

THE REPUBLIC OF THE UNION OF MYANMAR

MINISTRY OF TRANSPORT

DEPARTMENT OF CIVIL AVIATION



MYANMAR CIVIL AVIATION REQUIREMENTS

MCAR Part-5 ANS Section 9

Volume-V

Aeronautical Telecommunications

Aeronautical Radio Frequency Spectrum Utilization

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RECORD OF AMENDMENTS AND CORRIGENDA

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FOREWORDS

In pursuant to Article 28 of the Convention on International Civil Aviation each contracting State undertakes to provide in its territory, air navigation facilities to facilitate air navigation and also adopt and put into operation the appropriate standard systems for communication procedures, codes, marking, signals etc., in accordance with standard which may be recommended or established from time to time, pursuant to the convention. International Civil Aviation Organization adapts and amends from time to time, as may be necessary, international standards and recommended practices and procedures for Aeronautical Telecommunications – Aeronautical Radio Frequency Spectrum Utilization in Annex 10 Volume V.

This Civil Aviation Requirements is issued under the provisions of part 7, Radio Telegraph apparatus Rule 63 and 64 of the Burma Aircraft Rule 1937 for the requirements to be followed in respect of Aeronautical Telecommunications – Aeronautical Radio Frequency Spectrum Utilization.



(DIRECTOR GENERAL)
DEPARTMENT OF CIVIL AVIATION, MYANMAR

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CHAPTER 1

DEFINITIONS

When the following terms are used in this Civil Aviation Requirements, they have the following meanings:

Alternative means of communication. A means of communication provided with equal status, and in addition to the primary means.

Double channel simplex. Simplex using two frequency channels, one in each direction.

Duplex. A method in which telecommunication between two stations can take place in both directions simultaneously.

Frequency channel. A continuous portion of the frequency spectrum appropriate for a transmission utilizing a specified class of emission.

Offset frequency simplex. A variation of single channel simplex wherein telecommunication between two stations is effected by using in each direction frequencies that are intentionally slightly different but contained within a portion of the spectrum allotted for the operation.

Operational control communications. Communications required for the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of a flight.

Primary means of communication. The means of communication to be adopted normally by aircraft and ground stations as a first choice where alternative means of communication exist.

Simplex. A method in which telecommunication between two stations takes place in one direction at a time.

Single channel simplex. Simplex using the same frequency channel in each direction.

VHF digital link (VDL). A constituent mobile subnetwork of the aeronautical telecommunication network (ATN), operating in the aeronautical mobile VHF frequency band. In addition, the VDL may provide non-ATN functions such as, for instance, digitized voice.

CHAPTER 2

DISTRESS FREQUENCIES

2.1 Frequencies for Emergency Locator Transmitters (ELTs) for Search and Rescue

2.1.1 All emergency locator transmitters carried in compliance with Standards of Annex 6, Parts I, II and III shall operate on both 406 MHz and 121.500 MHz.

Note1: ITU Radio Regulations (5.256 and) provide for the use of 243 MHz in addition to the above frequencies.

Note2: Specifications for ELTs are found in Annex 10, Volume III, Part II, Chapter 5 and the ITU Radio Regulations, Article 34, Section I, No. 34.1.

2.2 Search and Rescue Frequencies

2.2.1 Where there is a requirement for the use of high frequencies for search and rescue scene of action coordination purpose, the frequencies 3023 KHz and 5680 KHz shall be employed.

2.2.2 Where specific frequencies are required for communication between rescue coordination center and aircraft engaged in search and rescue operations, they should be selected regionally from the appropriate aeronautical mobile frequency bands in light of the nature of the provisions made for the establishment of search and rescue aircraft.

CHAPTER 3**UTILIZATION OF FREQUENCIES BELOW 30 MHz****3.1 Method of Operations**

3.1.1 In the aeronautical mobile service, single channel simplex shall be used in radiotelephone communications utilizing radio frequencies below 30 MHz in the bands allocated exclusively to the aeronautical mobile (R) service.

3.1.2 Assignment of Single Sideband Channels

3.1.2.1 Single sideband channels shall be assigned in accordance with MCAR, Part-5, ANS, Section-9, Volume III(B), Para 2.4 of (Voice Communication Systems).

