30
	51X	111.4		1 075	12	–	–	1 012	12
	51Y	111.45		1 075	36	36	42	1 138	30
	52X	111.5	332.9	1 076	12	12	18	1 013	12
	52Y	111.55	332.75	1 076	36	36	42	1 139	30
	53X	111.6		1 077	12	–	–	1 014	12
	53Y	111.65		1 077	36	36	42	1 140	30
	54X	111.7	333.5	1 078	12	12	18	1 015	12
	54Y	111.75	333.35	1 078	36	36	42	1 141	30
	55X	111.8		1 079	12	–	–	1 016	12
	55Y	111.85		1 079	36	36	42	1 142	30
	56X	111.9	331.1	1 080	12	12	18	1 017	12
	56Y	111.95	330.95	1 080	36	36	42	1 143	30
	57X	112		1 081	12	–	–	1 018	12
	57Y	112.05		1 081	36	–	–	1 144	30
	58X	112.1		1 082	12	–	–	1 019	12
	58Y	112.15		1 082	36	–	–	1 145	30
	59X	112.2		1 083	12	–	–	1 020	12
	59Y	112.25		1 083	36	–	–	1 146	30
**	60X	–		1 084	12	–	–	1 021	12
**	60Y	–		1 084	36	–	–	1 147	30
**	61X	–		1 085	12	–	–	1 022	12
**	61Y	–		1 085	36	–	–	1 148	30
**	62X	–		1 086	12	–	–	1 023	12
**	62Y	–		1 086	36	–	–	1 149	30
**	63X	–		1 087	12	–	–	1 024	12
**	63Y	–		1 087	36	–	–	1 150	30
**	64X	–		1 088	12	–	–	1 151	12
**	64Y	–		1 088	36	–	–	1 025	30

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**	65X	—	1 089	12	—	—	1 152	12
**	65Y	—	1 089	36	—	—	1 026	30
**	66X	—	1 090	12	—	—	1 153	12
**	66Y	—	1 090	36	—	—	1 027	30
**	67X	—	1 091	12	—	—	1 154	12
**	67Y	—	1 091	36	—	—	1 028	30
**	68X	—	1 092	12	—	—	1 155	12
**	68Y	—	1 092	36	—	—	1 029	30
**	69X	—	1 093	12	—	—	1 156	12
**	69Y	—	1 093	36	—	—	1 030	30
	70X	112.3	1 094	12	—	—	1 157	12
**	70Y	112.35	1 094	36	—	—	1 031	30
	71X	112.4	1 095	12	—	—	1 158	12
**	71Y	112.45	1 095	36	—	—	1 032	30
	72X	112.5	1 096	12	—	—	1 159	12
**	72Y	112.55	1 096	36	—	—	1 033	30
	73X	112.6	1 097	12	—	—	1 160	12
**	73Y	112.65	1 097	36	—	—	1 034	30
	74X	112.7	1 098	12	—	—	1 161	12
**	74Y	112.75	1 098	36	—	—	1 035	30
	75X	112.8	1 099	12	—	—	1 162	12
**	75Y	112.85	1 099	36	—	—	1 036	30
	76X	112.9	1 100	12	—	—	1 163	12
**	76Y	112.95	1 100	36	—	—	1 037	30
	77X	113	1 101	12	—	—	1 164	12
**	77Y	113.05	1 101	36	—	—	1 038	30
	78X	113.1	1 102	12	—	—	1 165	12
**	78Y	113.15	1 102	36	—	—	1 039	30
	79X	113.2	1 103	12	—	—	1 166	12
**	79Y	113.25	1 103	36	—	—	1 040	30
	80X	113.3	1 104	12	—	—	1 167	12
	80Y	113.35	1 104	36	36	42	1 041	30
	81X	113.4	1 105	12	—	—	1 168	12
	81Y	113.45	1 105	36	36	42	1 042	30

