

Democratic Socialist Republic of Sri Lanka



Civil Aviation Authority of Sri Lanka

Implementing Standards

(Issued under Section 120, Civil Aviation Act No. 14 of 2010)

**Title: Conformance to Annex-10-Aeronautical Telecommunications Vol. V
(Aeronautical Radio Frequency Spectrum Utilization)**

Reference No. : IS-10-(v)-all

Date: 01st March 2022

Pursuant to Section 120 of the Civil Aviation Act No.14 of 2010 which is hereinafter referred to as the CA Act, Director General of Civil Aviation shall have the power to issue, whenever he considers it necessary or appropriate to do so, such Implementing Standards for the purpose of giving effect to any provision in the CA Act, Regulations or Rules made thereunder including the Articles of the Convention on International Civil Aviation specified in the Schedule to the CA Act.

Accordingly, I, being the Director General of Civil Aviation do hereby issue the Implementing Standards on Aeronautical Radio Frequency Spectrum Utilization as mentioned in the Attachment hereto (Ref: IS-10-(v)-all -Att) elaborating the requirements to be satisfied for the effective implementation of the International Standards and Recommended Practices on 'Aeronautical Radio Frequency Spectrum Utilization' contained in Annex-10 Volume V "Aeronautical Telecommunications" to the Convention.

This Implementing Standard shall be applicable to Aeronautical Communication, Navigation, Surveillance Service provider and all aircraft operating agencies. And shall come in to force with effect from 01st March 2022 and remain in force unless revised or revoked.

This Implementing Standard will replace the previous 02nd edition revision 00 issued on 09th July 2020.

Attention is also drawn to section 103 of the CA Act, which states inter alia that failure to comply with any Implementing Standard is an offence. Further, if any standard stipulated in this Implementing is not complied with or violated, an appropriate enforcement action will be taken as per the Aviation Enforcement Policy & Procedures Manual, SLCAP 0005 by the Director General of Civil Aviation under section 102 of the Civil Aviation Act No 14 of 2010.

Captain Themiya Abeywickrama
Director General of Civil Aviation and
Chief Executive Officer

Civil Aviation Authority of Sri Lanka
No 152/01, Minuwangoda Road,
Katunayake.

Enclosure: Attachment No. IS-10-(v)-all –Att

Implementing Standards

SLCAIS- 044: Aeronautical Radio Frequency Spectrum Utilization

Notice to the Recipient

1.1. The requirements in this Implementing Standard are based on the Standards and Recommended Practices (SARPs) adopted by the International Civil Aviation Organization (ICAO) and incorporated in the Amendment No. 90 to Annex 10 –Volume V Aeronautical Radio Frequency Spectrum Utilization.

1.2. In pursuance of the obligation cast under Article 38 of the Convention which requires the Contracting States to notify the ICAO of any differences between the national regulations of the States and practices and the International Standards contained in the respective Annex and any amendments thereto, the CAASL will be taking steps to notify ICAO of such differences relating to either a Standard or a Recommended Practice, if any. The CAASL will also keep the ICAO currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. Furthermore, the CAASL will take steps for the publication of differences between the national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Telecommunications, which is published in accordance with the provisions in the Annex-10 Volume V to the Convention.

1.3. Taking into account of the ICAO council resolution dated 13 April 1948 which invited the attention of Contracting States of the desirability of using in the State's national regulations, as far as is practicable, the precise language of those ICAO Standards that are of a regulatory character, to the greatest extent possible the CAASL has attempted to retain the ICAO texts in the Annex in drafting this Implementing Standard.

1.4 The requirements contained in this document are applicable to Airport & Aviation Services (SL) Ltd. and all aircraft operating agencies utilizing the Aeronautical Frequency bands.

1.5 Airport & Aviation Services (SL) Ltd. and all aircraft operating agencies shall strictly comply with the requirements published in this Document when operating within Sri Lanka airspace.

1.6 This Implementing Standard supersedes the Implementing Standards on **Aeronautical Radio Frequency Spectrum Utilization** 02nd Edition Revision 00 issued by the Director General of Civil Aviation dated on 09th July 2020.

1.7. The components in this Implementing Standard are defined as follows and they have the status as indicated:

1.7.1. **Standard:** Any specification for physical characteristics, configuration, materiel, performance, personnel or procedure, the uniform application of which is recognized as

necessary for the safety and regularity of national and international air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38. The ICAO Standards are reflected in the Implementing Standards if they are locally implemented using the normal fonts and recipients are required to conform to such requirements invariably.