3.1.2.2 For the operational use of the channels concerned administrations shall take into account the provisions of 27/19 of Appendix 27 of the ITU Radio Regulations.

3.1.2.3 The use of aeronautical mobile (R) frequencies below 30 MHz for international operations should be coordinated as specified in Appendix 27 of the ITU Radio Regulations as follows:

27/19 The International Civil Aviation Organization (ICAO) co-ordinates radio communications of the aeronautical mobile (R) service with international aeronautical operations and this Organization should be consulted in all appropriate cases in the operational use of the frequencies in the Plan.

3.1.2.4 Where international operating requirements for HF communications cannot be satisfied by the Frequency Allotment Plan at Part 2 of Appendix S27 to the Radio Regulations, an appropriate frequency may be assigned as specified in Appendix 27 by the application of the following provisions:

27/20 It is recognized that not all the sharing possibilities have been exhausted in the Allotment Plan contained in this Appendix. Therefore, in order to satisfy particular operational requirements which are not otherwise met by this Allotment Plan, administrations may assign frequencies from the aeronautical mobile (R) bands in areas other than those to which they are allotted in this Plan. However, the use of the frequencies so assigned must not reduce the protection to the same frequencies in the areas where they are allotted by the Plan below that determined by the application of the procedure defined in Part I, Section II B of this Appendix.

27/21 When necessary to satisfy the needs of international air operations administrations may adapt the allotment procedure for the assignment of aeronautical mobile (R) frequencies, which assignments shall then be the subject of prior agreement between administrations affected.

27/22 The co-ordination described in No. 27/21 shall be effected where appropriate and desirable for the efficient utilization of the frequencies in question, and especially when the procedures of No. 27/19 are unsatisfactory.

3.1.2.5 The use of classes of emission J7B and J9B shall be subject to the following provisions of Appendix 27:

27/12 For radiotelephone emissions the audio frequencies will be limited to between 300 and 2 700 Hz and the occupied bandwidth of other authorized emissions will not exceed the upper limit of J3E emissions. In specifying these limits, however, no restriction in their extension is implied in so far as emissions other than J3E are concerned, provided that the limits of unwanted emissions are met (see Nos. 27/73 and 27/74).

27/14 On account of the possibility of interference, a given channel should not be used in the same allotment area for radiotelephony and data transmissions.

27/15 The use of channels derived from the frequencies indicated in 27/18 for the various classes of emissions other than J3E and H2B will be subject to special arrangements by the administrations concerned and affected in order to avoid harmful interference which may result from the simultaneous use of the same channel for several classes of emission.

3.1.3 **Assignment of Frequencies for Aeronautical Operational Control Communications**

3.1.3.1 Worldwide frequencies for aeronautical operational control communications are required to enable aircraft operating agencies to meet the obligations prescribed in Annex 6, Part I. Assignment of these frequencies shall be in accordance with the following provisions of Appendix 27:

27/9 A world-wide allotment area is one in which frequencies are allotted to provide long distance communications between an aeronautical station within that allotment area and aircraft operating anywhere in the world.

27/217 The world-wide frequency allotments appearing in the tables at No. 27/213 and Nos. 27/218 to 27/231, except for carrier (reference) frequencies 3023 kHz and 5680 kHz, are reserved for assignment by administrations to stations operating under authority granted by the administration concerned for the purpose of serving one or more aircraft operating agencies. Such assignments are to provide communications between an appropriate aeronautical station and an aircraft station anywhere in the world for exercising control over regularity of flight and for safety of aircraft. World-wide frequencies are not to be assigned by administrations for MWARA, RDARA and VOLMET purposes. Where the operational area of an aircraft lies wholly within a RDARA or sub-RDARA boundary, frequencies allotted to those RDARAs and sub-RDARAs shall be used.

3.2 **NDB Frequency Management**

3.2.1 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.).

3.2.2 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.

