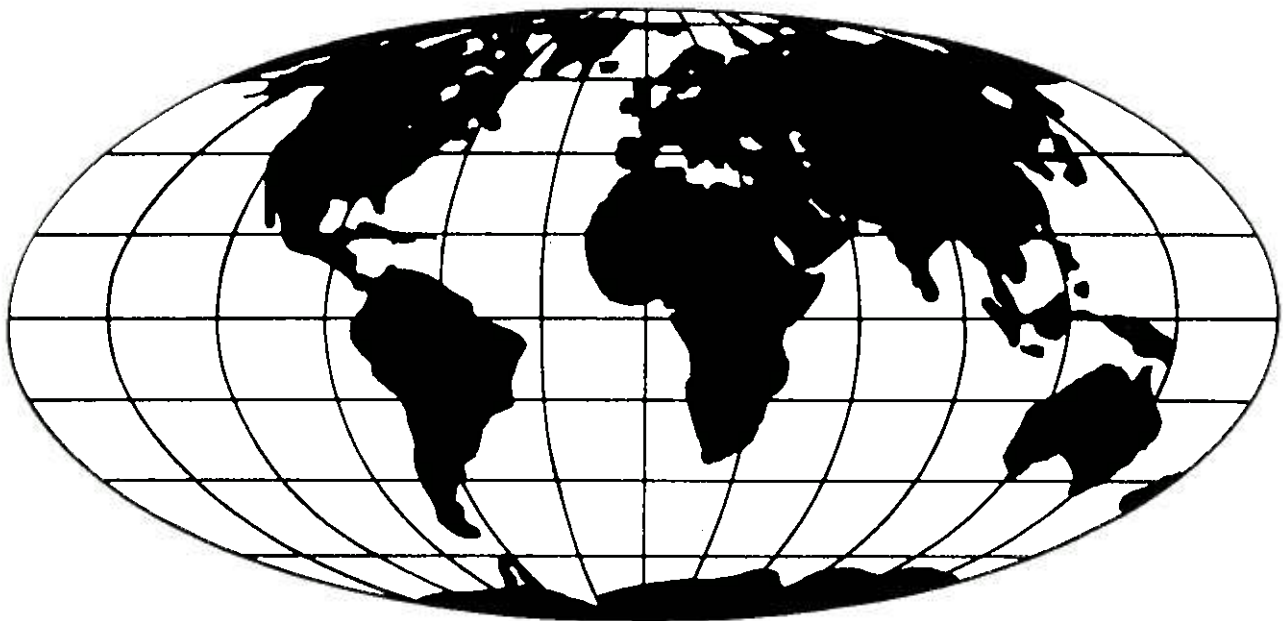


# INTERNATIONAL AMATEUR RADIO UNION



## MONITORING SYSTEM MANUAL



**The International Amateur Radio Union**

# **MONITORING SYSTEM MANUAL**

**1988**

Written by Bob Knowles ZL1BAD/ZL6IW,  
with editing support from ZL2AMJ and ZL1HV.

**R.E. Knowles ZL1BAD/ZL6IW**  
International Coordinator,  
IARU Monitoring System.  
Onewhero, RD 2,  
Tuakau,  
New Zealand

# IARU MONITORING SYSTEM MANUAL

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## **IARU MONITORING SYSTEM MANUAL**

This manual is dedicated to those amateurs of the "Intruder Watch System" who, for many years, worked quietly and determinedly at a thankless task, sustained by their belief that the preservation of the amateur bands for amateurs was worth their efforts.

Approved for circulation to IARU Regions and Societies



President, IARU

September 1988

# FOREWORD

*By the President of the International Amateur Radio Union,*

*Mr R.L. (Dick) Baldwin, WIRU*

## **Your help is needed!**

**F**or all of us, the ability to enjoy amateur radio is a rare privilege, one to be guarded zealously. Sometimes the protection of the Amateur Service can be accomplished by a few people who have worked hard and long to be at the right place at the right time, such as at an ITU conference. Sometimes the protection of the Amateur Service can be accomplished by those who spend a major portion of their time in preparation for public service in the event of a natural disaster.

There is another way in which every one of us can serve, and that is in helping to rid the amateur radio frequency bands of "intruders", stations from other services who choose to operate in the amateur bands because of overcrowding in their own spectrum allocations. Unfortunately, such "out-of-band" operation is all too frequent, and it would be even more prevalent were it not for the dedicated work of a few volunteers, those individuals who make up the IARU Monitoring System.

How can those out-of-band stations get away with it? Well, paragraph 342 in the International Telecommunication Union Radio Regulations (the regulations which govern the use of radio internationally) says, "Administrations of the Members (of the ITU) shall not assign any frequency in derogation of either the Table of Frequency Allocations ... or the other provisions of these Regulations **except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and these Regulations.**" (Emphasis supplied.) Thus, if there is no harmful interference, no regulation has been violated.

Obviously, therefore, it is up to us radio amateurs to vigorously report the interference caused to amateur radio stations by stations from other services operating in our allocations. We need all kinds of reports. We need reports - we need many reports - which simply list the presence of an offending station. We need reports which go further and identify such an offending station. We need reports which go into detail on the technical characteristics of an offending station.

This manual will help regional coordinators to do their job, will help them in organising a Monitoring System by individual IARU member societies. This manual will help IARU societies organise their members into becoming effective Monitoring System personnel. This manual will help individual radio amateurs conduct their own Monitoring System activities.

Whatever your level of operating and technical skill, there is a place in the IARU Monitoring System for you. *Your help is needed.* It is a task which brings the participant little glory but the satisfaction of knowing that he or she is doing something worthwhile. It is a task which results in some frustration, because to effect the removal of an intruding station often takes a great span of time.

We are indebted to Bob Knowles, ZL1BAD, the IARU Monitoring System International Coordinator, for his work in preparing this IARU Monitoring System Manual.

We are indebted to all of those selfless individuals who, for some thirty years all told, have monitored the amateur bands and who have faithfully, without tangible reward, reported the presence of stations of other services causing harmful interference in the amateur bands.

We are indebted to all of you who, whether representing your IARU member society or representing yourself as an enthusiastic and concerned individual radio amateur, take part in the work of the IARU Monitoring System to help maintain the amateur radio bands for radio amateurs. Your reward will come in knowing that you are contributing to the success of an important activity which strengthens amateur radio internationally.

The primary goal of the International Amateur Radio Union is the protection of the Amateur Service. Please join us in working toward successful accomplishment of that goal.

73,

*R. L. Baldwin, WIRU*

*President*

## Preface

**T**his manual provides a guide for radio societies, IARU Regional Monitoring System Coordinators, and individual radio amateur operators involved with the reporting of non-amateur signals in amateur bands.

It contains information on the day-to-day working of the IARU Monitoring System and how national societies fit into that system. Related information of help to those concerned with non-amateur signals in our bands is also included.

It is hoped this manual will also provide information and guidance for those amateur radio societies which do not yet participate in the important task of monitoring to protect the amateur radio frequency allocations.

The IARU Administrative Council has demonstrated the importance of the monitoring system for the protection of the amateur bands by appointing an International Coordinator for the Monitoring System.

There are reasons why some societies cannot participate in the monitoring system. Appendix 13.5j attached may assist in difficult cases.

This manual is issued by the IARU to Regional Organisations only. Regions are encouraged to reproduce it in quantity for distribution to their national societies. National societies are also encouraged to reproduce this manual, in whole or in part, with appropriate language translation, for the use of individual amateur monitors.

The manual is in loose-leaf form for easy amendment. Comments, suggestions and contributions of additional material are welcome.

The assistance received from those many amateurs who supplied ideas and information for the manual is acknowledged. To name them all would be impossible. The first IARU MS manual was produced some 10 years ago by Colin Thomas G3PSM. This manual and the Monitoring System owes much to his dedication and foresight.

# Introduction

The International Amateur Radio Union Monitoring System comprises the three Regional Monitoring Systems. In turn the Regional Monitoring Systems are made up from the national society monitoring systems.

The national society monitoring systems are known variously as "intruder watch", "band watch", "amateur interference reporting system", or whatever a parent society wishes to call its particular system. The objective remains the same: To log, identify, and if possible have removed, all non-amateur signals appearing in those frequencies that have been allocated exclusively to the Amateur Service. Some monitoring systems also log non-amateur stations that are operating in breach of the Radio Regulations in shared bands.

The IARU Monitoring System (MS) stations may also be asked from time-to-time to conduct band-occupancy monitoring for special purposes.

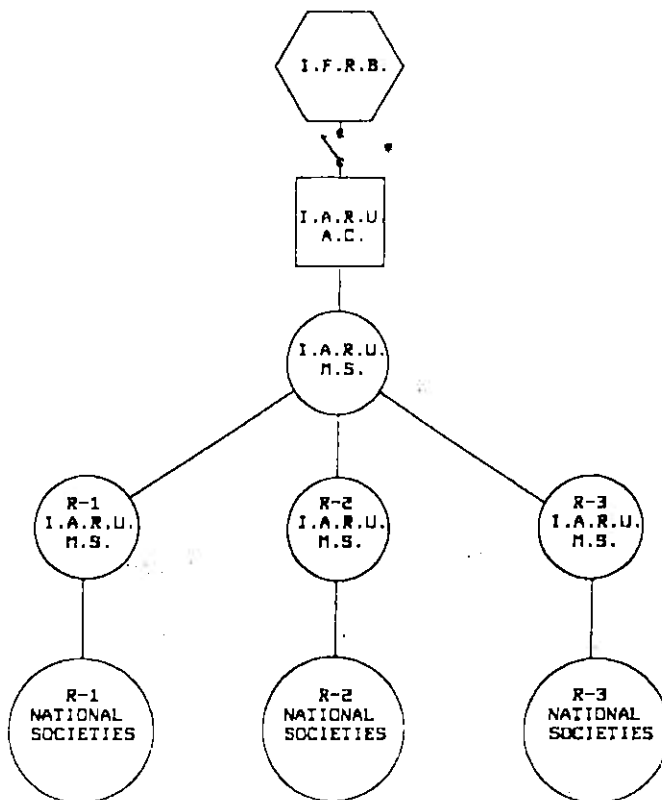
A small group of IARU and monitoring people met in Geneva in August 1985 to devise a Monitoring System to tie the three previously independent Regional Monitoring systems together. The Final Report of this group is attached here as Appendix 13.

The present IARU MS is the culmination of many years of work by a few dedicated amateurs. They had struggled on often in the face of apathy and sometimes hostility. These few "intruder watchers" as they were then known had the support of a few far-seeing administrators in two or three societies and in IARU who realised that the amateur bands were not a limitless resource. We have to protect the frequencies allocated for our use. With the increasing demands for spectrum space, and the tendency of some administrations to ignore their responsibilities under the ITU Convention, it is evident that the Amateur Service must

have a strong unified and effective monitoring system if it is to retain its frequency allocations. It must present factual authoritative information about "intruders" for further action.