1.7.2. **Recommended Practice:** Any specification for physical characteristics, configuration, materiel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity, efficiency or environmentally responsiveness of international air navigation, and to which Contracting States will endeavor to conform in accordance with the Convention. The ICAO Recommended Practices are reflected in the Implementing Standards in italic fonts and the Recipients are encouraged to implement them to the greatest extent possible.

1.7.3. **Appendices:** Comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council. Enforcement action on such matters will be as in the case of Standards or Recommended Practices.

1.7.4. **Definitions:** A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

1.7.5. **Tables and Figures:** add to or illustrate a Standard or Recommended Practice, and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

Table of Contents

CHAPTER 1	DEFINITIONS	7
CHAPTER 2	DISTRESS FREQUENCIES	9
2.1	Frequencies for emergency locator transmitters (ELTs) for search and rescue	9
2.2	Search and rescue frequencies	9
CHAPTER 3	UTILIZATION OF FREQUENCIES BELOW 30 MHZ.....	10
3.1	Method of operations	10
3.2	NDB frequency management	12
CHAPTER 4	UTILIZATION OF FREQUENCIES ABOVE 30 MHz	13
4.1	Utilization in the band 117.975 – 137.000 MHz.....	13
4.2	Utilization in the frequency band 108 – 117.975 MHz.....	20
4.3	Utilization in the frequency band 960 – 1 215 MHz for DME	22
4.4	N/A.....	23
CHAPTER 5	UTILIZATION OF FREQUENCIES FOR RPAS C2 LINK COMMUNICATION SERVICES.....	24
5.1	Satellite-based C2 Link systems	24
5.2	Terrestrial C2 Link communication systems	25
	ATTACHMENT A. CONSIDERATIONS AFFECTING THE DEPLOYMENT OF LF/MF FREQUENCIES AND THE AVOIDANCE OF HARMFUL INTERFERENCE	26
	ATTACHMENT B. GUIDING PRINCIPLES FOR LONG DISTANCE OPERATIONAL CONTROL COMMUNICATIONS.....	28

CHAPTER 1 DEFINITIONS

Note.— All references to “Radio Regulations” are to the Radio Regulations published by the International Telecommunication Union (ITU). Further information on the ITU processes as they relate to aeronautical radio system frequency use is contained in the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including statement of approved ICAO policies (Doc 9718).

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

C2 Link – The data link between the remotely piloted aircraft and the remote pilot station for the purposes of managing the flight.

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

Note.— This method was sometimes referred to as cross-band.

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.

Note – The classification of emissions and information relevant to the portion of the frequency spectrum appropriate for a given type of transmission (bandwidths) are specified in the Radio Regulations, Article S2 and Appendix S1.

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.

Note.— Such communications are normally required for the exchange of messages between aircraft and aircraft operating agencies.

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.

Remote pilot station (RPS) – The component of the remotely piloted aircraft system containing the equipment used to pilot the remotely piloted aircraft.

Remotely piloted aircraft (RPA) – An unmanned aircraft which is piloted from a remote

pilot station.

Remotely piloted aircraft system (RPAS) – A remotely piloted aircraft, its associated remote pilot station(s), the required C2 Link(s) and any other component as specified in the type design.

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

Note – In application to the aeronautical mobile service, this method may be subdivided as follows:

- a) single channel simplex;*
- b) double channel simplex;*
- c) offset frequency simplex.*

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

VHF digital link (VDL) – A constituent mobile sub network 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 IS 015, IS 023 and IS 059 shall operate on 406 MHz except,
1. all Sri Lankan registered aircraft authorized to carry 19 passengers or less;
or
 2. all Sri Lankan registered aircraft of a maximum certificated take-off mass of 5 700 kg or less.

Note.— Specifications for ELTs are Implementing Standard 040, Chapter 5.

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 purposes, the frequencies 3 023 kHz and 5 680 kHz shall be employed.
- 2.2.2 *Where specific frequencies are required for communication between rescue coordination centers 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 radio telephone 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 IS 040, Chapter 2, 2.4.

3.1.2.2 For the operational use of the channels concerned administrations shall take into account the provisions of S27/19 of Appendix S27 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 S27 of the ITU Radio Regulations as follows:

S27/19 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 S27 by the application of the following provisions:

S27/20 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, ANSP in consultation with CAASL 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.