CHAPTER 4

UTILIZATION OF FREQUENCIES ABOVE 30 MHz

Details pertaining to the allocation of spectrum to aeronautical services, including footnoted allocations and restrictions, are contained in both the ITU Radio Regulations of the International Telecommunication Union and the ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies (Doc 9718)

4.1 Utilization in the frequency Band 117.975 – 137.000 MHz

4.1.1 General Allotment of Frequency Band 117.975 – 137.000 MHz

4.1.1.1 The block allotment of the frequency band 117.975 – 137.000 MHz shall be as shown in Table 4-1.

4.1.2 Frequency Separation and Limits of Assignable Frequencies

4.1.2.1 In the frequency band 117.975 – 137.000 MHz, the lowest assignable frequency shall be 118.000 MHz and the highest 136.975 MHz.

4.1.2.2 The minimum separation between assignable frequencies in the aeronautical mobile (R) service shall be 8.33 kHz.

4.1.2.3 Requirements for mandatory carriage of equipment specifically designed for 8.33 kHz channel spacing shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment, including the appropriate lead time.

Note: No changes will be required to aircraft systems or ground systems operating solely in regions not using 8.33 kHz channel spacing.

4.1.2.4 Requirements for mandatory carriage of equipment specifically designed for VDL Mode 2, VDL Mode 3 and VDL Mode 4 shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment, including the appropriate lead time.

4.1.2.4.1 The agreement indicated in 4.1.2.4 shall provide at least two years' notice of mandatory carriage of airborne systems.

4.1.2.5 In regions where 25 kHz channel spacing (DSB-AM) and VHF digital link (VDL) and 8.33 kHz DSB-AM channel spacing are in operation, the publication of the assigned frequency or channel of operation shall conform to the channel contained in Table 4-1 (*bis*).

4.1.3 Frequencies used for Particular Functions**4.1.3.1 Emergency Channel**

4.1.3.1.1 The emergency channel (121.500 MHz) shall be used only for genuine emergency purposes, as broadly outlined in the following:

- a) to provide a clear channel between aircraft in distress or emergency and a ground station when the normal channels are being utilized for other aircraft;
- b) to provide a VHF communication channel between aircraft and aerodromes, not normally used by international air services, in case of an emergency condition arising;
- c) to provide a common VHF communication channel between aircraft, either civil or military, and between such aircraft, and surface services, involved in common search and rescue operations, prior to changing when necessary to the appropriate frequency;
- d) to provide air-ground communication with aircraft when airborne equipment failure prevents the use of the regular channels;
- e) to provide a channel for the operation of emergency locator transmitters (ELTs), and for communication between survival craft and aircraft engaged in search and rescue operations;
- f) to provide a common VHF channel for communication between civil aircraft and intercepting aircraft or intercept control units and between civil or intercepting aircraft and air traffic services units in the event of interception of the civil aircraft.

4.1.3.1.2 The frequency 121.500 MHz shall be provided at:

- a) all area control centres and flight information centres;
- b) aerodrome control towers and approach control offices serving international aerodromes and international alternate aerodromes; and
- c) any additional location designated by the appropriate ATS authority,

Where, the provision of that frequency is considered necessary to ensure immediate reception of distress calls or to serve the purposes specified in 4.1.3.1.1.

4.1.3.1.3 The frequency 121.500 MHz shall be available to intercept control units where considered necessary for the purpose specified in 4.1.3.1.1 f).

4.1.3.1.4 The emergency channel shall be guarded continuously during the hours of service of the units at which it is installed.

4.1.3.1.5 The emergency channel shall be guarded on a single channel simplex operation basis.

4.1.3.1.6 The emergency channel (121.500 MHz) shall be available only with the characteristics as contained in MCAR, Part-5, ANS, Section-9, Volume III(B) Para 2 (Voice Communication System) (25kHz)

4.1.3.2 **Air-to-Air Communications Channel**

4.1.3.2.1 An air-to-air VHF communications channel on the frequency of 123.45 MHz shall be designated to enable aircraft engaged in flights over remote and oceanic areas out of range of VHF ground stations to exchange necessary operational information and to facilitate the resolution of operational problems.