82X	113.5	1 106	12	—	—	1 169	12
82Y	113.55	1 106	36	36	42	1 043	30
83X	113.6	1 107	12	—	—	1 170	12
83Y	113.65	1 107	36	36	42	1 044	30
84X	113.7	1 108	12	—	—	1 171	12
84Y	113.75	1 108	36	36	42	1 045	30
85X	113.8	1 109	12	—	—	1 172	12
85Y	113.85	1 109	36	36	42	1 046	30
86X	113.9	1 110	12	—	—	1 173	12
86Y	113.95	1 110	36	36	42	1 047	30
87X	114	1 111	12	—	—	1 174	12
87Y	114.05	1 111	36	36	42	1 048	30
88X	114.1	1 112	12	—	—	1 175	12
88Y	114.15	1 112	36	36	42	1 049	30
89X	114.2	1 113	12	—	—	1 176	12
89Y	114.25	1 113	36	36	42	1 050	30
90X	114.3	1 114	12	—	—	1 177	12
90Y	114.35	1 114	36	36	42	1 051	30
91X	114.4	1 115	12	—	—	1 178	12
91Y	114.45	1 115	36	36	42	1 052	30
92X	114.5	1 116	12	—	—	1 179	12
92Y	114.55	1 116	36	36	42	1 053	30
93X	114.6	1 117	12	—	—	1 180	12
93Y	114.65	1 117	36	36	42	1 054	30
94X	114.7	1 118	12	—	—	1 181	12
94Y	114.75	1 118	36	36	42	1 055	30
95X	114.8	1 119	12	—	—	1 182	12
95Y	114.85	1 119	36	36	42	1 056	30
96X	114.9	1 120	12	—	—	1 183	12
96Y	114.95	1 120	36	36	42	1 057	30
97X	115	1 121	12	—	—	1 184	12
97Y	115.05	1 121	36	36	42	1 058	30
98X	115.1	1 122	12	—	—	1 185	12

98Y	115.15	1 122	36	36	42	1 059	30
99X	115.2	1 123	12	–	–	1 186	12
99Y	115.25	1 123	36	36	42	1 060	30
100X	115.3	1 124	12	–	–	1 187	12
100Y	115.35	1 124	36	36	42	1 061	30
101X	115.4	1 125	12	–	–	1 188	12
101Y	115.45	1 125	36	36	42	1 062	30
102X	115.5	1 126	12	–	–	1 189	12
102Y	115.55	1 126	36	36	42	1 063	30
103X	115.6	1 127	12	–	–	1 190	12
103Y	115.65	1 127	36	36	42	1 064	30
104X	115.7	1 128	12	–	–	1 191	12
104Y	115.75	1 128	36	36	42	1 065	30
105X	115.8	1 129	12	–	–	1 192	12
105Y	115.85	1 129	36	36	42	1 066	30
106X	115.9	1 130	12	–	–	1 193	12
106Y	115.95	1 130	36	36	42	1 067	30
107X	116	1 131	12	–	–	1 194	12
107Y	116.05	1 131	36	36	42	1 068	30
108X	116.1	1 132	12	–	–	1 195	12
108Y	116.15	1 132	36	36	42	1 069	30
109X	116.2	1 133	12	–	–	1 196	12
109Y	116.25	1 133	36	36	42	1 070	30
110X	116.3	1 134	12	–	–	1 197	12
110Y	116.35	1 134	36	36	42	1 071	30
111X	116.4	1 135	12	–	–	1 198	12
111Y	116.45	1 135	36	36	42	1 072	30
112X	116.5	1 136	12	–	–	1 199	12
112Y	116.55	1 136	36	36	42	1 073	30
113X	116.6	1 137	12	–	–	1 200	12
113Y	116.65	1 137	36	36	42	1 074	30
114X	116.7	1 138	12	–	–	1 201	12
114Y	116.75	1 138	36	36	42	1 075	30

	115X	116.8	1 139	12	–	–	1 202	12
	115Y	116.85	1 139	36	36	42	1 076	30
	116X	116.9	1 140	12	–	–	1 203	12
	116Y	116.95	1 140	36	36	42	1 077	30
	117X	117	1 141	12	–	–	1 204	12
	117Y	117.05	1 141	36	36	42	1 078	30
	118X	117.1	1 142	12	–	–	1 205	12
	118Y	117.15	1 142	36	36	42	1 079	30
	119X	117.2	1 143	12	–	–	1 206	12
	119Y	117.25	1 143	36	36	42	1 080	30
	120X	117.3	1 144	12	–	–	1 207	12
	120Y	117.35	1 144	36	–	–	1 081	30
	121X	117.4	1 145	12	–	–	1 208	12
	121Y	117.45	1 145	36	–	–	1 082	30
	122X	117.5	1 146	12	–	–	1 209	12
	122Y	117.55	1 146	36	–	–	1 083	30
	123X	117.6	1 147	12	–	–	1 210	12
	123Y	117.65	1 147	36	–	–	1 084	30
	124X	117.7	1 148	12	–	–	1 211	12
**	124Y	117.75	1 148	36	–	–	1 085	30
	125X	117.8	1 149	12	–	–	1 212	12
**	125Y	117.85	1 149	36	–	–	1 086	30
	126X	117.9	1 150	12	–	–	1 213	12
**	126Y	117.95	1 150	36	–	–	1 087	30
* These channels are reserved exclusively for national allotments. ** These channels may be used for national allotment on a secondary basis. The primary reason for reserving these channels is to provide protection for the secondary surveillance radar (SSR) system. 108.0 MHz is not scheduled for assignment to ILS service. The associated DME operating channel No. 17X may be assigned for emergency use. The reply frequency of channel No. 17X (i.e. 978 MHz) is also utilized for the operation of the universal access transceiver (UAT). Standards and Recommended Practices for UAT are found in Annex 10, Volume III, Part I, Chapter 12.								

