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Federal Communications Commission
Office of the Secretary

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	93-199
	)	
Request for Rulemaking setting standards for Aviation Receivers	)	RM-7610

GTE COMMENTS

GTE Service Corporation, on behalf of its affiliated domestic equipment and service companies ("GTE"), hereby offers its Comments on the Petition for Rulemaking filed by John Furr & Associates, Inc. ("Petitioner") which requests the Commission to institute a Rulemaking to set standards for Aviation Receivers that are used for navigation ("Avionics"). That Petition was placed on public notice by the FCC on February 7, 1991.

DISCUSSION

GTE supports an FCC Rulemaking to examine the issues.

There has been growing concern in the telecommunications industry about recent proposals from the Federal Aviation Administration ("FAA") over increased regulatory requirements on FCC-licensed transmitters due to claimed concerns about electromagnetic interference ("EMI") to Avionics. GTE supports the use of technically accurate criteria to minimize EMI in order to ensure aircraft safety. This same concern for aircraft safety in expressed by the Petitioner at pp. 1-2. However, there is a growing debate as to whether the current FAA criteria overstate

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the interference potential. GTE supports the Petitioner's request for a Rulemaking to technically examine the issues at hand, to determine what the interference potential really is, and to assess whether or not interference might be more readily addressed by improved Aviation Receiver designs. It remains to be determined whether the FCC can set performance criteria for Aviation Receivers or whether the Commission would need further legislative authority. GTE takes no position on that issue now. However, even assuming that legislative authority were required, that fact should not deter the FCC from examining the legal and technical issues raised by the Petitioner. It is also possible the FCC may find it has sufficient authority under Sections 303(f),(g) and (r) of the Communications Act to regulate Aviation Receivers. To the extent that the United States has signed treaties requiring increased immunity to interference of Avionics equipment, then the FCC can adopt policies and rules to foster compliance with these obligations.

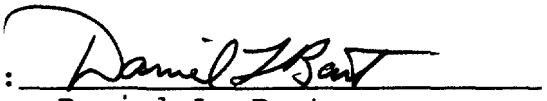
CONCLUSION

The FCC should review the issues surrounding EMI to Aviation Receivers and take appropriate action. If the Commission finds that it needs additional legislative authority, it should seek

it. However, the Communications Act and treaties of the United States may afford all the legal authority the FCC requires.

Respectfully submitted,

GTE Service Corporation, on behalf of its domestic affiliated equipment and service companies.

By: 

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March 11, 1991

Its Attorney

CERTIFICATE OF SERVICE

I, Jacquelyn McDaniel, hereby certify that copies of the foregoing "GTE Comments" have been mailed postage prepaid, by first-class U.S. mail on this 11th day of March 1991 to the following parties:

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INTERNATIONAL STANDARDS,
RECOMMENDED PRACTICES AND
PROCEDURES FOR AIR NAVIGATION SERVICES

AERONAUTICAL TELECOMMUNICATIONS

ANNEX 10

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME I

(PART I — EQUIPMENT AND SYSTEMS;
PART II — RADIO FREQUENCIES)

FOURTH EDITION OF VOLUME I — APRIL 1985

This edition incorporates all amendments adopted by the Council prior to 6 December 1984 and supersedes, on 21 November 1985, all *previous editions of* Annex 10.

For information regarding the applicability of the Standards and Recommended Practices and the Procedures for Air Navigation Services, *see* Foreword.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Check-list of Amendments

to Annex 10, Volume I

	Effective Date	Date of Applicability
Fourth Edition (incorporating Amendments 1 to 65)	6/4/85	21/11/85
Amendment 66 (adopted by the Council on 14 March 1986)	27/7/86	20/11/87
Amendment 67 (adopted by the Council on 16 March 1987)	27/7/87	22/10/87
Amendment 68 (adopted by the Council on 29 March 1990) Replacement pages iii, xiv, 19, 32 to 47, 60AA, 60BB, 145, 157, 217 to 222.	30/7/90	15/11/90

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to Annex 10, Vol. I

	Effective Date	Date of Applicability
Fourth Edition (incorporating Amendments 1 to 65)	6/4/85	21/11/85
Amendment 66 (adopted by the Council on 14 March 1986)	27/7/86	20/11/87
Amendment 67 (adopted by the Council on 16 March 1987) New and replacement pages iii, iv, xiv, 3 to 8, 17, 27, 37, 42 to 61, 146 to 150L, 156, 169, 179, 181 to 184D, 190, 194, 201 and 202, 221, 243 to 254, 266A and 266B.	27/7/87	22/10/87

TABLE OF CONTENTS

		Page
Foreword		(v)
VOLUME I		
PART I — EQUIPMENT AND SYSTEMS		
Chapter 1.	Definitions	1
Chapter 2.	Radio navigation aids	3
2.1	Aids to final approach and landing	3
2.2	Short-distance aids	4
2.3	Radio beacons	4
2.4	Long-distance aids	5
2.5	Secondary surveillance radar (SSR)	5
2.6	Distance measuring — general	6B
2.7	Ground and flight testing	6B
2.8	Provision of information on the operational status of radio navigation aids	6B
2.9	Secondary power supply for radio navigation aids and communication systems	6B
Chapter 3.	Specifications for radio navigation aids	7
3.1	Specification for ILS	7
3.2	Specification for precision approach radar system	21
3.3	Specification for VHF omnidirectional radio range (VOR)	22
3.4	Specification for non-directional radio beacon (NDB)	25
3.5	Specification for UHF distance measuring equipment (DME)	27
3.6	Specification for en-route VHF marker beacons (75 MHz)	41
3.7	Consol system characteristics	42
3.8	Secondary surveillance radar (SSR) system characteristics	42
3.9	System characteristics of airborne ADF receiving systems	60V
3.10	Loran-A system characteristics	60W
3.11	Microwave landing system (MLS) characteristics	60X
Chapter 4.	Communication systems	91
4.1	Definitions	91
4.2	Technical provisions relating to teletypewriter apparatus and circuits used in the AFTN	91
4.3	Terminal equipment associated with aeronautical radioteletypewriter channels operating in the band 2.5 MHz to 30 MHz	93
4.4	Teletypewriter broadcast systems in the band 110 kHz to 130 kHz	94
4.5	Air-ground VHF communication system characteristics	94
4.6	System characteristics of the ground installation	95
4.7	System characteristics of the airborne installation	95
4.8	SELCAL system	96
4.9	System practices	97
4.10	Technical provisions relating to ATS message transmission	97
4.11	Single sideband (SSB) HF communication system characteristics for use in the aeronautical mobile service	97
4.12	Technical provisions relating to international ground-ground data interchange at medium and higher signalling rates	101
4.13	Technical provisions relating to international air-ground data interchange	140
4.14	Technical provisions relating to international aeronautical speech circuit switching and signalling	140
Chapter 5.	Survival radio equipment	142
5.1	Specification for VHF survival radio equipment operating on 121.5 MHz and 243 MHz	142
Chapter 6.	Emergency location beacon — aircraft (ELBA) for search and rescue	143
6.1	Specification for VHF emergency location beacons — aircraft for search and rescue operating on 121.5 MHz and 243 MHz	143
APPENDIX A TO PART I.—	Microwave landing system (MLS) characteristics	145
APPENDIX B TO PART I.—	ICAO ILS/MLS transition plan	150E
APPENDIX C TO PART I.—	A world-wide scheme for the allocation to States of SSR Mode S addresses	150I
PART II — RADIO FREQUENCIES		
Chapter 1.	Definitions	151
Chapter 2.	Distress frequencies	152
2.1	Frequencies for survival radio equipment	152
2.2	Search and rescue frequencies	152
2.3	Frequencies for emergency location beacons — aircraft (ELBA) for search and rescue	152
Chapter 3.	Utilization of frequencies below 30 MHz	153
3.1	Method of operations	153
3.2	NDB frequency management	154