4.1.3.2.2 In remote and oceanic areas out of range of VHF ground stations, the air-to-air VHF communications channel on the frequency 123.450 MHz shall be available only with the characteristics as contained in MCAR, Part-5, ANS, Section-9, Volume III(B) Para 2 (Voice Communication System).(25kHz)

4.1.3.3 **Common signalling channel**

4.1.3.3.1 Common signalling channel VDL Mode 2. 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). This CSC uses the Mode 2 VDL modulation scheme and carrier sense multiple access (CSMA).

4.1.3.3.2 Common signalling channels VDL Mode 4. In areas where VDL Mode 4 is implemented, the frequencies 136.925 MHz and 113.250 MHz shall be provided as common signalling channels (CSC) to the VHF Digital Link Mode 4 (VDL Mode 4). These CSCs use the VDL Mode 4 modulation scheme.

4.1.3.4 Auxiliary frequencies for search and rescue operations

4.1.3.4.1 Where a requirement is established for the use of a frequency auxiliary to 121.500 MHz, as described in 4.1.3.1.1 c), the frequency 123.100 MHz shall be used.

4.1.3.4.2 The auxiliary search and rescue channel (123.100 MHz) shall be available only with the characteristics as contained in MCAR, Part-5, ANS, Section-9, Chapter 2 (25 kHz).

Note: The ITU Radio Regulations (RR 5.200) permit the use of the aeronautical auxiliary frequency 123.100 MHz by mobile stations of the maritime mobile service under the conditions laid down in Article 31 of the Radio Regulations for distress and safety purposes with stations of the aeronautical mobile service.

4.1.4 **Provisions Concerning the Deployment of VHF Frequencies and the Avoidance of Harmful Interference**

4.1.4.1 The geographical separation between facilities operating on the same frequency shall, except where there is an operational requirement for the use of common frequencies for groups of facilities, be such that the protected service volume of each facility is separated from the protected service volume of the other facility by a distance not less than that required to provide a desired to undesired signal ratio of 20 dB or by a separation distance not less than the sum of the distances to associated radio horizon of each service volume, whichever is smaller.

4.1.4.2 For areas where frequency assignment congestion is severe or is anticipated to become severe, the geographical separation between facilities operating on the same frequency shall, except where there is an operational requirement for the use of common frequencies for groups of facilities, be such that the protected service volume of each facility is separated from the protected service volume of the other facility by a distance not less than that required to provide a desired to undesired signal ratio of 14 dB or by a separation distance not less than the sum of the distances to the associated radio horizon of each service volume, whichever is smaller. This provision shall be implemented on the basis of a regional air navigation agreement.

4.1.4.3 The geographical separation between facilities operating on adjacent channels shall be such that points at the edge of the protected service volume of each facility are separated by a distance sufficient to ensure operations free from harmful interference.

4.1.4.4 The protection height shall be a height above a specified datum associated with a particular facility, such that below it harmful interference is improbable.

4.1.4.5 The protection height to be applied to functions or to specific facilities shall be determined regionally, taking into consideration the following factors:

- a) the nature of the service to be provided;
- b) the air traffic pattern involved;
- c) the distribution of communication traffic;
- d) the availability of frequency channels in airborne equipment;
- e) probable future developments.

4.1.4.6 Where the protected service volume is less than operationally desirable, separation between facilities operating on the same frequency should not be less than that necessary to ensure that an aircraft at the upper edge of the operational service volume of one facility does not come above the radio horizon with respect to emissions belonging to the service of adjacent facilities.

Note: The effect of this recommendation is to establish a geographical separation distance below which harmful interference is probable.

- 4.1.4.7 The geographical separation between VHF VOLMET stations shall be determined regionally and, shall be such that operations free from harmful interference are secured throughout the protected service volume of each VOLMET station.
- 4.1.4.8 the frequency band 117.975 – 137.000 MHz, the frequencies used for National Aeronautical Mobile Services, unless worldwide or regionally allotted to this specific purpose, shall be so deployed that no harmful interference is caused to facilities in the International Aeronautical Mobile Services.
- 4.1.4.9 The problem of inter-State interference should be resolved by consultation between the States concerned.
- 4.1.4.10 The communication coverage provided by a VHF ground transmitter shall, in order to avoid harmful interference to other stations, be kept to the minimum consistent with the operational requirement for the function.