ICAO APAC POINT OF CONTACT ON FREQUENCY AFFAIRS

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	STATE/NAME	TITLE/ORGANIZATION	TEL/FAX/E-MAIL
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	STATE/NAME	TITLE/ORGANIZATION	TEL/FAX/E-MAIL
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	STATE/NAME	TITLE/ORGANIZATION	TEL/FAX/E-MAIL
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	STATE/NAME	TITLE/ORGANIZATION	TEL/FAX/E-MAIL
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	STATE/NAME	TITLE/ORGANIZATION	TEL/FAX/E-MAIL
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Reference	Who	What	Due date	Status	Completed on	Result	Comment
A 4-5	All	States to provide ICAO Regional Office with information of all facilities that are in operation to improve the currency of Frequency lists	30-Mar-24	~~Open~~ On-going		In progress	
A 4-7	All, Robert Witzén	Create ad hoc group to draft Table of Content first, then develop the regional guidance material on aeronautical frequency spectrum management in a shared way by States.	31/03/2023 CNS SG/27	Open		~~CAAC volunteered to share a draft and lead the adhoc group. Decided to be continued in SRWG/5.~~	1. follow up VTC on 3 July. 2. Ad hoc drafting group meeting with CAAC on 10 July Draft Conclusion SRWG/7/1
A4-8	Robert Witzén, All	to run new VHF COM simulations	End-2023	Open		To be conducted with required raw data submission from States/Administration	
A5-2	ICAO	to host a regional WRC-23 preparatory meeting upon coordination with ICAO HQ after lifting of travel restriction.	31/12/2022 13-14 Feb 23	~~Open~~ Closed			
A5-3	ICAO	to resolve firewall query of Australia for FF installation and use.		Closed			Already replied during report
A5-4	ICAO	to inform ICAO HQ to consider the feasibility incorporating terrain data into future version of Frequency Finder	SRWG/7	~~Open~~ Closed			
A5-5	ICAO, India, Thailand, China, Japan, Mr. Robert Witzén	ad-hoc group led by India to further explore the issue of 50 kHz channel spacing in the frequency band 108-117.975 MHz for ILS (LOC)/VOR operations and provide the inputs to SRWG/6. To coordinate with Japan to participate in ad-hoc group.	31/03/2022 SRWG/7	~~Open~~ Closed			Completed with the paper from India.
A5-6	ICAO	to take appropriate follow up action to improve the awareness on the potential of emerging technologies and the necessity to consider the development of software tool like Frequency Finder to support the frequency assignment planning at regional office in future.	SRWG/7	~~Open~~ On-going			Currently a new technology implemented in FF is using GBAS/VDB Ongoing studies in NSP and FSMP are on LDACS in the DMEband
A5-10	ICAO	to conduct a in-person workshop for Frequency Finder after new release of FF along with online course proposed by ICAO HQ for new release of FF is available	SRWG/7 Tentatively October 2023	Open			~~Has a Workshop been planned? A workshop F2F is necessary as part of the User Acceptance Test.~~
A6-1	ICAO, SRWG	Recommended to undertake an analysis on VHF COM simulation in 3 - 5 years from now (2025-2028) to assess the severity of the congestion	2025-2028	Open			