Page

Chapter 4. Utilization of frequencies above 30 MHz 155

4.1 Utilization in the band 117.975-137 MHz 155
4.2 Utilization in the band 108-117.975 MHz 159
4.3 Utilization in the band 960-1 215 MHz for DME . 162
4.4 Utilization of the frequency band 5 031-5 091 MHz 163

ATTACHMENTS TO ANNEX 10 — VOLUME I

Attachment A to Part I.— Recommendations of Council concerning the utilization of facilities, research, development and evaluation 165

1. Utilization of facilities not covered by Annex 10 165
2. Research, development and evaluation of radio aids to air navigation 165

Attachment B to Part I.— Guidance material related to the secondary surveillance radar (SSR) system characteristics ... 169

Attachment C to Part I.— Information and material for guidance in the application of the Standards and Recommended Practices in Annex 10 177

1. Introduction 177
2. Material concerning ILS installations 178
3. Material concerning VOR 202
4. Precision approach radar system 210
5. Specification for 75 MHz marker beacons (en-route) . 212
6. Material concerning NDB 213
7. Material concerning DME 219
8. Material concerning power supply switch-over times .. 230

Attachment D to Part I.— Guidance material for communication systems 231

1. Factors affecting radioteletypewriter system engineering 231
2. VHF communications 231
3. SELCAL system 232
4. Independent sideband (ISB) system 232
5. HF radioteletypewriter circuits using four-frequency shift (F7B modulation) 233
6. Automatic error correction (ARQ) systems 233
7. Systems of continuous check of channel condition and low speed ITA-2 controlled circuit protocols 235

Attachment E to Part I.— Guidance material on the pre-flight checking of VOR airborne equipment 237

1. Specification for a VOR airborne equipment test facility (VOT) 237
2. Selection and use of VOR aerodrome check-points ... 238

Page

Attachment F to Part I.— Guidance material concerning reliability and availability of radiocommunications and navigation aids 239

1. Introduction and fundamental concepts 239
2. Practical aspects of reliability and availability 241

Attachment G to Part I.— Information and material for guidance in the application of the MLS Standards and Recommended Practices in Annex 10 243

1. Definitions 243
2. Signal-in-space characteristics — angle functions 243
3. Ground equipment 247
4. Siting considerations 248
5. Operational consideration on siting of DME ground equipment 248
6. Interrelationship of ground equipment monitor and control actions 248
7. Airborne equipment 249
8. Operations outside the promulgated MLS coverage sectors 250A
9. Separation criteria in terms of signal ratios and propagation losses 250A

Attachment A to Part II.— Considerations affecting the deployment of VHF communication frequencies 267

1. Criteria employed in establishing adjacent channel frequency deployment with respect to receiver rejection and other system characteristics 267
2. Criteria to be employed in establishing adjacent channel frequency deployment of VHF facilities that have a service range beyond the radio horizon 269
3. Criteria to be employed in establishing geographical separation between ground stations and between aircraft and ground stations for co-channel operation of VHF facilities that have a service area beyond the radio horizon 270
4. Criteria employed in establishing co-channel frequency deployment of VHF VOLMET facilities ... 270
5. Criteria employed in establishing adjacent channel frequency deployment of VHF VOLMET facilities ... 270

Attachment B to Part II.— Considerations affecting the deployment of LF/MF frequencies and the avoidance of harmful interference 281

Attachment C to Part II.— Guiding principles for long distance operational control communications 283

FOREWORD

Historical Background

Standards and Recommended Practices for Aeronautical Telecommunications were first adopted by the Council on 30 May 1949 pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago 1944) and designated as Annex 10 to the Convention. They became effective on 1 March 1950. The Standards and Recommended Practices were based on recommendations of the Communications Division at its Third Session in January 1949.

Table A shows the origin of Annex 10, and the origin of subsequent amendments, together with a summary of the principal subjects involved and the dates on which the Annex and the amendments were adopted by Council, when they became effective and when they became applicable.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specific request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.

The attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards, Recommended Practices and Procedures specified in Annex 10, Volumes I and II, should be notified and take effect in accordance with the provisions of Annex 15.

Use of the text of the Annex in national regulations. The Council, on 13 April 1948, adopted a resolution inviting the attention of Contracting States to the desirability of using in their own national regulations, as far as practicable, the precise language of those ICAO Standards that are of a regulatory character and also of indicating departures from the Standards, including any additional national regulations that were important for the safety or regularity of air navigation. Wherever possible, the provisions of this Annex have been deliberately written in such a way as would facilitate incorporation, without major textual changes, into national legislation.

Status of Annex Components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated:

1.—*Material comprising the Annex proper:*

a) *Standards* and *Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of 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.

Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.

c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. 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.

d) *Tables* and *Figures* which 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.

2.—*Material approved by the Council for publication in association with the Standards and Recommended Practices:*

a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption;

b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text;

c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question, but not constituting part of the Standards or Recommended Practices;

d) *Attachments* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

Selection of Language

This Annex has been adopted in four languages — English, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial Practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards* have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix **Recommendation:** *Notes* have been printed in light face italics, the status being indicated by the prefix *Note*.

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb "shall" is used, and for Recommended Practices the operative verb "should" is used.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in Annex 5 to the Convention on International Civil Aviation. Where Annex 5 permits the use of non-SI alternative units these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Table A. Amendments to Annex 10, Volume I

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
1st Edition	Third Session of the Communications Division	Introduction of Standards and Recommended Practices for radio navigation aids and communication facilities, together with methods of operation, procedures and codes for world-wide application.	30 May 1949 1 March 1950 1 April 1950
1	Third Session of the Communications Division	Amendment to provisions for radio teletypewriter terminal equipment in the band 3-30 MHz.	28 March 1951 1 October 1951 1 January 1952
2*	Third Session of the Communications Division	Addition of guidance material concerning radio teletypewriter system engineering.	28 March 1951 1 October 1951 1 January 1952
3	Third Session of the Communications Division	Standards and Recommended Practices relating to radio frequencies.	28 March 1951 1 October 1951 1 January 1952
4	Third Session of the Communications Division	Standards and Recommended Practices relating to communications procedures.	28 March 1951 1 October 1951 1 April 1952

* Did not affect any Standards or Recommended Practices.