The IARU MS defines a route by which the ordinary radio amateur in any country has a means of access to the international bodies in cases of harmful interference. The system is not perfect but it represents the best we have at this time. It does provide a reporting means when the normal procedure of appealing to a national administration is found not to work.

The diagram below shows the route which is followed for information originating from amateurs. It should be noted that this system does not in any way impinge upon the autonomy of any national society, regional IARU organisation or the right of these organisations to deal directly with their own administrations on these matters.



\* THIS "SWITCH" MAY BE CLOSED ONLY BY THE A.C. USING THE PROVISIONS OF THE I.T.U. RADIO REGULATIONS

## SECTION 1

# International Amateur Radio Union Monitoring System

### 1.1 Policy Statement

- a. No person shall, without the prior approval of the IARU Administrative Council in writing, communicate in the name of the IARU with the International Telecommunication Union (ITU), International Frequency Registration Board (IFRB), any administration or radio operating agency.
- b. The Administrative Council shall be the sole deciding authority with regard to any requests from regional organisations, national societies or individuals, for a case or cases of a breach of the Convention or infringement of the Regulations to be referred to the IFRB.

### 1.2 Objectives of the Monitoring System

- a. To collect data on the use of amateur bands.
- b. To compile a record of instances of harmful interference for further action.
- c. To take steps to eliminate harmful interference.
- d. To encourage monitoring activity by national societies.
- e. To have monitoring stations that meet the technical standards recommended by the CCIR available on a regional basis.

### 1.3 Participation in the IARU MS

Any national society that is a member of the IARU may participate in the work of the IARU MS and may send monitoring reports to the appropriate Regional Coordinator.

Any individual in those countries where there is no IARU member society may send monitoring reports to the Regional MS Coordinator.

### 1.4 The ITU Radio Regulations

Every national Society and each Regional Coordinator should have access to a copy of the ITU Radio Regulations. They should be read in conjunc-

tion with the ITU International Telecommunication Convention.

These publications are available direct from the ITU Geneva or from national administrations. Parts of the Convention and the Regulations that relate specifically to harmful interference and to monitoring are reproduced in Appendix 14 attached. A study of the full documents is needed to understand these parts.

Not every country in the world is a signatory to the Final Protocol of the ITU Convention or to other ITU documents. Non-signatory countries are not bound by the Convention or Regulations. However, ITU member countries are not obliged to recognise the radio services of non-member countries.

Regional and national MS Coordinators should make a special study of the provisions of Articles 35 and 38 of the Convention and of Radio Regulation 342. Additionally, particular attention should be paid to footnotes. See Appendix 3.

### 1.5 Harmful Interference

It is obvious from even a casual reading of the Radio Regulations that complaints about non-amateur stations in amateur bands must be supported by evidence of harmful interference. Any station may operate in an amateur band, under the provisions of paragraph 342 of the Radio Regulations, providing it does not cause harmful interference to amateur stations.

It must be noted that the definition of harmful interference in the Convention is different to the definition given in the Radio Regulations (see Appendix 14 attached).

### 1.6 Breaches of the Convention and/or the Radio Regulations

It is important to realise that the Radio Regulations derive from the Convention. It must also be noted that until a signatory government has ratified the Convention it is not necessarily bound by the provisions of the Convention and the Regulations (see Article 45 of the Convention).



## 1.7 The IARU MS International Coordinator

The International Coordinator (IC) is appointed by the IARU Administrative Council. He is responsible to the AC and reports directly to the IARU President. For administrative matters the IC confers with the IARU Secretary.

The IC is charged with the over-all coordination of the IARU Monitoring System including the preparation of reports to the AC relating to all matters affecting the use of amateur bands by non-amateur stations.

In addition, the IC initiates specialised monitoring activities, prepares training manuals, circulates in-

formation of interest to monitors, receives and processes reports from Regional Coordinators, and with the approval of Regional Coordinators, supplies national societies with information to assist them to participate in the IARU MS.

In cases of persistent "intruders" the IC attempts to verify the reports received, assess the degree of interference to the Amateur Service and explores various ways to have the intruder removed from the amateur band.

Other duties of the IC are detailed in the "Report of the IARU MS Working Group", Appendix 13.4.

## **SECTION 2**

# **Regional Organisations**

### **2.1 General**

This section is to provide an understanding of the organisation of the Regional monitoring systems.

### **2.2 Regional Organisations**

In each of the three ITU Regions there is a corresponding IARU organisation. Each regional organisation comprises those national societies within the region that have applied to be members of IARU. Under the current IARU Constitution, all members of IARU are also required to be members of the regional organisation.

Only one designated amateur radio society in any country can represent that country in the IARU.

### **2.3 IARU MS Regional Coordinator**

The three IARU Regional organisations have each appointed a Regional Monitoring System Coordinator for the Monitoring System within their Region. A Regional Coordinator is directly responsible to each Regional Executive but in day-to-day

matters would refer to the Regional Secretary. The Regional Coordinator should receive guidance from the executive explaining how policy matters within the Region are to be treated.

The Coordinator will act within the guidelines of regional policy for the regional organisation in all matters pertaining to monitoring within the region.

In general, Regional Secretaries should advise the Coordinator of all matters coming before them that relate to frequency allocations, changes to the regulations, changes in regional policy and staff, and keep him fully informed on all matters that are likely to have a bearing on the duties of Monitoring System Coordinators.

It is desirable that a Regional Coordinator be present at meetings of the Regional Executive when matters of monitoring are discussed.

Regional Secretaries shall encourage all societies to establish national monitoring systems and strive to widen the coverage of the Regional Monitoring System.

## SECTION 3

# Regional Coordinators

### 3.1 General

The three regional organisations have appointed coordinators to manage the monitoring system activities within their regions. The names and addresses of the Coordinators appear in Appendix 1 of this manual.

### 3.2 Responsibilities

Regional Coordinators are each directly responsible to their Regional IARU organisation for implementing the policy of the organisation on all monitoring matters.

In addition, Regional Coordinators will,

- a. compile regional data and progress reports then forward these to the IARU Monitoring Service International Coordinator.
- b. distribute information received from the International Coordinator to member societies.
- c. assist national coordinators to carry out their functions within the IARU Monitoring System.
- d. acknowledge all reports and inquiries received from the national coordinators and periodically summarise the reports to national societies.
- e. keep national coordinators informed of current developments.
- f. where approved by the regional organisation, receive and process reports from individuals or organisations in those countries where there is no IARU member society.
- g. not communicate in the name of the regional organisation with any administration, broadcasting authority or station management unless such action has the approval of the regional IARU organisation.
- h. It is recommended that the International Coordinator be informed where any communication of the type described in "g" above occurs.

### 3.3 Reporting formats

- a. To speed the data handling procedure, Regional

Coordinators shall, wherever possible, submit the regional summary of monitoring reports to the International Coordinator in the format noted in Section 6 (Reports).

- b. Regional Coordinators may, at their discretion, request monitoring reports from national societies to conform to a regional standard format. A suggested standard format appears in Section 6 (Reports).
- c. For special purpose monitoring, the Regional Coordinators may devise their own format for reports designed to suit that special purpose.
- d. It would be desirable within the limitations of cost to encourage the development of a standard 3-part reporting form. Such a form would be supplied to monitors by Societies. Upon completion the monitor retains one part and forwards two parts to the National Society. The National Society retains one part and forwards the remaining copy to the Regional Coordinator. From the reports received, the Regional Coordinator compiles a report.

### 3.4 Filtering of reports

It is desirable that the Regional Coordinators "filter" the reports they receive to reduce the volume of paper handled.

Whilst the full summary of reports from a society has value for statistical purposes, only those reports of persistent "intruders" need be forwarded to the International Coordinator.

### 3.5 Ambiguity in reports

The format of reports shown in Section 6 should be used as a guard against ambiguous notation especially when writing callsigns or other identifiers.

### 3.6 Abbreviations in reports

Abbreviations should be confined to those listed in Section 6 unless the meaning is so obvious that further explanation is not required.

In doing this remember that an obvious abbreviation in one language may have a totally different meaning in another language.

### **3.7 Frequency notation**

The frequency should be given in kilohertz (kHz) in all reports relating to frequencies below 30 MHz.

## SECTION 4

# National Societies

### 4.1 Participation

All IARU members are encouraged by the IARU Administrative Council to form a national system for monitoring the amateur bands for non-amateur use of those bands.

It is recognised that such action in some countries may not be in the best interests of the national society and so the decision on forming a monitoring system is entirely that of the society concerned.

### 4.2 Responsibilities

A national society, as a national coordinator in the IARU Monitoring Service, has the responsibilities noted in the "Report of the IARU Study Group, Geneva 1985", see Appendix 13.

### 4.3 Financial

Experience shows that the administration costs of a national monitoring system need not be great. In some cases, these costs amount to postage expense only. However, some societies supply specialised monitoring equipment for their coordinator where the cost of such items is beyond what a society may reasonably expect from its volunteers. Most coordinators supply their own equipment and use what is within their means.

### 4.4 Publicity

The publication of monitoring matters in national society magazines, newsletters, etc., is a very good way to stimulate interest in the activities of the Monitoring System. It also trains members to report non-amateur stations heard in amateur bands. An occasional article by the national society Monitoring System Coordinator keeps interested amateurs informed and serves to attract new recruits into the system. A pro-forma reporting sheet may also be circulated to members in this way.

### 4.5 Reports

Reports from national society coordinators should conform to the patterns outlined in this manual. The use of national languages in the headings do

not pose any language problems for other nationals if these formats are followed.

### 4.6 Other reports

National society coordinators, may, at their discretion, accept monitoring reports from amateurs in countries where there is no amateur society.

### 4.7 Coordinator

Any society that wishes to form a monitoring system may appoint a manager to administer the system. The society remains the national coordinator in the IARU Monitoring System.

It is desirable that the person taking up the position of manager for a national society should not hold other society positions. Experience has shown that the workload is such that the manager cannot do justice to other positions as well as to the manager position.

Care must be exercised in the selection of a manager. A better than average knowledge of all types of radio emissions is desirable and it is important that the manager be able to sift fact from supposition in reports. The appointee may represent a national society at government level, so tact is needed too.

The requirements of the national manager's position will vary in different countries. The society should fully brief their manager.

The manager should compile a monthly summary of all the reports received during the preceding month. A copy should be sent to the Regional Coordinator for inclusion in the regional summary.

The Manager should filter out reports of doubtful accuracy and return these to the sender with helpful comments designed to assist in training the originator.

A manager will find it an advantage in training the "team" to circulate descriptive material about signal types. Tape recordings are excellent to instruct personnel in the identification of signals. A simplified version of this manual may be circulated as a train-

ing aid. Managers may extract any information they wish from this book and use it for their own purposes.

Talks by managers to groups of amateurs have been found of value in recruiting monitors.