S27/21 When necessary to satisfy the needs of international air operations ANSP may adapt the allotment procedure for the assignment of aeronautical Mobile(R) frequencies, which assignments shall then be the subject of prior agreement between CAASL and other administrations affected.

S27/22 The co-ordination described in No. 27/19 shall be effected where appropriate and desirable for the efficient utilization of the

frequencies in question, and especially when the procedures of No. 27/21 are unsatisfactory.

3.1.2.5 The use of classes of emission J7B and J9B shall be subject to the following provisions of Appendix S27:

- S27/12 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. S27/73 and S27/74).
- S27/14 On account of the possibility of interference, a given channel should not be used in the same allotment area for radiotelephony and data transmissions.
- S27/15 The use of channels derived from the frequencies indicated in S27/18 for the various classes of emissions other than J3E and H2B will be subject to special arrangements by the CAASL and 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 Implementing Standard 013 (IS 013), Attachment C. Assignment of these frequencies shall be in accordance with the following provisions of Appendix S27:

- S27/9 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.
- S27/217 The world-wide frequency allotments appearing in the tables at No. S27/213 and Nos. S27/218 to S27/231, except for carrier (reference) frequencies 3 023 kHz and 5 680 kHz, are reserved for assignment by CAASL to stations operating under authority granted by the CAASL for the purpose of serving one or more aircraft operating agencies. Such assignments are to provide communications between 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.).*

Note.— Guidance material to assist in determining the application of the foregoing is given in Attachment A.

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.*

Note.— The Standard in Implementing Standard 034, 3.4.4.4, specifies the equipment arrangements to be made.

CHAPTER 4 UTILIZATION OF FREQUENCIES ABOVE 30 MHZ

4.1 Utilization in the band 117.975 – 137.000 MHz

4.1.1 General allotment of frequency band 117.975 – 137 MHz

Note.— As of 26 November 2026, subject to the conditions stated in 5.2.1, the frequency 136.925 MHz may be used for the provision of remotely piloted aircraft systems (RPAS) C2 Link communication services described in this Implementing standard, Chapter 5.

4.1.1.1 The block allotment of the frequency band 117.975 – 137 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 when notified by CAASL for the carriage of such equipment, with appropriate lead time.

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 when notified by CAASL for the carriage of such equipment, with appropriate lead time.

4.1.2.4.1 In respect of 4.1.2.4 & 4.1.2.3 CAASL will provide at least two years' notice for the mandatory carriage of airborne systems.

4.1.2.5 N/A

Table 4-1. Allotment table

Block allotment 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 4.1.4.8 and 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 – 123.050 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 and 4.1.4.9.
i) 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, 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 and 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

<i>Frequency (MHz)</i>	<i>Time slot*</i>	<i>Channel spacing (kHz)</i>	<i>Channel</i>
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.			

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) 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.

Note 1.— The use of the frequency 121.500 MHz for the purpose outlined in c) is to be avoided if it interferes in any way with the efficient handling of distress traffic.

Note 2.— The ITU Radio Regulations (RR 5.200) permit the use of the aeronautical emergency frequency 121.500 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.

4.1.3.1.2 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 Implementing Standard 040 (IS 040), Chapter 2 (25 kHz).

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 123.450 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 Implementing Standard 040 (IS 040) Chapter 2 (25 kHz).

4.1.3.3 Common signaling channel for VDL

4.1.3.3.1 Common signalling channel VDL Mode 2 - The frequency 136.975 MHz is reserved to provide a common signaling 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. 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). 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 Implementing Standard 040 (IS 040), 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 one facility is separated from the protected service volume of another 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 the 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 one facility is separated from the protected service volume of another 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 is 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, 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.

4.1.4.7 N/A

4.1.4.8 In 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 Any inter-State interference should be resolved in consultation with the CAASL.

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

4.1.5.1 Single channel simplex operation shall be used in the frequency band 117.975 – 137.000 MHz at all stations providing service for aircraft engaged in air navigation.

4.1.5.2 In addition to the above, the ground-to-air voice channel associated with an ICAO standard radio navigation aid may be used, 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 frequency band 117.975 – 137.000 MHz for use in the aeronautical mobile (R) service shall be selected from the lists in 4.1.6.1.1.

4.1.6.1.1 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

4.1.6.1.2 Frequencies for operational control communications may be required to enable aircraft operating agencies to meet the obligations prescribed in Implementing Standard 013 (IS 013), Attachment C in which case they should be selected from a dedicated band which is determined regionally.