4.1.5 **Method of Operation**

- 4.1.7.1 Single channel simplex operation shall be used in the frequency band (117.975 – 137) MHz at all stations providing service for aircraft engaged in international air navigation.
- 4.1.5.2 In addition to the above, the ground-to-air voice channel associated with an ICAO standard radio navigational aid may be used, subject to regional agreement, for broadcast or communication purposes or both.

4.1.6 **Plan of Assignable VHF Radio Frequencies for use in the International Aeronautical Mobile Service**

- 4.1.6.1 The frequencies in the band 117.975 – 137.000 MHz for use in the aeronautical mobile (R) service shall be selected from the lists in 4.1.6.1.2.

4.1.6.1.2 **List of Assignable Frequencies**

List A – assignable frequencies in regions or areas where 25 kHz frequency assignments are deployed

118.000 – 121.450 MHz in 25 kHz steps

121.550 – 123.050 MHz in 25 kHz steps

123.150 – 136.975 MHz in 25 kHz steps

List B – assignable frequencies in regions or areas where 8.33 kHz frequency assignments are deployed

118.000 – 121.450 MHz in 8.33 kHz steps

121.550 – 123.050 MHz in 8.33 kHz steps

123.150 – 136.475 MHz in 8.33 kHz steps

- 4.1.6.1.3 Recommendation Frequencies for operational control communications may be required to enable aircraft operating agencies to meet the obligations prescribed in Annex 6, Part I, in which case they should be selected from the a dedicated band bands 128.825 – 132.025 MHz which is determined regionally. These frequencies should be chosen, in so far as practicable, from the upper end of the band and in sequential order.
- 4.1.6.2 The frequencies that may be allotted for use in the aeronautical mobile (R) service in a particular region shall be limited to the number determined as being necessary for operational needs in the region.

4.2 Utilization in the Band 108 – 117.975 MHz

- 4.2.1 The block allotment of the frequency band 108 –117.975 MHz shall be as follows:

Band 108 – 111.975 MHz:

- a) ILS in accordance with 4.2.2 and MCAR, Part-5, ANS, Section-9, Volume (I) Para 3.1.3;
- b) VOR provided that:
 - 1) no harmful adjacent channel interference is caused to ILS;
 - 2) only frequencies ending in either even tenths or even tenths plus a twentieth of a megahertz are used.
- c) GNSS ground-based augmentation system (GBAS) in accordance with MCAR, Part-5, ANS, Section-9, Volume (I)Para 3.7.3.5, provided that no harmful interference is caused to ILS and VOR.

Band 111.975 – 117.975 MHz:

- 1) VOR;
- 2) GNSS ground-based augmentation system (GBAS) in accordance with MCAR,Part-5, ANS, Section-9, Volume(I), Para 3.7.3.5, provided that no harmful interference is caused to VOR.

- 4.2.2 For regional assignment planning, the frequencies for ILS facilities shall be selected in the following order:
- a) localizer channels ending in odd tenths of a megahertz and their associated glide path channels;
 - b) localizer channels ending in odd tenths plus a twentieth of a megahertz and their associated glide path channels.

- 4.2.2.1 ILS channels identified by localizer frequencies ending in an odd tenth plus one twentieth of a megahertz in the band 108 – 111.975 MHz shall be permitted to be utilized on the basis of regional agreement when they become applicable in accordance with the following:

- a) for restricted use commencing 1 January 1973;
- b) for general use on or after 1 January 1976.

4.2.3 For regional assignment planning, the frequencies for VOR facilities shall be selected in the following order:

- a) frequencies ending in odd tenths of a megahertz in the band 111.975 – 117.975 MHz;
- b) frequencies ending in even tenths of a megahertz in the band 111.975 – 117.975 MHz;
- c) frequencies ending in even tenths of a megahertz in the band 108 – 111.975 MHz;
- d) frequencies ending in 50 kHz in the band 111.975 –117.975 MHz, except as provided in 4.2.3.1;
- e) frequencies ending in even tenths plus a twentieth of a megahertz in the band 108 – 111.975 MHz except as provided in 4.2.3.1.