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
5	Third Session of the Communications Division	Standards and Recommended Practices relating to codes and abbreviations.	28 March 1951 1 October 1951 1 April 1952
6	Third Session of the Communications Division	Q Code.	1 April 1952 4 July 1952 1 September 1952
7	Air Navigation Commission	Introduction of definitions for height, altitude and elevation in Annex 10.	17 June 1952 1 December 1952 1 April 1953
8	Fourth Session of the Communications Division	Amendments concerning definitions, VHF radiotelegraph for aural reception, DME, SRE, NDB, 75 MHz en-route marker beacons, ILS.	17 June 1952 1 December 1952 1 April 1953
9	Fourth Session of the Communications Division	Provisions concerning the utilization of offset frequency simplex.	17 June 1952 1 December 1952 1 April 1953
10	Fourth Session of the Communications Division	Definitions and procedures relating to the AFS, AMS and Broadcasts.	17 June 1952 1 December 1952 1 April 1953
11	Secretariat proposal	Editorial amendments consequential to Amendment 7, and editorial improvements to Part IV.	17 June 1952 1 December 1952 1 April 1953
12	Fourth Session of the Communications Division	Annulment of 5.1.6.7 of Amendment 10 adopted by Council on 17 June 1952.	28 November 1952 1 March 1953 1 April 1953
13	Proposal by Ireland on Recommendations of the Fourth Session of the Communications Division	Procedure governing the relay of traffic between an aeronautical station and an aircraft no longer in radio contact.	5 May 1953 15 August 1953 1 October 1953
14	First Air Navigation Conference	Specifications for the siting of ILS marker beacons, VHF equisignal localizers and associated monitors.	11 December 1953 1 May 1954 1 June 1954
15	Fifth Session of the Communications Division	Amendment of paired frequencies for ILS localizers and glide paths.	2 November 1954 1 March 1955 1 April 1955
16	Fifth Session of the Communications Division	Provision of additional assignable frequencies in the VHF bands by extending the allotment table and by making provision for decreasing, under certain conditions, the minimum separation between channels.	2 November 1954 1 March 1955 1 April 1955
17	Fifth Session of the Communications Division	Addition of Standards and Recommended Practices on interim long distance radio navigation aids and on communications systems; also updating of the ILS specifications.	10 December 1954 1 April 1955 1 October 1955
18	Fifth Session of the Communications Division	Establishment of basic rules for the selection of frequencies for radio navigation aids operating in frequency bands above 30 MHz, including frequencies for secondary radar.	10 December 1954 1 April 1955 1 October 1955

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
19	Fifth Session of the Communications Division	Procedure to facilitate downgrading or cancellation of messages not delivered within time specified by originator and requirement for specification of aircraft heading in distress message.	10 December 1954 1 April 1955 1 October 1955
20	Fifth Session of the Communications Division	Amendment of codes and abbreviations.	10 December 1954 1 April 1955 1 October 1955
21	Third North Atlantic Regional Air Navigation Meeting	Alignment of radiotelegraphy messages originating in aircraft with radiotelephony messages.	27 May 1955 1 September 1955 1 October 1955
22	Fifth Session of the Communications Division	Pairing of localizer and glide path frequencies for the ILS.	18 November 1955 1 April 1956 1 December 1956
23	Air Navigation Commission	Amendment concerning words to be used in spelling in radiotelephony.	18 November 1955 1 March 1956 1 March 1956
24	Fourth Session of the Meteorology Division	Amendment of Q code signal QBB.	18 November 1955 1 April 1956 1 December 1956
25*	Annex 3	Amendment of the Q code signal QUK (consequential to amendment of Annex 3).	8 November 1955 — 1 January 1956
26	Annex 15	New definition of NOTAM and references to NOTAM (consequential to amendment of Annex 15).	22 February 1956 1 July 1956 1 December 1956
27	Second Air Navigation Conference	Siting of the inner and middle markers of the ILS and guidance material on the location of the ILS reference point.	11 May 1956 15 September 1956 1 December 1956
28	Procedures of the World Meteorological Organization (WMO) and Annex 3	Amendment of the Q code signals for the reporting of clouds and the introduction of the AIREP reporting procedure.	15 May 1956 15 September 1956 1 December 1956
29	Proposal by Australia	Tape-relay Standards.	4 June 1957 1 October 1957 1 December 1957
30*	Annex 3	Amendment of the Q code signals QUK and QUL (consequential to amendment of Annex 3).	25 November 1957 — 1 December 1957
31	Proposal by France	Amendment of the Q code signals QNH and QNY.	21 March 1958 1 August 1958 1 December 1958
32	Sixth Session of the Communications Division	Recommendations of the Meeting.	9 June 1958 1 October 1958 1 December 1958

* Did not affect any Standards or Recommended Practices.

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
33	ICAO Panel of Teletypewriter Specialists (TTP)	Communication operational procedures to ensure compatibility between AFTN communication centres employing manual "torn-tape", semi-automatic and fully automatic operation.	15 December 1958 1 May 1959 1 October 1959
34	Rules of the Air, Air Traffic Services and Search and Rescue Division	Increased number of radio frequencies that may be selected for use in radio survival equipment.	8 December 1959 1 May 1960 1 August 1960
35	Special Communications/Operations/ Rules of the Air, Air Traffic Services and Search and Rescue Division	Implementation requirements for VOR, introduction of new DME specification and extension of protection dates for VOR and DME to 1 January 1975.	8 April 1960 1 August 1960 1 January 1961
36	Air Navigation Commission	Substituted "Radiotelephony Speech for International Aviation" for "International Language for Aviation".	8 April 1960 1 August 1960 1 January 1961
37	Fifth Session of the Meteorology Division Aeronautical Information Services and Aeronautical Charts Division	Procedures respecting the forwarding of messages; amendment of Q code signals.	2 December 1960 1 April 1961 1 July 1961
38	Ordinary Administrative Radio Conference (OARC-1959)	Alignment of the provisions in Annex 10 with the related provisions of the Radio Regulations of the International Telecommunication Union (ITU).	20 January 1961 1 June 1961 1 July 1961
39	ICAO Panel of Teletypewriter Specialists (TTP)	Simplification of communication procedures for diversion routing, clarification of the application of ICAO two-letter abbreviations used in the addresses of messages and communication procedures concerning interstation co-operation.	26 June 1961 1 December 1961 1 January 1962
40	Seventh Session of the Communications Division	General updating and amendment of equipment and systems; radio frequencies and procedures.	5 April 1963 1 August 1963 1 November 1963
41	PANS-MET (Doc 7605)	Amendment of the Q code signals QFE, QFF and QNH to permit the transmission of altimeter settings in units of *millibars or tenths of a millibar.*	4 June 1963 1 October 1963 1 January 1964
42	Fourth Meeting of the Meteorological Telecommunications Network, Europe (MOTNE) Development/ Implementation Panel; Seventh Session of the Communications Division; and proposals by the Federal Republic of Germany, the United Kingdom and the United States	Non-typing or switching signals on the AFTN; new guidance material on ILS course structures and their evaluation; guidance material on ILS course structure and on the more important communication terms of specialized meaning and their definitions; the deletion of Part IV of the Annex as a consequence of the establishment of a new abbreviations and codes document; departure messages and guidance material on the monitoring of SSR.	25 March 1964 1 August 1964 1 January 1965