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Reference	Who	What	Due date	Status	Completed on	Result	Comment
A6-2	ICAO	Review the registered frequencies from the simulation conducted in 2016 in the Frequency Finder, and remove those temporary frequencies in the Frequency Finder in previous simulation service	SRWG/7	~~Open~~ Closed			
A6-3	ICAO	Establish an ad-hoc group (in offline mode through email list) to review the VHF COM Frequency Allotment Plan for APAC in terms of effective use of frequencies in the region, including the review of non-safety critical frequency use. (superceded by A7-1)	SRWG/7	Closed (superceded by A7-1)			
A6-4	ICAO	Publish questionnaire for APAC states for possible introduction of 50 kHz channel spacing in the APAC region via State Letter from ICAO APAC Regional Office (follow up of A5-5)	SRWG/7	~~Open~~ Closed			
A6-5	ICAO	Probable augmentation of the Frequency Finder tool to incorporate indication to States to coordinate or not to coordinate	SRWG/7	Open			
A6-6	China, ICAO	To summarize the revised planning principle/criteria in the format used in WP04 of SRWG/1	SRWG/7	Closed (Incorporated into Guidance Material)			
A6-7	ICAO	State Letter on updated Guidance Material to invite APAC States for review and comments ~~(Follow up of A4-7)~~ (Superceded by A7-2)	SRWG/7	~~Open~~ Closed			
~~A5-9~~ A6-8	ICAO	~~Administrations of Member States in APAC region would take proactive measures (necessary follow up actions) in line with FSMP at national and regional level, to support CAAs work with National telecommunication regulators to prevent and monitor any impact of 5G to Radio Altimeters (avoid the future safety issues on radio altimeter due to 5G implementation).~~	~~SRWG/7~~	~~Open~~ On-going			HQ SL: Ref.: SP 74/1-21/22, 25 March 2021, Subject: Potential safety concerns regarding interference to radio altimeters

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Reference	Who	What	Due date	Status	Completed on	Result	Comment
A6-3 A7-1	China as Rapporteur and Mr Robert Witzgen as Advisor with participation from volunteering States/Administration, ICAO	Ad-hoc Expert group led by China to address issues identified in current frequency allotment plan. Tasks of this group: - Study the allotment plan; - Analyze the real use of allotment registered in FF; - Understand the current situation; - Identify existing issues and rooms for improvement; - Develop suggestions in both technical and administrative perspectives; - Explore the potential in reallocating sub-bands/pools; - Produce a survey on the usage of TIBA in the Region; and - Review content of Guidance Material (~~as discussed in WP08~~)	SRWG/8	Open			
A7-2	ICAO	After circulating to APAC States for review of Guidance Material, ad-hoc group to review virtually the material	CNS SG/27	Open			
A7-3	Indonesia as Rapporteur with participation from volunteering States/Administration, ICAO	Ad-hoc group rapported by Indonesia to share the experience in this Region on handling HF resource utilization and provide recommendations, produce a survey on the usage of HF in the Region, review eANP Vol II relevant tables, review outcomes from former ICAO meetings, and suggestions to Agenda Item 1.9 in WRC-23 if deemed necessary.	SRWG/8	Open			

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Attachment 1 to the Report

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LIST OF WORKING PAPERS			
WP/01	1	Provisional Agenda	Secretariat
WP/02	2	Review of Relevant Meetings	Secretariat
WP/03	2	Relevant Action Items of 57th Conference of Directors General of Civil Aviation	Secretariat
WP/04	3	Review of VHF COM Frequency Allotment Plan for APAC	Secretariat
WP/05	3	Survey Result of the Introduction of 50 KHz Channel Spacing for ILS and VOR Facilities in the Asia/Pacific Region	Secretariat
WP/06	4	Update on Frequency Finder	Secretariat
WP/07	5	Review of Frequency List 2 in the Region	Secretariat
WP/08	6	Addressing Frequency Interference in APAC Region	Secretariat
WP/09	7	Potential Impacts from 5G Implementation on Aircraft Radio Altimeters - Outcomes in Relevant Meetings and Regional Updates	Secretariat
WP/10	7	Outcomes of APT-ICAO Webinar on 5G Implementation and Radio Altimeter	Secretariat
WP/11	8	Draft of Asia Pacific Regional Aeronautical Radio Frequency Management Guidance Material	China
WP/12	9	Review of Frequency Coordination in the APAC Region	Secretariat
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WP/16	3	Reconsideration on the Allotment Plan for APAC Region	Secretariat
WP/17	9	Utilization of HF Frequency Spectrum in Indonesia	Indonesia

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IP/01	-	Meeting Information	Secretariat
IP/02	9	Implementation of the Frequency Finder to Support Better Coordination	Indonesia
IP/03	9	Update on Space-based VHF	Singapore
IP/04	2	Outcomes of WRC-23 Workshop	Secretariat
LIST OF FLIMSIES			
		NIL	