4.2.3.1 Frequencies for VOR facilities ending in even tenths plus a twentieth of a megahertz in the band 108 –111.975 MHz and all frequencies ending in 50 kHz in the band 111.975 – 117.975 MHz shall be permitted to be utilized on the basis of a regional agreement when they have become applicable in accordance with the following:

- a) in the band 111.975 – 117.975 MHz for restricted use;
- b) for general use in the band 111.975 – 117.975 MHz at a date fixed by the Council but at least one year after the approval of the regional agreement concerned;
- c) for general use in the band 108 – 111.975 MHz at a date fixed by the Council but giving a period of two years or more after the approval of the regional agreement concerned.

4.2.4 To protect the operation of airborne equipment during the initial stages of deploying VORs utilizing 50 kHz channel spacing in an area where the existing facilities may not fully conform with MCAR, Part-5, ANS, Section-9, Volume I Para 3 , all existing VORs within interference range of a facility utilizing 50 kHz channel spacing shall be modified to comply with the provisions of MCAR, Part-5, ANS, Section-9, Volume I, Para 3.3.5 .7.

4.2.5 Frequency deployment. The geographical separation between facilities operating on the same and adjacent frequencies shall be determined regionally and shall be based on the following criteria:

- a) the required functional service radio of the facilities;
- b) the maximum flight altitude of the aircraft using the facilities;
- c) the desirability of keeping the minimum IFR altitude as low as the terrain will permit.

- 4.2.6 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.

4.3 Utilization in the Band 960 – 1 215 MHz for DME

- 4.3.1 DME operating channels bearing the suffix "X" or "Y" in Table A, MCAR, Part-5, ANS, Section-9, Volume I Para 3 shall be chosen on a general basis without restriction.
- 4.3.2 Intentionally left blank.
- 4.3.3 Intentionally left blank.
- 4.3.3.1 Intentionally left blank.
- 4.3.3.2 Intentionally left blank.
- 4.3.4 Coordination of regional DME channel assignments should be effected through ICAO.

- 4.4** Intentionally left blank.

Table 4-1. Allotment table

Block allotment of frequencies (MHz)	Worldwide utilization	Remarks
a) 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 4.1.4.9 & 4.1.4.9
b) 121.500	Emergency frequency	See 4.1.3.1 In order to provide a guard band for the protection of the aeronautical emergency frequency, the nearest assignable frequencies on either side of 121.500 MHz are 121.450 MHz and 121.550 MHz,
c) 121.550 – 121.9917 inclusive	International and National Aerodrome Surface Communications	Reserved for ground movement, pre-flight checking, air traffic services clearances, and associated operations.
d) 122.000 – 123.05 inclusive	National Aeronautical Mobile Services	Reserved for national allotments. National assignments are covered by the provisions of 4.1.4.8 and 4.1.4.9.
e) 123.100	Auxiliary frequency SAR	See 4.1.3.4 In order to provide a guard band for the protection of the aeronautical auxiliary frequency, the nearest assignable frequencies on either side of 123.100 MHz are 123.050 MHz and 123.150 MHz
f) 123.150– 123.6917 inclusive	National Aeronautical Mobile Services	Reserved for national allotments, with the exception of 123.450 MHz which is also used as an air-to-air communications channel (see g). National assignments are covered by the provisions of 4.1.4.8 and 4.1.4.9.
g) 123.450	Air-to-air communications	Designated for use as provided for in 4.1.3.2
h) 123.700 – 129.6917 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 4.1.4.8 & 4.1.4.9
i) 129.7 – 130.8917 inclusive	National Aeronautical Mobile Services	Reserved for national allotments but may be used in whole or in part, subject to regional agreement, to meet the requirements mentioned in 4.1.6.1.3.
j) 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 4.1.4.8 & 4.1.4.9
k) 136.900 – 136.975 inclusive	International and National Aeronautical Mobile Services	Reserved for VHF air-ground data link communications.