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
43	Seventh Session of the Communications Division	Amendments concerning the performance of ILS facilities, Category I and Category II.	23 June 1964 1 November 1964 1 February 1965
44	Seventh Session of the Communications Division; Fifth Meeting of the ICAO Panel of Teletypewriter Specialists; Rules of the Air, Air Traffic Services and Operations Division; Procedures for Air Navigation Services — Radiotelephony Procedures (Doc 7181)	Breakdown of Annex 10 into two volumes, Volume I (First Edition) containing Part I — Equipment and Systems, and Part II — Radio Frequencies, and Volume II (First Edition) containing Communications Procedures. Changes in the provisions regarding the action to be taken in the case of communications failure and in the case of transfer of communications watch from one radio frequency to another; provisions relating to teletypewriter procedures; deletion of the radiotelephony procedures in the aeronautical mobile service, except for certain basic provisions of the distress procedures.	31 May 1965 1 October 1965 10 March 1966
45	Fourth Air Navigation Conference; Sixth Meeting of the Panel of Teletypewriter Specialists	Specification of the technical characteristics for VHF survival radio equipment and introduction of the concept of the "ILS reference datum" in lieu of the "ILS reference point"; a number of AFTN technical provisions related to the progressive automation of the AFTN.	12 December 1966 12 April 1967 24 August 1967
46	Fifth Meeting of the ATC Automation Panel	Definitions and technical provisions relating to ATS message transmission on direct or omnibus channels.	7 June 1967 5 October 1967 8 February 1968
47	Communications/ Operations Divisional Meeting	Updating or expansion of practically every major specification. Of special importance are the changes to the ILS and SSR specifications; the introduction of a system specification for Loran-A; the expanded guidance material on the deployment of VHF communications frequencies and specification, for the first time, of the airborne elements of ADF, VHF and HF SSB Communications Systems.	11 December 1967 11 April 1968 22 August 1968
48	Communications/ Operations Divisional Meeting; Fifth Air Navigation Conference	New method of prescribing VOR/DME coverage; provisions regarding the availability of information on the operational status of radio navigation aids, regarding secondary power supplies of radio navigation and communication systems as well as guidance on power supply switch-over times for radio aids used in the vicinity of aerodromes.	23 January 1969 23 May 1969 18 September 1969
49	First Meeting of the Automated Data Interchange Systems Panel; Sixth Air Navigation Conference	Introduction of a 7-unit code for data interchange at medium signalling rates, the medium signalling rates to be used and the types of transmission and modulation for each of them; provisions concerning the secondary surveillance radar ground equipment to ensure immediate recognition of Codes 7600 and 7700 and provisions concerning the use of Code 2000 on Mode A.	1 June 1970 1 October 1970 4 February 1971

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
50	Second Meeting of the Automated Data Interchange Systems Panel; Air Navigation Commission Study on Regional Air Navigation Meeting recommendations of world-wide applicability; Fourth Meeting of the All Weather Operations Panel	Introduction of the term "Hertz (Hz)" in place of the term "cycles per second (c/s)" as the unit of frequency for electric and radio-technical matters; definition for data signalling rate, the extension of signalling rates to 9600 bits/second and some explanatory provisions related to the 7-unit coded character set; provisions concerning the pre-flight checking of VOR airborne equipment; definitions for "ILS Point D" and "ILS Point E" and some changes in the provisions relating to the specification for ILS and en-route VHF marker beacons.	24 March 1972 24 July 1972 7 December 1972
51	Third Meeting of the Automated Data Interchange Systems Panel; Third Meeting of the Obstacle Clearance Panel	Technical provisions relating to international ground-ground data interchange; guidance material concerning the lateral placement of the glide path antenna in relation to Annex 14 provisions on obstacle limitation surfaces and objects on strips for runways.	11 December 1972 11 April 1973 16 August 1973
52	Seventh Air Navigation Conference	New Standard relating to an emergency locator beacon — aircraft (ELBA); provision for additional localizer and glide path frequency pairs, and the introduction of 25 kHz channel spacing in the VHF band of the International Aeronautical Mobile Service; introduces refinements to the specifications for ILS, SSR and VOR, and extends the protection dates for ILS, DME and VOR from 1975 to 1985.	31 May 1973 1 October 1973 23 May 1974
53	Assembly Resolutions A17-10 and A18-10	Provisions relating to practices to be followed in the event that an aircraft is being subjected to unlawful interference.	7 December 1973 7 April 1974 23 May 1974
54*	Fourth Meeting of the Automated Data Interchange Systems Panel	New Attachment G to Part I of Volume I containing guidance material for ground-ground data interchange over data links at medium and higher signalling rates, and the insertion of cross references in Volume I, Part I, Chapter 4, 4.12.	17 June 1974 — —
55	Fifth Meeting of the All Weather Operations Panel; Second Meeting of the Review of the General Concept of Separation Panel; Air Navigation Working Group on Regional Plans; Seventh Air Navigation Conference	Technical specifications and guidance material for localizer and glide path components of the ILS; guidance material in respect of mandatory change-over points for VOR-defined ATS routes; alignment of the implementation provisions for ILS with those of other radio navigation aids; required geographic separation between ILS facilities and provisions concerning use of the VHF emergency channel (121.5 MHz) in the event of interception of aircraft.	4 February 1975 4 June 1975 9 October 1975
56	Correspondence	Designation of SSR Code 7500 for use in the event of unlawful interference.	12 December 1975 12 April 1976 12 August 1976
57	Asia/Pacific Regional Air Navigation Meeting	Provision of, and maintenance of guard on the VHF frequency 121.5 MHz.	16 June 1976 16 October 1976 6 October 1977

* Did not affect any Standards or Recommended Practices.