A monthly newsletter from the manager is a very good means to keep the monitoring team informed and interested.

Managers should not overlook shortwave listeners (SWLs) as monitors.

#### 4.8 The national administration

All societies are urged to establish dialogue with their national administration on the matter of non-amateur stations in amateur bands. Those that have not already done so should arrange for their administration to receive copies of a summary of monitoring reports and seek follow-up action on them. Such report summaries should be submitted monthly except in the case of urgent local matters requiring immediate attention.

Where for political or other reasons the best interests of the society would not be met by such actions, the society may seek help from the Regional Coordinator to help resolve national interference problems.

All societies should study the *Summaries of Monitoring Reports* circulated by the Regional Coordinators. Where an "intruder" is identified in the *Summary* as belonging to a society's country, that society should bring this to the attention of their administration.

#### 4.9 A suggested monitoring report form

The following format is suggested for report forms used by the monitoring stations of national societies. National language should be used for all titles on the form but the format itself should not be changed.

Use a separate form for each frequency reported on. Use separate forms for each station using the same frequency.

#### IARUMS MONITORING SYSTEM REPORT FORM

Station subject to Harmful interference

Frequency in kilohertz

--	--	--	--	--	--	--	--	--	--

Callsign of station causing harmful interference to the Amateur Service

Day	Month	Year	Time UT	Emm	Traffic and Comments

## SECTION 5

# Personnel

### 5.1 Personnel

Personnel in any section of the Monitoring System are, in general, volunteers. Their experience will range from a few weeks to many years. Some may not hold a transmitting licence, i.e. be shortwave listeners only.

Technical knowledge of monitoring personnel may vary from the simple to the very complex. Regardless of their level of skill, all monitors are capable of providing useful input to their section of the Monitoring System.

### 5.2 Equipment

The basic equipment for any monitoring station is a radio receiver, antenna, and a pair of ears (one will do!) plus the operator's ability to learn the limitations of each.

The degree of sophistication that may be achieved beyond the basics is entirely a matter for the operator concerned. In some cases the national societies provide equipment for the use of their Monitoring System Manager.

### 5.3 Hours of work

Being volunteers, monitors must be free to dedicate as much of their time to the Monitoring System as their personal commitments or inclinations permit. Within that framework, a monitor should strive to apply time to a specific task that may be set by the Manager, or to general monitoring for a minimum of 2 or 3 hours each week.

It is suggested that less than 2 hours weekly results in loss of familiarity with patterns of activity on the bands being monitored.

### 5.4 Types of monitoring

Monitors who wish to specialise in specific types of monitoring such as A1A or F1B only should do so. Those that prefer general

monitoring should likewise do so. Each complements the other.

### 5.5 Bands

Some monitors prefer to monitor a particular band. This should be encouraged. The end result is a person with an intimate knowledge of the particular band.

### 5.6 Pointers

Amateurs with previous monitoring experience or technical qualifications will find the following discussion very basic. These basic pointers are included for those with limited experience.

### 5.7 Receivers

The modern receiver with its in-built frequency counters and digital display makes reasonable accuracy in frequency measurement easy. But not all amateurs can afford such equipment and may have to rely on older designs. The dial readings of these older receivers can be improved by:

1. maintaining the operating room at a constant temperature, and
2. Using a crystal calibrator to check the dial accuracy against a recognised frequency standard station and make allowance for errors.

All calibration should be done on the band and in the mode being used to detect the intruding signal.

### 5.8 Frequency measurement of signals

All modulated or keyed signals occupy a finite bandwidth. Some choice is offered in designating the frequency of the emission. In some cases the choice is obvious. In others it is more arbitrary. Reference should be made to the following table to ensure uniformity in Monitoring System reports:

**Mode**    **Measure frequency at:**

**N0N**    Zero-beat in CW or SSB mode

**A1A**    Zero-beat in CW or SSB mode

**A2A**    Zero-beat of the carrier in SSB or CW mode

**A3A**    Zero-beat of the carrier of SSB or CW mode

**A3C**    Zero-beat of the main carrier

**C3F**    Centre frequency of the emission

**F1A**    Centre frequency of the emission

**F1B**    Centre frequency of the emission, i.e. halfway between the zero beats of the two carriers

**F3E**    Resolution frequency of the modulation

**F3C**    Centre frequency of the emission

**F3F**    Centre frequency of the emission

**F7B**    Centre frequency of the four carriers (sounds like two equally-strong RTTY signals close together)

**FXX**    Centre frequency of the emission

**J3E**    Resolution frequency of the modulation

**J8E**    Resolution frequencies of the two independent sidebands

**M7B**    Centre frequency of the emission

**P0N**    Centre frequency of the emission

**PXX**    Centre frequency of the emission

**R3C**    Centre frequency of the emission

**R3E**    Zero-beat of the carrier in SSB or CW mode, where the carrier can be heard, other-

wise at the resolution frequency of the modulation

**R7B**    Centre frequency of the emission

For definition of designations see Section 6.6.

## 5.9 Standards

It is not appropriate to dictate absolute standards in this manual because the equipment in use by monitoring stations varies.

Recommendation 7 (D) of an IARU Region 1 Division Conference states:

"For frequency measurements made solely to investigate the occupancy of frequency channels, the permissible error for stations operating in the band 10 kHz to 30 MHz is +/- 3 parts in 100 000; or as applied to the exclusive amateur bands, +/- 210 Hz at 7 MHz, +/- 420 Hz at 14 MHz, +/- 630 Hz at 21 MHz and +/- 840 Hz at 28 MHz."

Lower technical standards are acceptable at the discretion of societies, but it is suggested that where possible, stations participating as part of the IARU Monitoring System be equipped to the recommended standard or better.

The remarks relating to the frequency and calibration in Chapter 5 of this manual should be kept in mind when making frequency measurements.

## 5.10 Offsets

Allowances should be made, where applicable, for any in-built frequency offset that results in erroneous dial readings of measured frequency.



## SECTION 6

### General

#### 6.1 General

Much of the information in this section is available in other publications. It is included here as a quick reference. The cost of providing all the various reference books could be prohibitive for some societies. Short explanatory paragraphs introduce each part.

#### 6.2 Signal reporting codes

Many signal reporting codes have been devised and discarded. It is recognised by all authorities that a quantitative valid system of signal reporting is impractical because of the many variables present on any radio circuit. Nevertheless, an arbitrary system must be used if a listener is to convey an indication to another person of just how strong or weak the signal referred to was at any given moment at one location.

For this reason, it is recommended that the SINPO code be used where it is considered pertinent to the monitoring report.

The SINPO code is expressed as follows:

Rating Scale	S	I	N	P	O
	Signal Strength	Degrading effect of			Overall rating
		Interference	Noise	Propagation disturbance	
5	Excellent	Nil	Nil	Nil	Excellent
4	Good	Slight	Slight	Slight	Good
3	Fair	Moderate	Moderate	Moderate	Fair
2	Poor	Severe	Severe	Severe	Poor
1	Barely audible	Extreme	Extreme	Extreme	Unusable

In simplistic cases this can be further simplified by the use of the QSA code, whereby a signal of QSA5 is excellent and QSA1 is barely audible. The variations between are given by QAS2 to QAS4.

#### 6.3 CW codes

The English alphabet short version of the international morse code is generally heard on the amateur bands but it is NOT the full morse code.

Many non-amateur stations send CW using the full morse code and in their own language. The full morse code and some national alphabet codes are included in Appendix 9.

#### 6.4 FSK morse

This method for sending morse code often produces confusion to monitoring stations. It is difficult to receive the code when listening to both the carrier and the shifted carrier. To read correctly, simply switch in a narrow filter and listen to the shifted carrier only.

#### 6.5 RTTY

Many intruders on amateur bands use radio teletype. For "privacy" they seldom use the standard 5-bit Baudot/Murray code format.

Variations on the standard code are legion. Several code formats are given in the appendix 11 attached to aid monitors interested in decoding the variations.

Computer-generated "on-line cypher" machines also make some RTTY codes unbreakable. The patient monitor will sometimes be rewarded when the operator omits to switch in the cypher machine!

Various RTTY code-analyser computer programs have appeared in print in recent years.

These are helpful to monitors but it is not proposed to reproduce such programs here. Reference is given to these in Appendix 5.

An increasing diversity of FSK signals are being used by amateurs - e.g. AMTOR-ARQ, FEC, Pack-

et, ASCII, and high baud rate codes. Without the equipment to decode these signals, the monitor can only guess if the station is an intruder or an amateur. A rough rule of thumb is that "if the transmission continues for more than 15 minutes, the station is probably not an amateur".

## **6.6 Classification and designation of emissions**

The following pages provide the commonly used designations for the types of signals listed. This list-

ing is not complete. It shows only those types of signal likely to be encountered in amateur bands.

Much more detailed information on the designation and classification of signal types can be found in the Radio Regulations, part of which is given in Appendix 6.

The designations given here are for the main characteristics of a signal. Where a full designation would convey additional useful information, it should be used, see Appendix 6.

## 6.7

## DESIGNATION OF EMISSIONS

TYPE OF MODULATION OF MAIN CARRIER	TYPE OF TRANSMISSION	SUPPLEMENTARY CHARACTERISTICS	SYMBOL
AMPLITUDE MODULATION	With no modulation	--	NØN
	Telegraphy without use of a modulating audio frequency (by on- off keying)	--	A1A *
	Telegraphy by the on-off keying of an amplitude - modulating audio frequency or frequencies, or by the on-off keying of the modulated emission (special case: an unkeyed amplitude -modulated emission).	--	A2A *
	Telephony	Double sideband	A3E
		Single sideband reduced carrier	R3E
		Single sideband suppressed carrier	J3E
		Two independant sidebands	J8E
	Facsimile (with modulation of main carrier either directly or by a FM subcarrier	--	A3C
		Single sideband reduced carrier	R3C
	Television	Vestigial sideband	C3F

\* For aural reception

TYPE OF MODULATION OF MAIN CARRIER	TYPE OF TRANSMISSION	SUPPLEMENTARY CHARACTERISTICS	NEW SYMBOL
	Multi-channel voice frequency telegraphy	Single sideband reduced carrier	R7B
	Cases not covered by the above e.g. combined tele- phony and tele- graphy.	Two independant sidebands.	B9W
FREQUENCY (or PHASE) MODULATION	Telegraphy by frequency shift keying without the use of a modulating audio frequency; one of two frequencies being emitted at any instant	--	F1A *
	Telegraphy by the on-off keying of a frequency- modulating audio frequency or by the on-off keying of a frequency modulated emission (Special case: an unkeyed frequency modulated emission)	--	F2A *
	Telephony	--	F3E
	Facsimile by direct frequency modulation of the carrier.	--	F3C
	Television	--	F3F
	Four-frequency diplex telegraphy	--	F7B
	Cases not covered by the above in which the main carrier is frequency modulated.	--	FXX

\* For aural reception

TYPE OF MODULATION OF MAIN CARRIER	TYPE OF TRANSMISSION	SUPPLEMENTARY CHARACTERISTICS	SYMBOL
PULSE MODULATION	A pulsed carrier without any modulation intended to carry information (e.g radar)	--	PØN
	Telegraphy by the on-off keying of a pulsed carrier without the use of a modulating audio frequency.	--	K1A *
	Telegraphy by the on-off keying of a modulating audio frequency or frequencies or by the on-off keying of a modulated pulsed carrier (special Audio frequencies case; an unkeyed modulating the modulated pulsed amplitude of the carrier). pulses.		K2A *
	Audio frequencies modulating the width (or duration) of the pulses.		L2A *

---

\* For aural reception

STANDARD FORMAT OF REPORT SUMMARIES

SUMMARIES OF REPORTS FROM NATIONAL CO-ORDINATORS TO REGIONAL CO-ORDINATORS, AND FROM REGIONAL CO-ORDINATORS TO THE INTERNATIONAL CO-ORDINATOR, SHOULD CONFORM TO THE FOLLOWING FORMAT.