Table 4-1 (bis). Channelling / Frequency pairing

Frequency (MHz)	Time slot*	Channel spacing (kHz)	Channel
118.0000		25	118.000
118.0000	A	25	118.001
118.0000	B	25	118.002
118.0000	C	25	118.003
118.0000	D	25	118.004
118.0000		8.33	118.005
118.0083		8.33	118.010
118.0167		8.33	118.015
118.0250	A	25	118.021
118.0250	B	25	118.022
118.0250	C	25	118.023
118.0250	D	25	118.024
118.0250		25	118.025
118.0250		8.33	118.030
118.0333		8.33	118.035
118.0417		8.33	118.040
118.0500		25	118.050
118.0500	A	25	118.051
118.0500	B	25	118.052
118.0500	C	25	118.053
118.0500	D	25	118.054
118.0500		8.33	118.055
118.0583		8.33	118.060
118.0667		8.33	118.065
118.0750	A	25	118.071
118.0750	B	25	118.072
118.0750	C	25	118.073
118.0750	D	25	118.074
118.0750		25	118.075
118.0750		8.33	118.080
118.0833		8.33	118.085
118.0917		8.33	118.090
118.1000		25	118.100
Etc			
* Time slot indication is for VDL Mode 3 channels. (Ref. Annex 10, Volume III, Part -I, Chapter-6 for characteristics of VDL Mode 3 operation)			

Appendix to Chapter 4. LIST OF ASSIGNABLE FREQUENCIES

Frequency (MHz)	Annotations	Frequency (MHz)	Annotations
121.5	Emergency frequency	121.95	
123.1	Auxiliary frequency SAR	121.625	
121.60	Reserved for aerodrome surface communications [see Table 4-1, Item c)]	121.675	Reserved for aerodrome surface communications [see Table 4-1, Item c)]
121.65		121.725	
121.70		121.775	
121.75		121.825	
121.80		121.875	
121.85		121.925	
121.90		121.975	

GROUP A

Frequencies (MHz)

118.00	118.90	119.80	120.70	123.80	124.70	125.60	126.50	127.40	128.30	129.20	131.20
118.10	119.00	119.90	120.80	123.90	124.80	125.70	126.60	127.50	128.40	129.30	131.30
118.20	119.10	120.00	120.90	124.00	124.90	125.80	126.70	127.60	128.50	129.40	131.40
118.30	119.20	120.10	121.00	124.10	125.00	125.90	126.80	127.70	128.60	129.50	131.50
118.40	119.30	120.20	121.10	124.20	125.10	126.00	126.90	127.80	128.70	129.60	131.60
118.50	119.40	120.30	121.20	124.30	125.20	126.10	127.00	127.90	128.80	130.90	131.70
118.60	119.50	120.40	121.30	124.40	125.30	126.20	127.10	128.00	128.90	131.00	131.80
118.70	119.60	120.50	121.40	124.50	125.40	126.30	127.20	128.10	129.00	131.10	131.90
118.80	119.70	120.60	123.70	124.60	125.50	126.40	127.30	128.20	129.10		

GROUP B

Frequencies (MHz)

118.05	118.95	119.85	120.75	123.95	124.85	125.75	126.65	127.55	128.45	129.25	131.25
118.15	119.05	119.95	120.85	124.05	124.95	125.85	126.75	127.65	128.55	129.35	131.35
118.25	119.15	120.05	120.95	124.15	125.05	125.95	126.85	127.75	128.65	129.45	131.45
118.35	119.25	120.15	121.05	124.25	125.15	126.05	126.95	127.85	128.75	129.55	131.55
118.45	119.35	120.25	121.15	124.35	125.25	126.15	127.05	127.95	128.85	129.65	131.65
118.55	119.45	120.35	121.25	124.45	125.35	126.25	127.15	128.05	128.95	130.95	131.75
118.65	119.55	120.45	121.35	124.55	125.45	126.35	127.25	128.15	129.05	131.05	131.85
118.75	119.65	120.55	123.75	124.65	125.55	126.45	127.35	128.25	129.15	131.15	131.95
118.85	119.75	120.65	123.85	124.75	125.65	126.55	127.45	128.35			

GROUP C

Frequencies (MHz)