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
58	A study by the ANC of threshold wheel clearance; Sixth Meeting of the Automated Data Interchange Systems Panel; Proposal by France; Proposal by IFALPA	Introduction of tables of code conversion between the International Telegraph Alphabet No. 2 and the 7-unit coded character set; modification of the frame check sequence algorithm used for error checking in automated data interchange; amendment of material related to the ILS reference datum, introduction of new material related to the possibility of interference from spurious radiations in the LF/MF band and amendment to the guidance material in Attachments C and G to Part I.	23 and 27 June 1977 27 October 1977 23 February 1978
59	Ninth Air Navigation Conference; An ANC study of frangibility requirements emanating from Rec. 3/5 of the Third Meeting of the Obstacle Clearance Panel; Communications Divisional Meeting (1976)	Transfer of the SSR Mode B to an unassigned status; cross-reference to the provisions of Annex 14 concerning frangibility criteria for the navigational facilities on operational areas; cross-reference to the provisions of Annex 11 concerning the determination of VOR accuracy and change-over point; introduction of Attachment C to Part II, dealing with Guiding Principles for Long Distance Operational Control Communications.	14 December 1977 14 April 1978 10 August 1978
60	Sixth Meeting of the All Weather Operations Panel	Change of a preferred ILS glide path angle from 2.5 degrees to 3 degrees.	4 December 1978 4 April 1979 29 November 1979
61	Seventh Meeting of the Automated Data Interchange Systems Panel; All Weather Operations Divisional Meeting (1978); Communications Divisional Meeting (1978)	Introduction of a new series of marginal serial numbers in use by the International Telecommunication Union (ITU) and clarification of the term "Radio Regulations"; change to the definition of the Aeronautical Fixed Telecommunication Network (AFTN); change of the ILS protection date to 1995; addition of information related to the Microwave Landing System (MLS); changes in the radio frequency provisions related to the Final Acts of the ITU World Administrative Radio Conference (WARC) 1978; changes in the provisions related to the introduction of single sideband classes of emission into the high frequency (HF) aeronautical mobile service; clarification of symbols permitted with the 7-unit coded character set; change from single numbered to double numbered code and byte independent data link control procedures; introduction of new material related to character oriented data link control procedures; changes to the definition of operational control communications.	10 December 1979 10 April 1980 27 November 1980
62	Eighth Meeting of the Automated Data Interchange Systems Panel; Eighth Meeting of the All Weather Operations Panel; ANC study related to the interception of civil aircraft; recommendation of the Secretariat related to the protection date for VOR and DME	Changes to the protection date provisions of VOR and DME; changes and additions to the material related to ILS airborne equipment criteria and criteria on geographic separation of VOR/ILS facilities; addition of material related to the continuous check of channel condition and the use of controlled circuit protocols; changes to the provisions to make the 7-unit coded character set identical to the International Reference Version of International Alphabet No. 5; addition of provisions related to the use of character parity on CIDIN links; addition to the provisions related to character oriented data link control procedures; changes to the provisions related to VHF communication in the event of interception.	14 December 1981 14 April 1982 25 November 1982

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
63	Recommendations of the ANC relating to the assignment of an air-to-air VHF frequency at the request of IFALPA; recommendations of the Secretariat related to the depletion of the SELCAL codes; Accident Prevention and Investigation Divisional Meeting (1979); COM Divisional Meeting (1981)	Changes and additions to the material related to frequencies above 30 MHz used for particular functions to provide for an air-to-air VHF communications channel; addition of material related to the addition of new RED SELCAL tones; changes and additions to the material related to radar characteristics to provide for the recording and retention of radar data; extensive changes and additions to Chapters 1, 2, 3, 4, 5, 6 and Appendix A with respect to ILS, NDB, DME, MLS, radioteletype, VHF and HF communications, survival radio equipment and emergency locator beacons.	13 December 1982 13 April 1983 24 November 1983
64		Volume II only	
65	Recommendations of the ANC relating to the protection date of aeronautical mobile VHF communications equipment operating on 25 kHz channel spacing at the request of the Kingdom of the Netherlands; recommendations of the Secretariat related to harmful interference to aeronautical frequency bands from external sources, and related to switching and signalling over aeronautical voice circuits; recommendations of the ANC relating to SPI pulse in SSR Mode C at the request of the United Kingdom; Ninth Meeting of the All Weather Operations Panel; Tenth Meeting of the Automated Data Interchange Systems Panel	Changes to the material related to the protection date of aeronautical mobile VHF communications equipment operating on 25 kHz channel spacing; changes and additions to the material relating to harmful interference to aeronautical frequency bands from external sources; addition of material relating to switching and signalling over aeronautical voice circuits; changes to material relating to SSR SPI pulse transmission; extensive changes to Chapters 3, 4 and Attachments C, G and H with respect to ILS, DME and CIDIN.	6 December 1984 6 April 1985 21 November 1985

CHAPTER 3. SPECIFICATIONS FOR RADIO NAVIGATION AIDS

Note.— Specifications concerning the siting and construction of equipment and installations on operational areas aimed at reducing the hazard to aircraft to a minimum are contained in Annex 14, Chapter 8.

3.1 Specification for ILS

3.1.1 Definitions

Angular displacement sensitivity. The ratio of measured DDM to the corresponding angular displacement from the appropriate reference line.

Back course sector. The course sector which is situated on the opposite side of the localizer from the runway.

Course line. The locus of points nearest to the runway centre line in any horizontal plane at which the DDM is zero.

Course sector. A sector in a horizontal plane containing the course line and limited by the loci of points nearest to the course line at which the DDM is 0.155.

DDM — Difference in depth of modulation. The percentage modulation depth of the larger signal minus the percentage modulation depth of the smaller signal, divided by 100.

Displacement sensitivity (localizer). The ratio of measured DDM to the corresponding lateral displacement from the appropriate reference line.

Facility Performance Category I — ILS. An ILS which provides guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 60 m (200 ft) or less above the horizontal plane containing the threshold.

Note.— This definition is not intended to preclude the use of Facility Performance Category I — ILS below the height of 60 m (200 ft), with visual reference where the quality of the guidance provided permits, and where satisfactory operational procedures have been established.

Facility Performance Category II — ILS. An ILS which provides guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 15 m (50 ft) or less above the horizontal plane containing the threshold.

Facility Performance Category III — ILS. An ILS which, with the aid of ancillary equipment where necessary, provides guidance information from the coverage limit of the facility to, and along, the surface of the runway.

Front course sector. The course sector which is situated on the same side of the localizer as the runway.

Half course sector. The sector, in a horizontal plane containing the course line and limited by the loci of points nearest to the course line at which the DDM is 0.0775.

Half ILS glide path sector. The sector in the vertical plane containing the ILS glide path and limited by the loci of points nearest to the glide path at which the DDM is 0.0875.

ILS continuity of service. That quality which relates to the rarity of radiated signal interruptions. The level of continuity of service of the localizer or the glide path is expressed in terms of the probability of not losing the radiated guidance signals.

ILS glide path. That locus of points in the vertical plane containing the runway centre line at which the DDM is zero, which, of all such loci, is the closest to the horizontal plane.

ILS glide path angle. The angle between a straight line which represents the mean of the ILS glide path and the horizontal.

ILS glide path sector. The sector in the vertical plane containing the ILS glide path and limited by the loci of points nearest to the glide path at which the DDM is 0.175.