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(GENERAL INFORMATION, NAME, ADDRESS ETC.)

FREQ.KHZ	DATE	TIME(UTC)	IDENTIFICATION	ADM. (IF KNOWN)	EMM	COMMENTS

NOTES: TO FACILITATE COMPUTER ANALYSIS OF DATA, THE FOLLOWING FORMS SHOULD BE USED.

FREQUENCY - A 5 FIGURE NUMBER, FOLLOWED BY A DECIMAL POINT AND 1 FIGURE IF NEEDED.

EXAMPLES: "14250" "21032.8" "07060"

DATE A 6 FIGURE NUMBER DENOTING DAY MONTH, YEAR

EXAMPLES: "120886" "010387" "101185" "DY0886"

"DY" MAY BE USED TO INDICATE THE OPERATION OCCURED ON EACH DAY OF THE MONTH.

TIME UTC: A 4 FIGURE NUMBER FROM 0001 to 2359. THIS MAY BE PRECEDED BY AN OBLIQUE (/) STROKE TO INDICATE THAT THE TRANSMISSION STARTS AT THE TIME SHOWN. THE TIME FIGURE MAY BE FOLLOWED BY A SMALL DASH (-) TO SHOW THAT THE TRANSMISSION CONTINUES ON TO AN UNKNOWN TIME.

FOLLOWING THE SMALL DASH ANOTHER 4 FIGURE TIME GROUP MAY BE USED TO INDICATE THAT THE TRANSMISSION WAS MONITORED FROM THE FIRST TIME SHOWN TO THE LAST TIME SHOWN.

A FURTHER OBLIQUE STROKE PLACED AFTER THE TIME FIGURE INDICATES CLOSING TIME.

EXAMPLES: 1105 A SINGLE OBSERVATION  
/1110- TRANSMISSION STARTS AT 1110- AND CONTINUES  
1105-1230 SHOWS TIME THE SIGNAL WAS MONITORED  
1300/ INDICATES SIGNAL STOPPED AT 1300  
/0800-1430/ SHOWS SIGNAL STARTS AT 0800 AND  
CONTINUES UNTIL 1430 WHEN IT STOPS.

IDENTIFICATION NAME, CALLSIGN, OR OTHER IDENTIFIER (IF KNOWN)

COUNTRY OR CONTROLLING ADMINISTRATION (IF KNOWN). USE ITU ABBREVIATIONS FOR COUNTRY NAMES. (See Appendix 4)

EMMISSION A LETTER, FIGURE, LETTER, GROUP SUCH AS "F1B"  
WHERE FURTHER INFORMATION IS NECESSARY THE FULL DETAILS MAY BE GIVEN (SEE SECTION DEALING WITH DESIGNATION AND CLASSIFICATION OF SIGNALS)  
WHERE MORE THAN ONE MODE IS USED SEPERATE WITH OBLIQUE STROKE. EXAMPLES F1A/B OR A1A/F1B

COMMENTS ANY GENERAL EXPLANATION ETC. REQUIRED.

### 6.9 AMBIGUOUS NOTATION

CARE MUST BE USED, PARTICULARLY IN CALL SIGNS, TO  
DIFFERENTIATE BETWEEN THE FOLLOWING LETTERS AND FIGURES:-

Ø and O

1 and I

2 and Z

U and V

IT IS PREFERABLE THAT REPORTS BE TYPEWRITTEN, WHERE THIS  
IS NOT POSSIBLE, HAND WRITTEN CAPITAL LETTERS SHOULD BE  
USED.



# APPENDIX 1

## IARU-MS COORDINATORS

### International Coordinator

R.E. Knowles ZL1BAD / ZL6IW

Onewhero, R.D. 2., Tuakau, New Zealand.

Telephone 0064 - 085 - 28 - 775 (Home)  
0064 - 09 - 771-293 (Business)

Electronic Mail: NZ Telecom Corporation's STARNET box:  
6401:AZL005

Telex: Send via above STARNET box as follows:  
Call NZ60189 and enter the following *exactly*:

REFILE  
TO:  
STARNET AZL005  
END

(then enter your message, exchange answerbacks and clear the call).

### Region 1 Coordinator

J. Van Der Velde PA0VDV

FAZANTENHOF 57

3755 EE EEMNES NETHERLANDS

### Region 2 Coordinator

M.L. Gibson W7JIE

1215 NORTH 28 PLACE

RENTON, WASHINGTON, 98056 U.S.A.

### Region 3 Coordinator

W. Martin VK2COP

33 SOMERVILLE ROAD,

HORNSBY HEIGHTS, NEW SOUTH WALES, 2077, AUSTRALIA

## ABBREVIATIONS IN REPORTS

THE FOLLOWING ABBREVIATIONS ARE ACCEPTED AS STANDARD IN THE MONITORING SYSTEM AND MAY BE USED IN ALL REPORTS.

Bd	BAUD RATE
MR	MORSE CODE
FDM	FREQUENCY DIVISION MULTIPLEX
FSK-MR	FREQUENCY SHIFT KEYED MORSE CODE
Scr	TELEPRINTER USING CCITT NO.2 CODE IN CONJUNCTION WITH ON-LINE CYPHER.
ScPr	TELEPRINTER USING SCRAMBLE SYSTEM
TDM	TIME DIVISION MULTIPLEX
U5	TELEPRINTER USING FIVE UNIT CODE (CCITT NO. 2 = MURRAY, OFTEN CALLED BAUDOT)
U54	AS FOR U5. TRANSMISSION SPEED OF 45.5 BAUD
U55	AS FOR U5. TRANSMISSION SPEED OF 50 BAUD
U57	AS FOR U5. TRANSMISSION SPEED OF 75 BAUD
U7	TELEPRINTER USING SEVEN UNIT CODE (CCITT NO.5 = ASCII)
4F	MORSE CODE TRAFFIC USING FOUR FIGURE CODE GROUPS
4L	MORSE CODE TRAFFIC USING FOUR LETTER CODE GROUPS
5F	MORSE CODE TRAFFIC USING FIVE FIGURE CODE GROUPS
5L	MORSE CODE TRAFFIC USING FIVE LETTER CODE GROUPS
SF	MORSE CODE TRAFFIC. FIGURE GROUPS USING ABBREVIATED (SHORT) FIGURES
HX	INTERMITTENT OPERATIONS ON THE DATES SHOWN.
H24	ACTIVE FOR FULL 24 HOURS OF THE DATES SHOWN
SIMO	SIMULTANEOUSLY
ARQ	AS IN SITOR/AMTOR TELEPRINTER CODE
FEC	AS IN SITOR/AMTOR TELEPRINTER CODE
f/2	INDICATES THE FREQUENCY IN QUESTION DIVIDED BY 2
f/3	INDICATES THE FREQUENCY IN QUESTION DIVIDED BY 3
2f	INDICATES THE SECOND HARMONIC OF THE FREQUENCY IN QUESTION
3f	INDICATES THE THIRD HARMONIC OF THE FREQUENCY IN QUESTION
/	(PRECEDING THE TIME) INDICATES TRANSMISSION STARTING TIME
/	(FOLLOWING THE TIME) INDICATES TRANSMISSION CLOSING TIME

MISCELLANEOUS ABBREVIATIONS AND SIGNALS  
(ITU STANDARD)

ABBREVIATION	DEFINITION
AA	ALL AFTER ... (USED AFTER A QUESTION MARK IN RADIOTELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASE OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST A REPETITION).
AB	ALL BEFORE ... (USED AFTER A QUESTION MARK IN RADIOTELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASE OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST A REPETITION)
ADS	ADDRESS (USED AFTER A QUESTION MARK IN RADIO-TELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASE OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST A REPETITION).
--	
AR	END OF TRANSMISSION
--	
AS	WAITING PERIOD
BK	SIGNAL USED TO INTERRUPT A TRANSMISSION IN PROGRESS
BN	ALL BETWEEN ... AND ... (USED AFTER A QUESTION MARK IN RADIOTELEGRAPHY OR AFTER RQ IN RADIO-TELEPHONY (IN CASE OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST A REPETITION).
BQ	A REPLY TO AN RQ
BT	SIGNAL TO MARK THE SEPARATION BETWEEN DIFFERENT PARTS OF THE SAME TRANSMISSION
C	YES OR "THE SIGNIFICANCE OF THE PREVIOUS GROUP SHOULD BE READ IN THE AFFIRMATIVE".
CFM	CONFIRM (OR I CONFIRM)
CL	I AM CLOSING MY STATION
COL	COLLATE (OR I COLLATE).
CORRECTION	CANCEL MY LAST WORD OR GROUP. THE CORRECT WORD OR GROUP FOLLOWS (USED IN RADIOTELEPHONY, SPOKEN AS KOR-REK-SHUN).
CP	GENERAL CALL TO TWO OR MORE SPECIFIED STATIONS. (SEE ARTICLES 52, 63, INT.RAD.REG.)
CQ	GENERAL CALL TO ALL STATIONS. (SEE ARTICLE 52)
CS	CALL SIGN (USED TO REQUEST A CALL SIGN)
DDD	USED TO IDENTIFY THE TRANSMISSION OF THE DISTRESS MESSAGE BY A STATION NOT ITSELF IN DISTRESS (SEE NO. 3164)

ABBREVIATION	DEFINITION
DE	FROM ... (USED TO PRECEDE THE NAME OR OTHER IDENTIFICATION OF THE CALLING STATION).
DF	YOUR BEARING AT ... HOURS WAS ... DEGREES, IN THE DOUBTFUL SECTOR OF THIS STATION, WITH A POSSIBLE ERROR OF ... DEGREES.
DO	BEARING DOUBTFUL. ASK FOR ANOTHER BEARING LATER (OR AT ... HOURS).
E	EAST (CARDINAL POINT) (SEE NO 3098)
ETA	ESTIMATED TIME OF ARRIVAL
INTERCO	INTERNATIONAL CODE OF SIGNALS GROUPS FOLLOW (USED IN RADIOTELEPHONY, SPOKEN AS IN-TER-CO).
ITP	THE PUNCTUATION COUNTS
K	INVITATION TO TRANSMIT
$\bar{K}\bar{A}$	STARTING SIGNAL
KMH	KILOMETRES PER HOUR
KTS	NAUTICAL MILES PER HOUR (KNOTS)
MIN	MINUTE (OR MINUTES)
MPH	STATUTE MILES PER HOUR
MSG	PREFIX INDICATIONS TO OR FROM THE MASTER OF A SHIP CONCERNING ITS OPERATION OR NAVIGATION.