4.1.6.2 N/A

4.2 Utilization in the frequency 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 Implementing Standard 034 (IS 034), 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 Implementing Standard 034 (IS 034), 3.7.3.5, provided that no harmful interference is caused to ILS and VOR.

Note.— ILS/GBAS geographical separation criteria and geographical separation criteria for GBAS and VHF communication services operating in the 118 – 137 MHz band are under development. Until these criteria are defined and included in the SARPs, it is intended that frequencies in the band 112.050 – 117.900 MHz will be used for GBAS assignments.

- Band 111.975 – 117.975 MHz:
 - a) VOR;
 - b) GNSS ground-based augmentation system (GBAS) in accordance with Implementing Standard 034 (IS 034), 3.7.3.5, provided that no harmful interference is caused to VOR.

Note 1.— Guidance material relating to the distance separation required to prevent harmful interference between ILS and VOR when using the band 108 – 111.975 MHz is found in Section 3 of Attachment C to Annex 10, Volume I.

Note 2.— Guidance material relating to the distance separation required to prevent harmful interference between VOR and GBAS when using the band 112.050 – 117.900 MHz is found in Section 7.2.1 of Attachment D to Annex 10, Volume I.

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 utilized on the basis of regional agreement.

4.2.3 The frequencies for VOR facilities shall be selected in the following order:

- 1) frequencies ending in odd tenths of a megahertz in the band 111.975 – 117.975 MHz;
- 2) frequencies ending in even tenths of a megahertz in the band 111.975 – 117.975 MHz;
- 3) frequencies ending in even tenths of a megahertz in the band 108 – 111.975 MHz;
- 4) frequencies ending in 50 kHz in the band 111.975 – 117.975 MHz, except as provided in 4.2.3.1;
- 5) 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 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 the Standards in Implementing Standard 034 (IS 034), Chapter 3, all existing VORs within interference range of a facility utilizing 50 kHz channel spacing shall be modified to comply with the provisions of Implementing Standard 034 (IS 034), 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 radii 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.

Note.— Guidance material on this subject is contained in the Attachments to this Implementing Standard.

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.*

Note.— The Standards in Implementing Standard 034, 3.1.2.7.2 and 3.1.3.9, specify the equipment arrangements to be made.

4.3 Utilization in the frequency band 960 – 1 215 MHz for DME

Note 1.— Guidance on the frequency planning of channels for DME systems is given in Annex 10, Volume I, Attachment C, Section 7.

Note 2.— As of 26 November 2026, subject to the conditions stated in 5.2.1, the frequency band 960 – 1 164 MHz may be shared with RPAS C2 Link communication services described in this Implementing Standard, Chapter 5.

4.3.1 DME operating channels bearing the suffix “X” or “Y” in Table A, Chapter 3 of Implementing Standard 034 (IS 034), shall be chosen on a general basis without restriction.

Note.— The channel pairing plan provides for the use of certain Y channels with VOR. The guidance material in Annex 10, Volume I, Attachment C, Section 7, includes specific provisions relating to situations where the same, or adjacent channel, is used in the same area for both systems.

4.3.2 DME channels bearing the suffix “W” or “Z” in Table A, Chapter 3 of Implementing Standard 034 (IS 034), shall be chosen on the basis of regional agreement.

4.3.3 The channels for DME associated with ILS/MLS shall be selected from Table 4-2.

Note.— DME channels in Groups 1 and 2 may be used in association with ILS and/or MLS. DME channels in Groups 3, 4 and 5 may be used in association with VOR or MLS.

Table 4-2

<i>Group</i>	<i>DME channels</i>	<i>Associated paired VHF channels</i>	<i>Remarks</i>	<i>Assignment procedure</i>
1	EVEN 18X to 56X	ILS 100 kHz spacings	Would normally be used if a single DME is paired with ILS and is part of MLS	for general use (see 4.3.1)
2	EVEN 18Y to 56Y	ILS 50 kHz spacings		
3	EVEN 80Y to 118Y	VOR 50 kHz spacings Odd tenths of a MHz		
4	ODD 17Y to 55Y	VOR 50 kHz spacings		
5	ODD 81Y to 119Y	VOR 50 kHz spacings Even tenths of a MHz		
6	EVEN 18W to 56W	No associated paired VHF channel		for later use (see 4.3.2)
7	EVEN 18Z to 56Z	No associated paired VHF channel		
8	EVEN 80Z to 118Z	No associated paired VHF channel		
9	ODD 17Z to 55Z	No associated paired VHF channel		
10	ODD 81Z to 119Z	No associated paired VHF channel		