Note.— The ILS glide path sector is located in the vertical plane containing the runway centre line, and is divided by the radiated glide path in two parts called upper sector and lower sector, referring respectively to the sectors above and below the glide path.

ILS integrity. That quality which relates to the trust which can be placed in the correctness of the information supplied by the facility. The level of integrity of the localizer or the glide path is expressed in terms of the probability of not radiating false guidance signals.

ILS Point "A". A point on the ILS glide path measured along the extended runway centre line in the approach direction a distance of 7.5 km (4 NM) from the threshold.

ILS Point "B". A point on the ILS glide path measured along the extended runway centre line in the approach direction a distance of 1 050 m (3 500 ft) from the threshold.

3.1.3.11.2.1 **Recommendation.**— *In the case of localizers in which the basic functions are provided by the use of a two-frequency system, the conditions requiring initiation of monitor action should include the case when the DDM in the required coverage beyond plus or minus 10 degrees from the front course line, except in the back course sector, decreases below 0.155.*

3.1.3.11.3 The total period of radiation, including period(s) of zero radiation, outside the performance limits specified in a), b), c), d), e) and f) of 3.1.3.11.2 above shall be as short as practicable, consistent with the need for avoiding interruptions of the navigation service provided by the localizer.

3.1.3.11.3.1 The total period referred to under 3.1.3.11.3 above shall not exceed under any circumstances:

10 seconds for Category I localizers;

5 seconds for Category II localizers;

2 seconds for Category III localizers.

Note 1.— The total time periods specified are never-to-be-exceeded limits and are intended to protect aircraft in the final stages of approach against prolonged or repeated periods of localizer guidance outside the monitor limits. For this reason, they include not only the initial period of outside tolerance operation but also the total of any or all periods of outside tolerance radiation including period(s) of zero radiation, which might occur during action to restore service, for example, in the course of consecutive monitor functioning and consequent change-over(s) to localizer equipment(s) or elements thereof.

Note 2.— From an operational point of view, the intention is that no guidance outside the monitor limits be radiated after the time periods given, and that no further attempts be made to restore service until a period in the order of 20 seconds has elapsed.

3.1.3.11.3.2 **Recommendation.**— *Where practicable, the total period under 3.1.3.11.3.1 above should be reduced so as not to exceed two seconds for Category II localizers and one second for Category III localizers.*

3.1.3.11.4 **Design and operation of the monitor system shall be consistent with the requirement that navigation guidance and identification will be removed and a warning provided at the designated remote control points in the event of failure of the monitor system itself.**

Note.— Guidance material on the design and operation of monitor systems is given in 2.1.8 of Attachment C to Part I.

3.1.3.11.5 **Any erroneous navigation signals on the carrier occurring during removal of navigation and identification components in accordance with 3.1.3.11.1 b) above shall be suppressed within the total periods allowed in 3.1.3.11.3.1 above.**

Note.— To prevent hazardous fluctuations in the radiated signal, localizers employing mechanical modulation equipment may require suppression of navigation components during modulator rundown.

3.1.4 Interference immunity performance for ILS localizer receiving systems

3.1.4.1 After 1 January 1998, the ILS localizer receiving system shall provide adequate immunity to interference from two signal, third-order intermodulation products caused by VHF FM broadcast signals having levels in accordance with the following:

$$2N_1 + N_2 + 72 \leq 0$$

for VHF FM sound broadcasting signals in the range 107.7 – 108.0 MHz

and

$$2N_1 + N_2 + 3\,(24 - 20 \log \frac{\Delta f}{0.4}) \leq 0$$

for VHF FM sound broadcasting signals below 107.7 MHz,

where the frequencies of the two VHF FM sound broadcasting signals produce, within the receiver, a two signal, third-order intermodulation product on the desired ILS localizer frequency.

N_1 and N_2 are the levels (dBm) of the two VHF FM sound broadcasting signals at the ILS localizer receiver input. Neither level shall exceed the desensitization criteria set forth in 3.1.4.2 below.

$\Delta f = 108.1 - f_1$, where f_1 is the frequency of N_1, the VHF FM sound broadcasting signal closer to 108.1 MHz.

3.1.4.2 After 1 January 1998, the ILS localizer receiving system shall not be desensitized in the presence of VHF FM broadcast signals having levels in accordance with the following table:

Frequency (MHz)	*Maximum level of unwanted signal at receiver input*
88-102	+ 15 dBm
104	+ 10 dBm
106	+ 5 dBm
107.9	– 10 dBm

The relationship is linear between adjacent points designated by the above frequencies.

Note.— Guidance material on immunity criteria to be used for the performance quoted in 3.1.4.1 and 3.1.4.2 above is contained in Attachment C to Part I, 2.2.10.

3.1.4.3 After 1 January 1995, all new installations of airborne ILS localizer receiving systems shall meet the provisions of 3.1.4.1 and 3.1.4.2 above.

3.1.4.4 **Recommendation.**— *Airborne ILS localizer receiving systems meeting the immunity performance standards of 3.1.4.1 and 3.1.4.2 above should be placed into operation at the earliest possible date.*

3.1.5 UHF glide path equipment and associated monitor

Note.— θ is used in this paragraph to denote the nominal glide path angle.

3.1.5.1 *General*

3.1.5.1.1 The radiation from the UHF glide path antenna system shall produce a composite field pattern which is amplitude modulated by a 90 Hz and a 150 Hz tone. The pattern shall be arranged to provide a straight line descent path in the vertical plane containing the centre line of the runway, with the 150 Hz tone predominating below the path and the 90 Hz tone predominating above the path to at least an angle equal to 1.75 θ.

3.1.5.1.2 **Recommendation.**— *The UHF glide path equipment should be capable of adjustment to produce a radiated glide path from 2 to 4 degrees with respect to the horizontal.*

3.1.5.1.2.1 **Recommendation.**— *The ILS glide path angle should be 3 degrees. ILS glide path angles in excess of 3 degrees should not be used except where alternative means of satisfying obstruction clearance requirements are impracticable.*

3.1.5.1.2.2 The glide path angle shall be adjusted and maintained within:

a) 0.075 θ from θ for Facility Performance Categories I and II — ILS glide paths;

b) 0.04 θ from θ for Facility Performance Category III — ILS glide paths.

Note 1.— Guidance material on adjustment and maintenance of glide path angles is given in 2.4 of Attachment C to Part I.

Note 2.— Guidance material on ILS glide path curvature, alignment and siting, relevant to the selection of the height of the ILS reference datum is given in 2.4 of Attachment C to Part I and Figure C-5.

3.1.5.1.3 The downward extended straight portion of the ILS glide path shall pass through the ILS reference datum at a height ensuring safe guidance over obstructions and also safe and efficient use of the runway served.

3.1.5.1.4 The height of the ILS reference datum for Facility Performance Categories II and III — ILS shall be 15 m (50 ft). A tolerance of plus 3 m (10 ft) is permitted.