ABBREVIATIONS (I.T.U. STANDARD)

N NORTH (CARDINAL POINT) (SEE NO. 3098).  
NIL I HAVE NOTHING TO SEND TO YOU  
NO NO (NEGATIVE)  
NW NOW  
NX NOTICE TO MARINERS (OR NOTICE TO MARINERS FOLLOWS)  
OK WE AGREE ( OR IT IS CORRECT)  
OL OCEAN LETTER  
P PREFIX INDICATING PRIVATE RADIOTELEGRAM  
PBL PREAMBLE (USED AFTER A QUESTION MARK IN RADIOTELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASE OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST A REPETITION).  
PSE PLEASE  
R RECEIVED  
REF REFERENCE TO ...(OR REFER TO.....)  
RPT REPEAT (OR I REPEAT) (OR REPEAT....)  
RQ INDICATION OF A REQUEST  
S SOUTH (CARDINAL POINT) (SEE NO 3098)  
SIG SIGNATURE (USED AFTER A QUESTION MARK IN RADIOTELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASE OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST A REPETITION).  
SLT RADIOMARITIME LETTER  
SOS DISTRESS SIGNAL (...---... TO BE SENT AS ONE SIGNAL).  
SS INDICATOR PRECEEDING THE NAME OF A SHIP STATION  
SVC PREFIX INDICATING A SERVICE TELEGRAM  
SYS REFER TO YOUR SERVICE TELEGRAM  
TFC TRAFFIC  
TR USED BY A LAND STATION TO REQUEST THE POSITION AND NEXT PORT OF CALL OF A MOBILE STATION (SEE NOs. 4741 AND 4942): USED ALSO AS A PREFIX TO THE REPLY.  
TTT THIS GROUP WHEN SENT THREE TIMES CONSTITUTES THE SAFETY SIGNAL (SEE NO. 3221)  
TU THANK YOU  
TXT TEXT (USED AFTER A QUESTION MARK IN RADIOTELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASE OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST A REPETITION).  
VA END OF WORK

W WEST (CARDINAL POINT) (SEE No. 3098)

WA WORD AFTER.....(USED AFTER A QUESTION MARK IN RADIO-  
TELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASES  
OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST  
A REPETITION).

WB WORD BEFORE.....(USED AFTER A QUESTION MARK IN RADIO-  
TELEGRAPHY OR AFTER RQ IN RADIOTELEPHONY (IN CASE  
OF LANGUAGE DIFFICULTIES) OR AFTER RPT, TO REQUEST  
A REPETITION).

WD WORD(S) OR GROUP(S)

WX WEATHER REPORT (OR WEATHER REPORT FOLLOWS)

XQ PREFIX USED TO INDICATE THE TRANSMISSION OF A SERVICE  
NOTE.

XXX THIS GROUP WHEN SENT THREE TIMES CONSTITUTES THE  
URGENCY SIGNAL (SEE No. 3196)

YES YES (AFFIRMATIVE)

YZ THE WORDS WHICH FOLLOW ARE IN PLAIN LANGUAGE

NORMAL AMATEUR ABBREVIATIONS AND Q CODES MAY ALSO BE USED ON  
REPORTS. "NORMAL" IN THIS CONTEXT SHOULD BE TAKEN TO MEAN THE  
ABBREVIATIONS APPEARING IN THE LISTS GIVEN IN THE ARRL OR RSGB  
HANDBOOKS, OR IN THE LISTS APPROVED BY THE ITU, AS GIVEN IN  
THIS MANUAL.

## INTERNATIONAL AMATEUR BANDS

THE ALLOCATION OF FREQUENCIES TO SERVICES INTERNATIONALLY IS A COMPLEX TOPIC WHICH IS THE SUBJECT OF ARTICLE 8 OF THE INTERNATIONAL RADIO REGULATIONS. THE FULL TABLE OF ALLOCATIONS UP TO 30 MHZ TAKES UP IN EXCESS OF 40 PAGES. THIS APPENDIX IS AN ATTEMPT TO CONCISELY PRESENT THE INFORMATION RELEVANT TO AMATEUR ALLOCATIONS BELOW 30 MHZ. THE THREE-FIGURE NUMBERS REFER TO THE FOOTNOTES AND ARE THE SAME NUMBERS AS ARE USED IN THE INTERNATIONAL RADIO REGULATIONS. ONLY INFORMATION REFERRING TO AMATEUR ALLOCATIONS IS PRESENTED HERE.

PRIMARY ALLOCATIONS ARE INDICATED BY CAPITALS. LOWER CASE LETTERS INDICATE THAT THE SERVICE HAS A SECONDARY ALLOCATION. IN THE FOOTNOTES AN ELLIPSIS (....) IS USED TO INDICATE THE OMISSION OF INFORMATION NOT RELEVANT TO THE FREQUENCY RANGE COVERED BY AMATEUR ALLOCATIONS.

IN MAY AVOID CONFUSION AT THIS POINT TO MENTION THE WAY IN WHICH THE INTERNATIONAL RADIO REGULATIONS DEFINE AND USE THE THREE WORDS, ALLOCATION, ALLOTMENT AND ASSIGNMENT. THESE TERMS HAVE PRECISE AND DISTINCT MEANINGS AS FOLLOWS:

ALLOCATION	IS THE DISTRIBUTION OF BANDS OF FREQUENCIES TO THE VARIOUS RADIO SERVICES ON A REGIONAL BASIS.
ALLOTMENT	IS THE DISTRIBUTION OF FREQUENCIES AMONG AREAS OR COUNTRIES.
ASSIGNMENT	IS THE DISTRIBUTION OF FREQUENCIES TO STATIONS

## ALLOCATION TO SERVICES

REGION 1	REGION 2	REGION 3
1800 - 1810 RADIOLOCATION 487 485 486	1800 - 1850 AMATEUR 489	1800 - 2000 AMATEUR FIXED MOBILE EXCEPT AERONAUTICAL MOBILE RADIONAVIGATION RADIOLOCATION 489
1810 - 1850 AMATEUR 490 491 492 493		
1850 - 2000 FIXED MOBILE EXCEPT AERONAUTICAL MOBILE 484 488 495	1850 - 2000 AMATEUR FIXED MOBILE EXCEPT AERONAUTICAL MOBILE RADIOLOCATION RADIONAVIGATION 489 494	

494 SOME COUNTRIES OF REGION 1 USE RADIODETERMINATION SYSTEMS IN THE BANDS ..., 1850-2160 KHZ, ..., AND 3500-3800 KHZ. THE ESTABLISHMENT AND OPERATION OF SUCH SYSTEMS ARE SUBJECT TO AGREEMENT OBTAINED UNDER THE PROCEDURE SET FORTH IN ARTICLE 14. THE RADIATED MEAN POWER OF THESE STATIONS SHALL NOT EXCEED 50W.

485 ADDITIONAL ALLOCATION: IN ANGOLA, BULGARIA, HUNGARY, MONGOLIA, NIGERIA, POLAND, THE GERMAN DEMOCRATIC REPUBLIC, CHAD, CZECHOSLOVAKIA AND THE U.S.S.R., THE BANDS ...1800-1810 KHZ.,... ARE ALSO ALLOCATED TO THE FIXED AND LAND MOBILE SERVICES ON A PRIMARY BASIS SUBJECT TO AGREEMENT OBTAINED UNDER THE PROCEDURE SET FORTH IN ARTICLE 14.

486 IN REGION 1, IN THE BANDS ...1800-1810 KHZ AND ..., EXCEPT IN THE COUNTRIES LISTED IN NO 485 AND ...), EXISTING STATIONS IN THE FIXED AND MOBILE, EXCEPT AERONAUTICAL



MOBILE, SERVICES (...) MAY CONTINUE TO OPERATE ON A PRIMARY BASIS UNTIL SATISFACTORY REPLACEMENT ASSIGNMENTS HAVE BEEN FOUND AND IMPLEMENTED IN ACCORDANCE WITH RESOLUTION 38.

487 IN REGION 1, THE ESTABLISHMENT AND OPERATION OF STATIONS OF THE RADIOLOCATION SERVICE IN THE BANDS ..., 1800-1810 KHZ., AND ..., SHALL BE SUBJECT TO AGREEMENT OBTAINED UNDER THE PROCEDURE SET FORTH IN ARTICLE 14 (SEE ALSO NO. 486). THE RADIATED POWER OF RADIOLOCATION STATIONS SHALL NOT EXCEED 50W. PULSE SYSTEMS ARE PROHIBITED.

488 IN THE FEDERAL REPUBLIC OF GERMANY, DENMARK, FINLAND, HUNGARY, IRELAND, ISRAEL, JORDAN, MALTA, NORWAY, POLAND, THE GERMAN DEMOCRATIC REPUBLIC, THE UNITED KINGDOM, SWEDEN, CZECHOSLOVAKIA, AND THE U.S.S.R., ADMINISTRATIONS MAY ALLOCATE UP TO 200 KHZ. TO THEIR AMATEUR SERVICE IN THE BANDS 1715-1800 KHZ. AND 1850-2000 KHZ. HOWEVER, WHEN ALLOCATING THE BANDS IN THIS RANGE TO THEIR AMATEUR SERVICE, ADMINISTRATIONS SHALL, AFTER PRIOR CONSULTATION WITH ADMINISTRATIONS OF NEIGHBOURING COUNTRIES, TAKE SUCH STEPS AS MAY BE NECESSARY TO PREVENT HARMFUL INTERFERENCE FROM THEIR AMATEUR SERVICE TO THE FIXED AND MOBILE SERVICES OF OTHER COUNTRIES. THE MEAN POWER OF ANY AMATEUR STATION SHALL NOT EXCEED 10W.

489 IN REGION 2, LORAN STATIONS OPERATING IN THE BAND 1800-2000 KHZ. SHALL CEASE OPERATION BY 31 DECEMBER 1982. IN REGION 3, THE LORAN SYSTEM OPERATES EITHER ON 1825 OR 1950 KHZ, THE BANDS OCCUPIED BEING 1825-1875 KHZ AND 1925-1975 KHZ RESPECTIVELY. OTHER SERVICES TO WHICH THE BAND 1800-2000 KHZ IS ALLOCATED MAY USE ANY FREQUENCY THEREIN ON CONDITION THAT NO HARMFUL INTERFERENCE IS CAUSED TO THE LORAN SYSTEM OPERATING ON 1850 KHZ OR 1950 KHZ.