132.00	132.35	132.70	133.05	133.40	133.75	134.10	134.45	134.80	135.10	135.40	135.70
132.05	132.40	132.75	133.10	133.45	133.80	134.15	134.50	134.85	135.15	135.45	135.75
132.10	132.45	132.80	133.15	133.50	133.85	134.20	134.55	134.90	135.20	135.50	135.80
132.15	132.50	132.85	133.20	133.55	133.90	134.25	134.60	134.95	135.25	135.55	135.85
132.20	132.55	132.90	133.25	133.60	133.95	134.30	134.65	135.00	135.30	135.60	135.90
132.25	132.60	132.95	133.30	133.65	134.00	134.35	134.70	135.05	135.35	135.65	135.95
132.30	132.65	133.00	133.35	133.70	134.05	134.40	134.75				

GROUP D

Frequencies (MHz)

132.025	132.525	133.025	133.525	134.025	134.525	135.025	135.525	136.000	136.250	136.500	136.750
132.075	132.575	133.075	133.575	134.075	134.575	135.075	135.575	136.025	136.275	136.525	136.775
132.125	132.625	133.125	133.625	134.125	134.625	135.125	135.625	136.050	136.300	136.550	136.800
132.175	132.675	133.175	133.675	134.175	134.675	135.175	135.675	136.075	136.325	136.575	136.825
132.225	132.725	133.225	133.725	134.225	134.725	135.225	135.725	136.100	136.350	136.600	136.850
132.275	132.775	133.275	133.775	134.275	134.775	135.275	135.775	136.125	136.375	136.625	136.875
132.325	132.825	133.325	133.825	134.325	134.825	135.325	135.825	136.150	136.400	136.650	136.900
132.375	132.875	133.375	133.875	134.375	134.875	135.375	135.875	136.175	136.425	136.675	136.925
132.425	132.925	133.425	133.925	134.425	134.925	135.425	135.925	136.200	136.450	136.700	136.950
132.475	132.975	133.475	133.975	134.475	134.975	135.475	135.975	136.225	136.475	136.725	136.975

GROUP E

Frequencies (MHz)

118.025	118.925	119.825	120.725	123.925	124.825	125.725	126.575	127.425	128.275	129.125	131.175
118.075	118.975	119.875	120.775	123.975	124.875	125.775	126.625	127.475	128.325	129.175	131.225
118.125	119.025	119.925	120.825	124.025	124.925	125.825	126.675	127.525	128.375	129.225	131.275
118.175	119.075	119.975	120.875	124.075	124.975	125.875	126.725	127.575	128.425	129.275	131.325
118.225	119.125	120.025	120.925	124.125	125.025	125.925	126.775	127.625	128.475	129.325	131.375
118.275	119.175	120.075	120.975	124.175	125.075	125.975	126.825	127.675	128.525	129.375	131.425
118.325	119.225	120.125	121.025	124.225	125.125	126.025	126.875	127.725	128.575	129.425	131.475
118.375	119.275	120.175	121.075	124.275	125.175	126.075	126.925	127.775	128.625	129.475	131.525
118.425	119.325	120.225	121.125	124.325	125.225	126.125	126.975	127.825	128.675	129.525	131.575
118.475	119.375	120.275	121.175	124.375	125.275	126.175	127.025	127.875	128.725	129.575	131.625
118.525	119.425	120.325	121.225	124.425	125.325	126.225	127.075	127.925	128.775	129.625	131.675
118.575	119.475	120.375	121.275	124.475	125.375	126.275	127.125	127.975	128.825	129.675	131.725
118.625	119.525	120.425	121.325	124.525	125.425	126.325	127.175	128.025	128.875	130.925	131.775
118.675	119.575	120.475	121.375	124.575	125.475	126.375	127.225	128.075	128.925	130.975	131.825
118.725	119.625	120.525	123.725	124.625	125.525	126.425	127.275	128.125	128.975	131.025	131.875
118.775	119.675	120.575	123.775	124.675	125.575	126.475	127.325	128.175	129.025	131.075	131.925
118.825	119.725	120.625	123.825	124.725	125.625	126.525	127.375	128.225	129.075	131.125	131.975
118.875	119.775	120.675	123.875	124.775	125.675						

GROUP F

(see also Table 4-1 (bis))

118.000 – 121.400 in 8.33 kHz steps	121.600 – 123.050 in 8.33 kHz steps	123.150 – 136.475 in 8.33 kHz steps
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- END -