3.1.5.1.5 **Recommendation.**— *The height of the ILS reference datum for Facility Performance Category I — ILS should be 15 m (50 ft). A tolerance of plus 3 m (10 ft) is permitted.*

Note 1.— In arriving at the above height values for the ILS reference datum, a maximum vertical distance of 5.8 m (19 ft) between the path of the aircraft glide path antenna and the path of the lowest part of the wheels at the threshold was assumed. For aircraft exceeding this criterion, appropriate steps may have to be taken either to maintain adequate clearance at threshold or to adjust the permitted operating minima.

Note 2.— Appropriate guidance material is given in 2.4 of Attachment C to Part I.

3.1.5.1.6 **Recommendation.**— *The height of the ILS reference datum for Facility Performance Category I — ILS used on short precision approach runway codes 1 and 2 should be 12 m (40 ft). A tolerance of plus 6 m (20 ft) is permitted.*

3.1.5.2 *Radio frequency*

3.1.5.2.1 The glide path equipment shall operate in the band 328.6 MHz to 335.4 MHz. Where a single radio frequency carrier is used, the frequency tolerance shall not exceed 0.005 per cent. Where two carrier glide path systems are used, the frequency tolerance shall not exceed 0.002 per cent and the nominal band occupied by the carriers shall be symmetrical about the assigned frequency. With all tolerances applied, the frequency separation between the carriers shall not be less than 4 kHz nor more than 32 kHz.

3.1.5.2.2 The emission from the glide path equipment shall be horizontally polarized.

3.1.5.2.3 For Facility Performance Category III — ILS glide path equipment, signals emanating from the transmitter shall contain no components which result in apparent glide path fluctuations of more than 0.02 DDM peak to peak in the frequency band 0.01 Hz to 10 Hz.

3.1.5.3 *Coverage*

3.1.5.3.1 The glide path equipment shall provide signals sufficient to allow satisfactory operation of a typical aircraft installation in sectors of 8 degrees in azimuth on each side of the centre line of the ILS glide path, to a distance of at least 18.5 km (10 NM) up to 1.75 θ and down to 0.45 θ above the horizontal or to such lower angle, down to 0.30 θ, as required to safeguard the promulgated glide path intercept procedure.

3.1.5.3.2 In order to provide the coverage for glide path performance specified in 3.1.5.3.1 above, the minimum field

3.11.5.3.5.4 **Recommendation.**— *The flare ground equipment antenna should be located about 1 000 m (3 300 ft) from threshold in the direction of the stop end of the runway.*

3.11.5.4 *Data*

Note.— Guidance material relating to data applications is provided in Attachment G to Part I, 2.7.

3.11.5.4.1 *Basic data.* The basic data words 1, 2, 3, 4 and 6 shall be transmitted throughout the approach azimuth coverage sector.

Note.— The composition of the basic data words is given in Appendix A to Part I, Table A-7.

3.11.5.4.1.1 Where the back azimuth function is provided, basic data words 4, 5 and 6 shall be transmitted throughout the approach azimuth and back azimuth coverage sectors.

3.11.5.4.2 *Auxiliary data.* Auxiliary data words A1, A2 and A3 shall be transmitted throughout the approach azimuth coverage sector.

3.11.5.4.2.1 Where the back azimuth function is provided, auxiliary data words A3 and A4 shall be transmitted throughout the approach azimuth and back azimuth coverage sectors.

Note.— The composition of the auxiliary data words is given in Appendix A to Part I, Table A-10.

3.11.5.4.3 *Monitor and control.* The monitor system shall provide a warning to the designated control point if the radiated power is less than that necessary to satisfy the DPSK requirement specified in 3.11.4.10.1 above. If a detected error in a data word persists, radiation of that word shall cease.

3.11.5.5 *Distance measuring equipment*

3.11.5.5.1 DME information shall be provided at least throughout the coverage volume in which approach and back azimuth guidance is available.

Note.— Siting of DME ground equipment is dependent on runway length, runway profile and local terrain. Guidance on siting of DME ground equipment is given in Attachment G to Part I, 5.

3.11.6 Airborne equipment characteristics

3.11.6.1 *Angle and data functions*

3.11.6.1.1 *Accuracy*

3.11.6.1.1.1 Where the DPSK and scanning beam signal power densities are the minimum specified in 3.11.4.10.1 above, the airborne equipment shall be able to acquire the signal and any decoded angle signal shall have a CMN not exceeding 0.2 degree.

Note 1.— It is intended that basic and auxiliary data words which contain information essential for the desired operation be decoded within a time period and with an integrity which is suitable for the intended application.

Note 2.— Information related to the acquisition and validation of angle guidance and data functions is given in Attachment G to Part I, 7.3.

3.11.6.1.1.2 Where the radiated signal power density is high enough to cause the airborne receiver noise contribution to be insignificant, the airborne equipment shall not degrade the accuracy of any decoded angle guidance signal by greater than plus or minus 0.017 degree (PFE), and plus or minus 0.015 degree (azimuth), and plus or minus 0.01 degree (elevation) CMN.

3.11.6.1.1.3 In order to obtain accurate guidance to 2.5 m (8 ft) above the runway surface, the airborne equipment shall produce less than 0.04 degree CMN with the power densities indicated in 3.11.4.10.2 b) above.

3.11.6.1.2 *Dynamic range*

3.11.6.1.2.1 The airborne equipment shall be able to acquire the signal and the performance in 3.11.6.1.1.2 above shall be met where the power density of any of the radiated signals has any value between the minimum specified in 3.11.4.10.1 above up to a maximum of minus 14.5 dBW/m^2.

3.11.6.1.2.2 The receiver performance shall not degrade beyond the specified limits when the maximum differential levels permitted in 3.11.6.1.2.1 above exist between signal power densities of individual functions.

3.11.6.1.3 *Receiver angle data output filter characteristics*

3.11.6.1.3.1 For sinusoidal input frequencies, receiver output filters shall not induce amplitude variations or phase lags in the angle data which exceed those obtained with a single pole low-pass filter with a corner frequency of 10 rad/s by more than 20 per cent.

Note.— Receiver outputs intended only to operate visual displays may benefit from appropriate additional filtering. Additional information on output data filtering is given in Attachment G to Part I, 7.4.2.

3.11.6.1.4 *Adjacent channel spurious response.* The receiver performance specified in 3.11.6 above shall be met when a desired signal is being tracked in the presence of an adjacent channel signal that is 25 dB stronger.

3.11.6.2 *Distance measuring function*

Note.— Text for this section is under study.