490 ALTERNATIVE ALLOCATION: IN THE FEDERAL REPUBLIC OF GERMANY, ANGOLA, AUSTRIA, BELGIUM, BULGARIA, CAMEROON, THE CONGO, DENMARK, EGYPT, SPAIN, ETHIOPIA, FRANCE, GREECE, ITALY, THE LEBANON, LUXEMBOURG, MALAWI, THE NETHERLANDS, PORTUGAL, SYRIA, THE GERMAN DEMOCRATIC REPUBLIC, SOMALIA, TANZANIA, TUNISIA, TURKEY, AND THE U.S.S.R., THE BAND 1810-1830

KHZ. IS ALLOCATED TO THE FIXED AND MOBILE, EXCEPT AERONAUTICAL MOBILE, SERVICES ON A PRIMARY BASIS.

491 ADDITIONAL ALLOCATION: IN SAUDI ARABIA, IRAQ, ISRAEL, LIBYA, POLAND, ROUMANIA, CHAD, CZECHOSLOVAKIA, TOGO, AND YUGOSLAVIA, THE BAND 1810-1830 KHZ IS ALSO ALLOCATED TO THE FIXED AND MOBILE, EXCEPT AERONAUTICAL MOBILE, SERVICES ON A PRIMARY BASIS.

492 IN REGION 1, THE USE OF THE BAND 1810-1830 KHZ BY THE AMATEUR SERVICE IS SUBJECT TO THE CONDITION THAT SATISFACTORY REPLACEMENT ASSIGNMENTS HAVE BEEN FOUND AND IMPLEMENTED IN ACCORDANCE WITH RESOLUTION 38, FOR FREQUENCIES TO ALL EXISTING STATIONS OF THE FIXED AND MOBILE, EXCEPT AERONAUTICAL MOBILE, SERVICES OPERATING IN THIS BAND (EXCEPT FOR THE STATIONS OF THE COUNTRIES LISTED IN NOS. 490, 491 AND 493). ON COMPLETION OF SATISFACTORY TRANSFER, THE AUTHORISATION TO USE THE BAND 1810-1830 KHZ BY THE AMATEUR SERVICE IN COUNTRIES SITUATED TOTALLY OR PARTIALLY NORTH OF 40 DEGREES N SHALL BE GIVEN ONLY AFTER CONSULTATION WITH THE COUNTRIES MENTIONED IN NOS. 490 AND 491 TO DEFINE THE NECESSARY STEPS TO BE TAKEN TO PREVENT HARMFUL INTERFERENCE BETWEEN AMATEUR STATIONS AND STATIONS OF OTHER SERVICES OPERATING IN ACCORDANCE WITH NOS. 490 AND 491.

493 ALTERNATIVE ALLOCATION: IN BURUNDI AND LETHOSO, THE BAND 1810-1850 KHZ IS ALLOCATED TO THE FIXED AND MOBILE, EXCEPT AERONAUTICAL MOBILE, SERVICES ON A PRIMARY BASIS.

494 ALTERNATIVE ALLOCATION: IN ARGENTINA, BOLIVIA, CHILE, MEXICO, PARAGUAY, PERU, URUGUAY AND VENEZUELA, THE BAND 1850-2000 KHZ IS ALLOCATED TO THE FIXED AND MOBILE, EXCEPT AERONAUTICAL MOBILE, RADIOLOCATION AND RADIONAVIGATION SERVICES ON A PRIMARY BASIS.

495 IN REGION 1, IN MAKING ASSIGNMENTS TO STATIONS IN THE FIXED AND MOBILE SERVICES IN THE BANDS 1850-2045 KHZ ..., ADMINISTRATIONS SHOULD BEAR IN MIND THE SPECIAL REQUIREMENTS OF THE MARITIME MOBILE SERVICE.

## ALLOCATION TO SERVICES

REGION 1	REGION 2	REGION 3
3500 - 3800 AMATEUR 510 FIXED MOBILE EXCEPT AERONAUTICAL MOBILE 484	3500 - 3750 AMATEUR 510  509 511	3500 - 3900 AMATEUR 510 FIXED MOBILE
3800 - 3900 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	3750 - 4000 AMATEUR 510 FIXED MOBILE EXCEPT AERONAUTICAL MOBILE (R)  511 512 514 515	
3900 - 3950 AERONAUTICAL MOBILE (OR) 513		3900 - 3950 AERONAUTICAL MOBILE BROADCASTING
3950 - 4000 FIXED BROADCASTING		3950 - 4000 FIXED BROADCASTING  516

509 ADDITIONAL ALLOCATION: IN HONDURAS, MEXICO, PERU AND VENEZUELA, THE BAND 3500-3750 KHZ IS ALSO ALLOCATED TO THE FIXED AND MOBILE SERVICES ON A PRIMARY BASIS.

510 FOR THE USE OF THE BANDS ALLOCATED TO THE AMATEUR SERVICE AT 3.5 MHZ, 7.0 MHZ 10.1 MHZ, 14.0 MHZ, 18.068 MHZ, 21.0 MHZ, 24.89 MHZ AND 144 MHZ IN THE EVENT OF NATURAL DIS-

ASTERS, SEE RESOLUTION 640.

- 511 ADDITIONAL ALLOCATION: IN BRAZIL, THE BAND 3700-4000 KHZ IS ALSO ALLOCATED TO THE RADIOLOCATION SERVICE ON A PRIMARY BASIS.
- 512 ALTERNATIVE ALLOCATION: IN ARGENTINA, BOLIVIA, CHILE, ECUADOR, PARAGUAY, PERU AND URUGUAY, THE BAND 3750-4000 KHZ IS ALSO ALLOCATED TO THE FIXED AND MOBILE, EXCEPT AERONAUTICAL MOBILE, SERVICES ON PRIMARY BASIS.
- 513 ALTERNATIVE ALLOCATION: IN BOTSWANA, LESOTHO, MALAWI, MOZAMBIQUE, NAMIBIA, SOUTH AFRICA, SWAZILAND, ZAMBIA AND ZIMBABWE, THE BAND 3900-3950 KHZ IS ALLOCATED TO THE BROADCASTING SERVICE ON A PRIMARY BASIS. THE USE OF THIS BAND BY THE BROADCASTING SERVICE IS SUBJECT TO AGREEMENT OBTAINED UNDER THE PROCEDURE SET FORTH IN ARTICLE 14 WITH NEIGHBOURING COUNTRIES HAVING SERVICES OPERATING IN ACCORDANCE WITH THE TABLE.
- 514 ADDITIONAL ALLOCATION: IN CANADA, THE BAND 3950-4000 KHZ IS ALSO ALLOCATED TO THE BROADCASTING SERVICE ON A PRIMARY BASIS. THE POWER OF BROADCASTING STATIONS OPERATING IN THIS BAND SHOULD NOT EXCEED THAT NECESSARY FOR A NATIONAL SERVICE WITHIN THE FRONTIER OF THIS COUNTRY AND SHALL NOT CAUSE HARMFUL INTERFERENCE TO OTHER SERVICES OPERATING IN ACCORDANCE WITH THE TABLE.
- 515 ADDITIONAL ALLOCATION: IN GREENLAND, THE BAND 3850-4000 KHZ IS ALSO ALLOCATED TO THE BROADCASTING SERVICE ON A PRIMARY BASIS. THE POWER OF THE BROADCASTING STATIONS OPERATING IN THIS BAND SHOULD NOT EXCEED THAT NECESSARY FOR A NATIONAL SERVICE AND SHALL IN NO CASE EXCEED 5KW.
- 516 IN REGION 3, THE STATIONS OF THOSE SERVICES TO WHICH THE BAND 3995-4005 KHZ IS ALLOCATED MAY TRANSMIT STANDARD FREQUENCY AND TIME SIGNALS.

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 ALLOCATION TO SERVICES
 

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REGION 1	REGION 2	REGION 3
7100 - 7300	AMATEUR 510 AMATEUR SATELLITE 526 527	
7100 - 7300 BROADCASTING	7100 - 7300 AMATEUR 510 528	7100 - 7300 BROADCASTING

526 ADDITIONAL ALLOCATION: IN ANGOLA, IRAQ, KENYA, RWANDA, SOMALIA AND TOGO, THE BAND 7000-7050 KHZ IS ALSO ALLOCATED TO THE FIXED SERVICE ON A PRIMARY BASIS.

527 ALTERNATIVE ALLOCATION: IN EGYPT, ETHIOPIA, GUINEA, LIBYA, MADAGASCAR, MALAWI, AND TANZANIA, THE BAND 7000-7050 KHZ IS ALLOCATED TO THE FIXED SERVICE ON A PRIMARY BASIS.

528 THE USE OF THE BAND 7100-7300 KHZ IN REGION 2 BY THE AMATEUR SERVICE SHALL NOT IMPOSE CONSTRAINTS ON THE BROADCASTING SERVICE INTENDED FOR USE WITHIN REGION 1 AND REGION 3.

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 ALLOCATION TO SERVICES
 

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REGION 1			REGION 2	REGION 3
10	100-10	150	FIXED AMATEUR 510	
14	000-14	250	AMATEUR 510 AMATEUR- SATELLITE	
14	250-14	350	AMATEUR 510 535	

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535 ADDITIONAL ALLOCATION: IN AFGANISTAN, CHINA, THE IVORY COAST, IRAN AND THE U.S.S.R., THE BAND 14250-14350 KHZ IS ALSO ALLOCATED TO THE FIXED SERVICE ON A PRIMARY BASIS. STATIONS OF THE FIXED SERVICE SHALL NOT USE A RADIATED POWER EXCEEDING 24 dBW.

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 ALLOCATION TO SERVICES
 

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REGION 1			REGION 2	REGION 3
18	068-18	168	AMATEUR 510 AMATEUR SATELLITE 537 539	

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537 THE BAND 18068-18168 KHZ IS ALLOCATED TO THE FIXED SERVICE ON A PRIMARY BASIS SUBJECT TO THE PROCEDURE DESCRIBED IN RESOLUTION 8. THE USE OF THIS BAND BY THE AMATEUR AND AMATEUR-SATELLITE SERVICES SHALL BE SUBJECT TO THE COMPLETION OF SATISFACTORY TRANSFER OF ALL ASSIGNMENTS TO STATIONS IN THE FIXED SERVICE OPERATING IN THIS BAND AND RECORDED IN THE MASTER REGISTER, IN ACCORDANCE WITH THE PROCEDURE DESCRIBED IN RESOLUTION 8.