4.3.3.1 N/A

4.3.3.2 N/A

4.3.4 N/A

4.4 N/A

4.4.1 N/A

4.4.2 N/A

4.4.3 N/A

CHAPTER 5 UTILIZATION OF FREQUENCIES FOR RPAS C2 LINK COMMUNICATION SERVICES

(Applicable as of 26 November 2026)

5.1 Satellite-based C2 Link systems

5.1.1 Satellite-based RPAS C2 Link systems shall operate in the following frequency bands:

- a) frequency bands with an appropriate allocation to aeronautical safety services under the aeronautical mobile satellite (route) service (AMS(R)S). Frequency bands that meet these criteria and can be used for RPAS C2 Links, subject to the conditions associated with the allocations, are: 1 610 – 1 626.5 MHz and 5 000 – 5 150 MHz;

Note.— The SARPs contained in Implementing Standard 039 (IS 039), Chapter 4 and Implementing Standard 040 (IS 040), Chapter 2 address requirements for ATC communications.

- b) frequency bands with an allocation to aeronautical safety services under the mobile-satellite service (MSS) where AMS(R)S operations have priority access. Frequency bands that meet these criteria and can be used for RPAS C2 Links are: 1 545 – 1 555 MHz and 1 646.5 – 1 656.5MHz;

Note.— The SARPs contained in Implementing Standard 039 (IS 039), Chapter 4 and Implementing Standard 040 (IS 040), Chapter 2 address requirements for ATC communications.

- c) frequency bands with an allocation to the fixed satellite service (FSS) where the conditions in ITU Resolution 155 (WRC-15) are met. Frequency bands in which this resolution applies are:
- 10.95 – 11.2 GHz (space-to-Earth);
 - 11.45 – 11.7 GHz (space-to-Earth);
 - 11.7 – 12.2 GHz (space-to-Earth) in Region 2;
 - 12.2 – 12.5 GHz (space-to-Earth) in Region 3;
 - 12.5 – 12.75 GHz (space-to-Earth) in Regions 1 and 3;
 - 19.7 – 20.2 GHz (space-to-Earth);
 - 14.0 – 14.47 GHz (Earth-to-space); and
 - 29.5 – 30.0 GHz (Earth-to-space) with an ITU satellite earth station class of “UG”.

Note 1.— UG is an earth station on board an unmanned aircraft communicating with a space station of a geostationary-satellite network in the fixed-satellite service for the control and non-payload communications of unmanned aircraft systems in non-segregated airspaces in the frequency bands listed under resolves 1 of ITU Resolution 155 (WRC-15).

Note 2.— Particular note needs to be taken of the timing and order of functions as delineated in ITU Resolution 155 (WRC-15), and in particular the references to necessary actions.

5.1.2 Remotely piloted aircraft (RPA) and remote pilot station (RPS) earth stations shall operate within the notified and recorded technical parameters of the associated satellite network, including specific or typical earth stations as published by the ITU.

5.1.3 RPA and RPS earth stations operating in accordance with 5.1.1 c) shall use FSS assignments that have been successfully coordinated under Article 9 of the ITU Radio Regulations and recorded in the Master International Frequency Register (MIFR) with a favourable finding under Article 11 of the ITU Radio Regulations including Nos. 11.31, 11.32 or 11.32A where applicable, and except those assignments that have not successfully completed coordination procedures under No. 11.32 by applying Appendix 5 paragraph 6.d.i of the ITU Radio Regulations.

5.2 Terrestrial C2 Link communication systems

5.2.1 Terrestrial RPAS C2 Link systems shall operate in bands allocated to the Aeronautical Mobile (Route) Service (AM(R)S). Frequency bands with such allocations include 113.250 MHz and 136.925 MHz (common signaling frequencies for VDL Mode 4), 960-1164 MHz and 5030-5091 MHz. The operation of the C2 Link within any of these bands shall be implemented so as to be compatible with the systems currently using these allocations. Compatibility shall be ensured through the development and application of necessary SARPs and determined on the basis of regional air navigation agreements.