Table A. DME/MLS angle, DME/VOR and DME/ILS/MLS channelling and pairing

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
						DME/P mode			
DME no.	VHF frequency MHz	MLS angle frequency MHz	MLS channel no.	Frequency MHz	DME/N µs	Initial approach µs	Final approach µs	Frequency MHz	Pulse codes µs
* 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
* 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	108.00	-	-	1 041	12	-	-	978	12
17Y	108.05	5 043.0	540	1 041	36	36	42	1 104	30
17Z	-	5 043.3	541	1 041	-	21	27	1 104	15
18X	108.10	5 031.0	500	1 042	12	12	18	979	12
18W	-	5 031.3	501	1 042	-	24	30	979	24
18Y	108.15	5 043.6	542	1 042	36	36	42	1 105	30
18Z	-	5 043.9	543	1 042	-	21	27	1 105	15

ATTACHMENT C TO PART I. — INFORMATION AND MATERIAL FOR GUIDANCE IN THE APPLICATION OF THE STANDARDS AND RECOMMENDED PRACTICES IN ANNEX 10

1. Introduction

The material in this Attachment is intended for guidance and clarification purposes and is not to be considered as part of the specifications or as part of the Standards and Recommended Practices contained in this Annex.

For the clarity of understanding of the text that follows and to facilitate the ready exchange of thoughts on closely associated concepts, the following definitions are included:

Definitions relating to the Instrument Landing System (ILS)

Note.— The terms given here are in most cases capable of use either without prefix or in association with the prefixes "nominal" and "indicated". Such usages are intended to convey the following meanings:

The prefix "nominal": *the design characteristics of an element or concept.*

No prefix: *the achieved characteristics of an element or concept.*

The prefix "indicated": *the achieved characteristics of an element or concept, as indicated on a receiver (i.e. including the errors of the receiving installation).*

Localizer system	ILS Glide path system

Slant course line. The line formed at the intersection of the course surface and the plane of the nominal ILS glide path.

False ILS glide path. Those loci of points in the vertical plane containing the runway centre line at which the DDM is zero, other than that locus of points forming the ILS glide path.

Displacement error. The angular or linear displacement of any point of zero DDM with respect to the nominal course line or the nominal ILS glide path respectively.

Linearity sector. A sector containing the course line or ILS glide path, within a course sector or an ILS glide path sector, respectively, in which the increment of DDM per unit of displacement remains substantially constant.

Low DDM zone. A zone outside a course sector or an ILS glide path sector in which the DDM is less than the minimum value specified for the zone.

Note.— The minimum values of DDM related to such zones are specified in Part I, 3.1.3.7 and 3.1.5.6.

Plane of the nominal ILS glide path. A plane perpendicular to the vertical plane of the runway centre line extended and containing the nominal ILS glide path.

procedures. In certain applications including the use of screens or reflectors to reinforce signals in the course sector, the use of screens or reflectors will modify the range and characteristics of the back course of the localizer. Here again, it is considered that the effects are unlikely to be operationally significant unless operational use is being made of the back course. In this latter case, it may be necessary to provide an additional facility to supplement or replace the back course.

2.1.11,3.2 Where it is necessary to limit radiation from the localizer over a wide sector and confine most of it to a sector centred on the front course of the localizer in order to reduce bends sufficiently, the disadvantages will, in general, be as follows:

1) Orientation information from the localizer in the sector in which radiation is limited will no longer be available or will be unreliable.

2) It will not be practicable to carry out a preliminary check of the performance of the aircraft receiver through the flag system until the aircraft is within the sector centred on the course line.

3) In the area outside the sector centred on the course line, sufficient radiation may occur in particular directions to operate the ILS indicator in the aircraft in an erratic manner, giving rise to false indications.

4) The loss of the back course.

2.1.11.3.3 In respect to 1), it is considered that orientation information is necessary but that practice has shown that such information is preferably obtained in any event from an auxiliary aid such as a locator. Such an auxiliary aid would be necessary if radiation from the localizer is confined to a narrow sector centred on the course line. In respect to 2), it is considered that the loss of a receiver check prior to entry into the sector centred on the course line could be operationally accepted.

2.1.11.3.4 The disadvantage indicated in 3) may, in some instances, be a serious drawback. In general, it is considered that acceptance of this disadvantage will depend on the extent to which false indications will occur at a particular site and on the procedures established or specified for the use of the ILS installation. In practice, it is possible to establish procedures so that no use is made of the localizer signals until the aircraft is able to check that it is in the usable sector. Experience has shown at one installation in operational use that, procedurally, no difficulty has arisen through the existence of erratic indications in the off-course sector. It is considered that the question of whether or not the off-course signal characteristics due to reduction of radiation in a narrow sector may be accepted operationally is a matter for individual assessment at each location concerned.

2.1.11.3.5 The loss of the back course indicated in 4) may have several disadvantages. At some locations, the back course serves a useful function through intersection with other aids for facilitating procedures in the area concerned. Also, the back course often provides a useful aid in missed approach procedures and can often be used to simplify approach for landing when conditions require that the landing direction be opposite to the direction for which the ILS is primarily installed. Loss of the back course will, in general, require the provision of a substitute aid or aids, and the principal disadvantage in suppressing the back course may be considered in terms of the additional expense of a substitute aid or aids.

2.1.11.4 *Extent to which sector centred on course line may be narrowed.* It is considered that a radiation sector 10 degrees each side of the localizer course line would be the minimum sector that could be accepted operationally. It is desirable that the characteristics of the signal from the localizer should be identical with those specified in this Annex within the region in the immediate vicinity (region from DDMs 0.155 to zero) of the course line and approximate closely to them out to 10 degrees, so that the indications of the ILS indicator and the signals fed to a coupling device, if used, will correspond to the standard ILS throughout any manoeuvres necessary in the transition from the approach to the localizer to establishment on course line.

It should be realized, however, that for an increased runway length, the localizer course sector wherein proportional guidance is provided will be narrower as a result of adjusting the localizer to the sensitivity specified in Part I, 3.1.3.7.1. Although a proportional guidance signal is provided on each side of the course line up to a level of 0.180 DDM, the level above 0.150 DDM may not be usable by the automatic airborne system during the intercept manoeuvre unless that system is armed within the sector in which a minimum of 0.180 DDM is provided (e.g. plus or minus 10 degrees). It is advantageous to permit the localizer capture mode of the automatic airborne system to be armed at off-course angles greater than 10 degrees; consequently it is desirable to maintain a minimum DDM of 0.180 through a wider sector than plus or minus 10 degrees wherever practical.

2.1.11.5 *Further possibilities.* If the disadvantages arising from the use of the restricted coverage and modified signal characteristics discussed in 2.1.11.3 above are unacceptable, possibilities exist through the addition of equipment to provide the coverage and signal characteristics that would maintain the essential information provided by a standard ILS in the suppressed sector while, at the same time, maintaining in the regions about the course sector the objective of the restricted coverage system. It may be necessary to employ this more elaborate system at aerodromes of high traffic density.

2.2 ILS airborne receiving equipment

Note.— The specified tolerances are those considered necessary to achieve the operational objective and include allowances, where appropriate, for:

a) variation of relevant ground system parameters within the limits defined in Part I, 3.1;

b) variation of aircraft environment;