538 ADDITIONAL ALLOCATION: IN THE U.S.S.R., THE BAND 18068-18168 KHZ IS ALSO ALLOCATED THE THE FIXED SERVICE ON A PRIMARY BASIS FOR USE WITHIN THE BOUNDARY OF THE U.S.S.R. WITH A PEAK ENVELOPE POWER NOT EXCEEDING 1 KW.

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ALLOCATION TO SERVICES

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REGION 1	REGION 2	REGION 3
21 000-21 450	AMATEUR 510 AMATEUR- SATELLITE	
24 890-24 990	AMATEUR 510 AMATEUR- SATELLITE 542 543	
28 000-29 700	AMATEUR AMATEUR- SATELLITE	

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542 ADDITIONAL ALLOCATION: IN KENYA, THE BAND 23600-24900 KHZ IS ALSO ALLOCATED TO THE METEOROLOGICAL AIDS SERVICE (RADIOSONDES) ON A PRIMARY BASIS.

543 THE BAND 24890-24990 KHZ IS ALLOCATED TO THE FIXED AND LAND MOBILE SERVICES ON A PRIMARY BASIS SUBJECT TO THE PROCEDURE DESCRIBED IN RESOLUTION 8. THE USE OF THIS BAND BY THE AMATEUR AND AMATEUR-SATELLITE SERVICES SHALL BE SUBJECT TO THE COMPLETION OF SATISFACTORY TRANSFER OF ALL ASSIGNMENTS TO FIXED AND LAND MOBILE STATIONS OPERATING IN THIS BAND AND RECORDED IN THE MASTER REGISTER, IN ACCORDANCE WITH THE PROCEDURE DESCRIBED IN RESOLUTION 8.



## (EXTRACT FROM INTERNATIONAL FREQUENCY LIST)

## SYMBOLS DESIGNATING COUNTRIES OR GEOGRAPHICAL AREAS

Meanings of the symbols used in Columns 4b and 5a of the International Frequency List

**NB.:** The symbols have a geographical significance only. The presence of any given symbol designating a country or a geographical area with respect to a frequency assignment to a station is without prejudice to any question of territorial status which may be involved.

Symbol	Name of the country or geographical area	Symbol	Name of the country or geographical area
AAA	Shared throughout the world	CKN	Cook Islands (Northern Group)
AAB	Shared by several countries, but in a restricted area of the world	CLM	Colombia (Republic of)
ADL	Adelie Land	CLN	Sri Lanka (Democratic Socialist Republic of)
AFG	Afghanistan (Democratic Republic of)	CME	Cameroon (United Republic of)
AFS	South Africa (Republic of) <sup>1</sup>	CNR	Canaries
AGL	Angola (People's Republic of)	COG	Congo (People's Republic of the)
ALB	Albania (Socialist People's Republic of)	COM	Comoros (Federal and Islamic Republic of the)
ALG	Algeria (Algerian Democratic and Popular Republic)	CPV	Cape Verde (Republic of)
ALS	Alaska (State of), United States of America	CRO	Crozet Archipelago
AMS	S Paul and Amsterdam Islands	CTI	Ivory Coast (Republic of the)
AND	Andorra	CTR	Costa Rica
AOE	Spanish Saharian Territory	CUB	Cuba
ARG	Argentine Republic	CVA	Vatican City State
ARS	Saudi Arabia (Kingdom of)	CYP	Cyprus (Republic of)
ASC	Ascension		
ATN	Netherlands Antilles	D	Germany (Federal Republic of)
AUS	Australia	DDR	German Democratic Republic
AUT	Austria	DJI	Djibouti (Republic of)
AZR	Azores	DNK	Denmark
		DOM	Dominican Republic
B	Brazil (Federative Republic of)		
BAH	Bahamas (Commonwealth of the)	E	Spain
BDI	Burundi (Republic of)	ECD	Communication-satellite space station(s) for use by the Administration or Administrations whose names appear in Column 12b
BEL	Belgium	ECE	
BEN	Benin (People's Republic of)	ECF	
BER	Bermuda	ECH	
BGD	Bangladesh	ECI	
BHR	Bahrain (State of)	ECJ	Egypt (Arab Republic of)
BIO	British Indian Ocean Territory	ECL	
BLR	Byelorussian Soviet Socialist Republic	EGY	
BOL	Bolivia (Republic of)	EHC	Space research space station(s) for use by the Administration or Administrations whose names appear in Column 12b
BOT	Botswana Republic	EHE	
BRB	Barbados	EHF	
BRM	Burma (Socialist Republic of the Union of)	EHK	
BRU	Brunei	EHM	
BUL	Bulgaria (People's Republic of)	EHR	Meteorological-satellite space station(s) for use by the Administration or Administrations whose names appear in Column 12b
		EHT	
CAF	Central African Empire	EMA	
CAN	Canada	EMC	
CAR	Caroline Islands	ENA	Radionavigation-satellite space station(s) for use by the Administration or Administrations whose names appear in Column 12b
CBG	Democratic Kampuchea		
CHL	Chile (except Easter Island)		
CHN	China (People's Republic of)		
CHR	Christmas Island (Indian Ocean)		
CKH	Cook Islands		
		EQA	Ecuador
		ETH	Ethiopia

<sup>1</sup> See I.T.U. Administrative Council Resolution No. 619 (22nd Session, 1967)

Symbol	Name of the country or geographical area	Symbol	Name of the country or geographical area
F	France	KEN	Kenya (Republic of)
FJI	Fiji	KER	Kerguelen Islands
FLK	Falkland Islands and Dependencies <sup>1</sup>	KOR	Korea (Republic of)
FNL	Finland	KRE	Korea (Democratic People's Republic of)
		KWT	Kuwait (State of)
G	United Kingdom of Great Britain and Northern Ireland		
GAB	Gabon Republic	LAO	Lao People's Democratic Republic
GCA	Territories in the United Kingdom in Region 1	LBN	Lebanon
GCB	Territories in the United Kingdom in Region 2	LBR	Liberia (Republic of)
GCC	Territories in the United Kingdom in Region 3	LBY	Libya (Socialist People's Libyan Arab Jamahiriya)
GDL	Guadeloupe (French Department of)	LIE	Liechtenstein
GHA	Ghana	LSO	Lesotho (Kingdom of)
GIB	Gibraltar	LUX	Luxembourg
GIL	Gilbert Islands		
GMB	Gambia (Republic of the)	MAC	Macao
GNB	Guinea-Bissau (Republic of)	MAU	Mauritius
GNE	Equatorial Guinea (Republic of)	MCO	Monaco
GRC	Greece	MCS	Marcus Island
GRL	Greenland	MDG	Madagascar (Democratic Republic of)
GTM	Guatemala (Republic of)	MDR	Madeira
GUB	Guyana	MDW	Midway Islands
GUF	Guyana (French Department of)	MEX	Mexico
GUI	Guinea (People's Revolutionary Republic of)	MLA	Malaysia
GUM	Guam	MLD	Maldives (Republic of)
		MLI	Mali (Republic of)
HKG	Hongkong	MLT	Malta (Republic of)
HNB	Belize	MNG	Mongolian People's Republic
HND	Honduras (Republic of)	MOZ	Mozambique (People's Republic of)
HNG	Hungarian People's Republic	MRA	Mariana Islands
HOL	Netherlands (Kingdom of the)	MRC	Morocco (Kingdom of)
HTI	Haiti (Republic of)	MRL	Marshall Islands
HVO	Upper Volta (Republic of)	MRN	Marion Island
HWA	Hawaii (State of), United States of America	MRT	Martinique (French Department of)
HWL	Howland Island	MTN	Mauritania (Islamic Republic of)
		MWI	Malawi
I	Italy	MYT	Mayotte Island
ICO	Cocos Keeling Islands		
IND	India (Republic of)	NCG	Nicaragua
INS	Indonesia (Republic of)	NCL	New Caledonia and Dependencies
IOB	British West Indies	NGR	Niger (Republic of the)
IRL	Ireland	NHB	New Hebrides (British-French Condominium)
IRN	Iran	NIG	Nigeria (Federal Republic of)
IRQ	Iraq (Republic of)	NIU	Niue Island
ISL	Iceland	NMB	Namibia
ISR	Israel (State of)	NOR	Norway
IWA	Iwo Jima	NPL	Nepal
		NRU	Nauru Island
J	Japan	NZL	New Zealand
JAR	Jarvis Island		
JMC	Jamaica	OCE	French Polynesia
JON	Johnston Island	OMA	Oman (Sultanate of)
JOR	Jordan (Hashemite Kingdom of)	ONC	Stations of the "United Nations Military Observer Group in India and Pakistan"
		ONJ	Stations of the "United Nations Truce Supervision Organization in areas between the Armistice Demarcation Lines at Jerusalem"

<sup>1</sup> As regards jurisdiction over the Falkland (Malvinas) Islands and certain other territories, see the statement by the Argentine Republic (paragraph V of the Final Protocol to the International Telecommunication Convention, Montreux, 1965) and that by the United Kingdom of Great Britain and Northern Ireland (paragraph L of that Protocol)

Symbol	Name of the country or geographical area	Symbol	Name of the country or geographical area
PAK	Pakistan (Islamic Republic of)	SWN	Swan Island
PAQ	Easter Island, Chile	SWZ	Swaziland (Kingdom of)
PHL	Philippines (Republic of the)	SYR	Syrian Arab Republic
PHX	Phoenix Islands	TCD	Chad (Republic of the)
PLM	Palmyra Island	TCH	<del>Czechoslovak Socialist Republic</del>
<del>PNG</del>	<del>Papua New Guinea</del>	TGK	Tanzania (United Republic of) (Tanganyika)
PNR	Panama (Republic of)	TGO	Togolese Republic
PNZ	Panama Canal Zone	THA	Thailand
POL	Poland (People's Republic of)	TKL	Tokelau Islands
POR	Portugal	TMP	Portuguese Timor
PRG	Paraguay (Republic of)	TON	Tonga (Kingdom of)
PRU	Peru	TRC	Tristan da Cunha (Station of the Republic of South Africa)
PTC	Pitcairn Island	TRD	Trinidad and Tobago
PTR	Puerto Rico	TUN	Tunisia
QAT	Qatar (State of)	TUR	Turkey
REU	Reunion (French Department of)	TUV	Tuvalu
RHS	Rhodesia <sup>a</sup>	UAE	United Arab Emirates
ROD	Rodriguez	UGA	Uganda (Republic of)
ROU	Roumania (Socialist Republic of)	UKR	Ukrainian Soviet Socialist Republic
RRW	Rwanda (Republic of)	URG	Uruguay (Oriental Republic of)
RYU	Ryu Kyu Islands	URS	Union of Soviet Socialist Republics
S	Sweden	USA	The 48 contiguous States of the United States of America (excluding the States of Alaska and Hawaii)
SDN	Sudan (Democratic Republic of the)	VEN	Venezuela (Republic of)
SEN	Senegal (Republic of the)	VIR	Virgin Islands
SEY	Seychelles (Republic of)	VTN	Viet-Nam (Socialist Republic of)
SHN	S. Helena	WAK	Wake Island
SLM	Solomon Islands	WAL	Wallis and Futuna Islands
SLV	El Salvador (Republic of)	YEM	Yemen Arab Republic
SMA	American Samoa	YMS	Yemen (People's Democratic Republic of)
SMO	Western Samoa	YUG	Yugoslavia (Socialist Federal Republic of)
SMR	San Marino (Republic of)	ZAI	Zaire (Republic of)
SNG	Singapore (Republic of)	ZAN	Tanzania (United Republic of) (Zanzibar)
SOM	Somali Democratic Republic	ZMB	Zambia (Republic of)
SPM	S. Pierre and Miquelon		
SRL	Sierra Leone		
STP	Sao Thome and Principe (Democratic Republic of)		
SUI	Switzerland (Confederation of)		
SUR	Suriname (Republic of)		

<sup>a</sup> See I.T.U. Administrative Council Resolution No. 676, 25th Session, 1970

COMPUTER ANALYSIS OF RTTY BIT PATTERNS

- (1) "QST" JULY 1984 - K3RH

NOTE: WRITTEN FOR "APPLE" AND "COMMODORE 64" IN BASIC AND MACHINE CODE.