ATTACHMENT A. CONSIDERATIONS AFFECTING THE DEPLOYMENT OF LF/MF FREQUENCIES AND THE AVOIDANCE OF HARMFUL INTERFERENCE

1. Particularly in areas of high density of NDBs, it is recognized that efficient planning is essential in order to: a) ensure satisfactory operation of ADF equipment, and b) provide the most efficient usage of the limited frequency spectrum available for the NDB service. It is axiomatic that regional meetings will so plan facilities as to ensure that all facilities will receive the best possible protection from harmful interference. Nevertheless, in certain regions, congestion of facilities has been such that regional meetings have had to plan in terms of a *minimum* protection ratio.

Regional meetings include in their planning consideration of such factors as:

- a) the possibility of reducing the number of NDBs required, by coordination of system plans;
- b) the possibility of reducing the coverage where a lesser grade of service than that obtainable within the rated coverage is acceptable;
- c) the characteristics of ADF equipment in use;
- d) the atmospheric noise grades, appropriate to the area concerned;
- e) ground conductivity; and
- f) interference protection required at the edge of the rated coverage

of the foregoing factors, that which is most susceptible to improvement of a technical kind is c).

2. 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). The following data concerning the attenuation characteristics of ADF equipment were used in the EUR region to aid in the frequency assignment process:

<i>Frequency difference (kHz)</i>	<i>Attenuation (dB)</i>
0	0
1	1
2	6
2.4	10
3	20
3.6	30
4.3	40
5	50
6	65
7	80

The above figures (or distance separation criteria derived from them) have also been applied in other regions in determining the minimum protection ratio.

Where a bearing accuracy of ± 5 degrees is required at the edge of cover, a minimum protection of 15 dB by day should be used as the basis for LF/MF channel assignment planning.

3. In view of the fact that there is a need to improve the planning criteria, it is considered that the main source from which improvement can be derived is recognition of higher attenuation figures than those given above. Regional meetings are accordingly advised that, when the congestion is such that the use of the above figures no longer permits efficient planning of the LF/MF frequency spectrum available, the following figures represent, from a technical point of view, the best that can be accepted in determining distance separation criteria:

<i>Frequency difference (kHz)</i>	<i>Attenuation (dB)</i>
0	0
1	6
3	35
5	65
6	80

When using these figures, it should be noted that the RF selectivity of modern ADF equipment is, in general, better than these figures and that, while the RF selectivity of older ADF equipment is not better than these figures, consideration of the dynamic characteristic of this older equipment shows this to be better. It could therefore be expected that frequency planning based on the new figures would considerably improve the service provided to users of modern equipment, and would not materially reduce the service presently provided to those aircraft using the older equipment.

Nevertheless, in their planning, regional meetings would need to consider this question most carefully.

ATTACHMENT B. GUIDING PRINCIPLES FOR LONG DISTANCE OPERATIONAL CONTROL COMMUNICATIONS

Note.— The numerical sequence of the clauses below does not signify any order of relative importance.

1. Aeronautical Operational Control (AOC) HF Stations should be authorized where no other means for the exercise of long distance operational control are available or where the use of the normal communication services provided for safety and regularity of flights are unsuitable or inadequate.
2. The total number of ground stations on the worldwide radio channels should be kept to a minimum.
3. Depending on the national policy of the State, aeronautical stations could be operated by the State on behalf of one or more aircraft operating agencies provided that the agencies' requirements for flexibility and direct communication to their aircraft can be met, or aeronautical stations could be operated by an aircraft operating agency or a communication agency serving the interests of one or more aircraft operating agencies and operating under licence issued by the CAASL.
4. The licences should be issued on a regular renewal basis and, pursuant to RR 4.11 and in accordance with RR 43.4, should prohibit "public correspondence", or point-to-point type traffic, or other communications traffic not meeting the definition of operational control communications.
5. VHF (general purpose or AOC channels) and not HF should be used when an aircraft is within the coverage of an appropriate VHF aeronautical station.

Note.— The specific categories of messages that may be handled on aeronautical mobile (R) service channels are prescribed in Implementing Standard 038 (IS 038), Chapter 5, 5.1.8. The same chapter defines the standard communications procedures for the service including the requirements for maintaining watch in Implementing Standard 038 (IS 038), Chapter 5, 5.2.2. In accordance with RR18.6 of the ITU Radio Regulations, licenses should define the purpose of the station for aeronautical operational control (as defined in Implementing Standard 013 (IS 013), Attachment C) and should specify the general characteristics in accordance with Appendix 27 of the Radio Regulations.