- (2) ELECTRONICS AND WIRELESS WORLD - JANUARY 1986

NOTE: THIS IS A "HOW TO WRITE YOUR OWN PROGRAM" TYPE OF ARTICLE.

- (3) COMPUTER - SIMPLE INTERFACE FOR RTTY, FAX, CW

AUSTRALIAN ELECTRONICS MONTHLY, JULY 1985 - VK7RH

NOTE: INCLUDES PROGRAM, CIRCUITS AND P.C.B. DIAGRAM.

## EXTRACT FROM THE RADIO REGULATIONS

## APPENDIX 6

**Additional Characteristics for the Classification of Emissions;  
Determination of Necessary Bandwidths Including  
Examples for their Calculation and Associated  
Examples for the Designation of Emissions**

**(See Appendix 6.7 "EMISSION")**

**PART A****Additional Characteristics for the Classification of Emissions**

Article 4 of these Regulations describes the basic characteristics, with three symbols, for the classification of emissions. For a more complete description of an emission, two optional additional characteristics should be added.

The optional additional characteristics (see also Recommendation 62) are:

*Fourth symbol* – Details of signal(s)

*Fifth symbol* – Nature of multiplexing

Where the fourth or the fifth symbol is not used this should be indicated by a dash where each symbol would otherwise appear.

**1. *Fourth symbol* – Details of signal(s)**

1.1 Two-condition code with elements of differing numbers  
and/or durations

**A**

1.2 Two-condition code with elements of the same number and  
duration without error-correction

**B**

1.3 Two-condition code with elements of the same number and  
duration with error-correction

**C**

## AP6-2

1.4	Four-condition code in which each condition represents a signal element (of one or more bits)	D
1.5	Multi-condition code in which each condition represents a signal element (of one or more bits)	E
1.6	Multi-condition code in which each condition or combination of conditions represents a character	F
1.7	Sound of broadcasting quality (monophonic)	G
1.8	Sound of broadcasting quality (stereophonic or quadraphonic)	H
1.9	Sound of commercial quality (excluding categories given in sub-paragraphs 1.10 and 1.11)	J
1.10	Sound of commercial quality with the use of frequency inversion or band-splitting	K
1.11	Sound of commercial quality with separate frequency-modulated signals to control the level of demodulated signal	L
1.12	Monochrome	M
1.13	Colour	N
1.14	Combination of the above	W
1.15	Cases not otherwise covered	X
2.	<i>Fifth symbol</i> – Nature of multiplexing	
2.1	None	N
2.2	Code-division multiplex*	C
2.3	Frequency-division multiplex	F

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\* This includes bandwidth expansion techniques.

AP6-3

2.4	Time-division multiplex	T
2.5	Combination of frequency-division multiplex and time-division multiplex	W
2.6	Other types of multiplexing	X

## PART B

### **Determination of Necessary Bandwidths Including Examples for their Calculation and Associated Examples for the Designation of Emissions**

For the full designation of an emission, the necessary bandwidth, indicated in four characters, shall be added just before the classification symbols. When used, the necessary bandwidth shall be determined by one of the following methods:

- 1) use of the formulae included in the following table which also gives examples of necessary bandwidths and designation of corresponding emissions;
- 2) computation in accordance with CCIR Recommendations<sup>1</sup>;
- 3) measurement, in cases not covered by 1) or 2) above.

However, the necessary bandwidth so determined is not the only characteristic of an emission to be considered in evaluating the interference that may be caused by that emission.

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<sup>1</sup> See also Recommendation 63.

## AP6-4

In the formulation of the table, the following terms have been employed:

- $B_n$  = Necessary bandwidth in hertz
- $B$  = Modulation rate in bauds
- $N$  = Maximum possible number of black plus white elements to be transmitted per second, in facsimile
- $M$  = Maximum modulation frequency in hertz
- $C$  = Sub-carrier frequency in hertz
- $D$  = Peak deviation, i.e., half the difference between the maximum and minimum values of the instantaneous frequency. The instantaneous frequency in hertz is the time rate of change in phase in radians divided by  $2\pi$
- $t$  = Pulse duration in seconds at half-amplitude
- $t_r$  = Pulse rise time in seconds between 10% and 90% amplitude
- $K$  = An overall numerical factor which varies according to the emission and which depends upon the allowable signal distortion
- $N_c$  = Number of baseband channels in radio systems employing multi-channel multiplexing
- $f_p$  = Continuity pilot sub-carrier frequency (Hz) (continuous signal utilized to verify performance of frequency-division multiplex systems).



## AP6-5

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
I. NO MODULATING SIGNAL			
Continuous wave emission	—	—	NONE
II. AMPLITUDE MODULATION			
1. Signal with Quantized or Digital Information			
Continuous wave telegraphy, Morse code	$B_n = BK$ $K = 5$ for fading circuits $K = 3$ for non-fading circuits	25 words per minute; $B = 20, K = 5$ Bandwidth: 100 Hz	100HA1AAN
Telegraphy by on-off keying of a tone modulated carrier, Morse code	$B_n = BK + 2M$ $K = 5$ for fading circuits $K = 3$ for non-fading circuits	25 words per minute; $B = 20, M = 1\ 000$ $K = 5$ Bandwidth: 2 100 Hz = 2.1 kHz	2K10A2AAN
Selective calling signal using sequential single frequency code, single-sideband full carrier	$B_n = M$	Maximum code frequency is: 2 110 Hz $M = 2\ 110$ Bandwidth: 2 110 Hz = 2.11 kHz	2K11H2BFN
Direct-printing telegraphy using a frequency shifted modulating sub-carrier, with error-correction, single-sideband, suppressed carrier (single channel)	$B_n = 2M + 2DK$ $M = \frac{B}{2}$	$B = 50$ $D = 35$ Hz (70 Hz shift) $K = 1.2$ Bandwidth: 134 Hz	134HJ2BCN

## AP6-6

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Telegraphy, multi-channel with voice frequency, error-correction, some channels are time-division multiplexed, single-sideband, reduced carrier	$B_n = \text{highest central frequency} + M + DK$ $M = \frac{B}{2}$	15 channels; highest central frequency is: 2 805 Hz $B = 100$ $D = 42.5$ Hz (85 Hz shift) $K = 0.7$ Bandwidth: 2 885 Hz = 2.885 kHz	2K89R7BCW
2. Telephony (Commercial Quality)			
Telephony, double-sideband (single channel)	$B_n = 2M$	$M = 3\,000$ Bandwidth: 6 000 Hz = 6 kHz	6K00A3EJN
Telephony, single-sideband, full carrier (single channel)	$B_n = M$	$M = 3\,000$ Bandwidth: 3 000 Hz = 3 kHz	3K00H3EJN
Telephony, single-sideband, suppressed carrier (single channel)	$B_n = M - \text{lowest modulation frequency}$	$M = 3\,000$ lowest modulation frequency is 300 Hz Bandwidth: 2 700 Hz = 2.7 kHz	2K70J3EJN
Telephony with separate frequency modulated signal to control the level of demodulated speech signal, single-sideband, reduced carrier (Lincompex) (single channel)	$B_n = M$	Maximum control frequency is 2 990 Hz $M = 2\,990$ Bandwidth: 2 990 Hz = 2.99 kHz	2K99R3ELN
Telephony with privacy, single-sideband, suppressed carrier (two or more channels)	$B_n = N_c M - \text{lowest modulation frequency in the lowest channel}$	$N_c = 2$ $M = 3\,000$ lowest modulation frequency is 250 Hz Bandwidth: 5 750 Hz = 5.75 kHz	5K75J8EKF

## AP6-7

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Telephony, independent sideband (two or more channels)	$B_n = \text{sum of } M \text{ for each sideband}$	2 channels $M = 3\,000$ Bandwidth: 6 000 Hz = 6 kHz	6K00B8EJN
3. Sound Broadcasting			
Sound broadcasting, double-sideband	$B_n = 2M$ $M$ may vary between 4 000 and 10 000 depending on the quality desired	Speech and music, $M = 4\,000$ Bandwidth: 8 000 Hz = 8 kHz	8K00A3EGN
Sound broadcasting, single-sideband, reduced carrier (single channel)	$B_n = M$ $M$ may vary between 4 000 and 10 000 depending on the quality desired	Speech and music, $M = 4\,000$ Bandwidth: 4 000 Hz = 4 kHz	4K00R3EGN
Sound broadcasting, single-sideband, suppressed carrier	$B_n = M - \text{lowest modulation frequency}$	Speech and music, $M = 4\,500$ lowest modulation frequency = 50 Hz; Bandwidth: 4 450 Hz = 4.45 kHz	4K45J3EGN
4. Television			
Television, vision and sound	Refer to relevant CCIR documents for the bandwidths of the commonly used television systems	Number of lines = 625; Nominal video bandwidth: 5 MHz Sound carrier relative to video carrier = 5.5 MHz; Total vision bandwidth: 6.25 MHz; FM sound bandwidth including guardbands: 750 kHz RF channel bandwidth: 7 MHz	6M25C3F --  750KF3EGN

## AP6-8

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
5. Facsimile			
Analogue facsimile by sub-carrier frequency modulation of a single-sideband emission with reduced carrier, monochrome	$B_n = C + \frac{N}{2} + DK$ $K = 1.1$ (typically)	$N = 1\ 100$ corresponding to an index of cooperation of 352 and a cyler rotation speed of 60 rpm. Index of cooperation is the product of the drum diameter and number of lines per unit length. $C = 1\ 900$ $D = 400$ Hz Bandwidth: 2 890 Hz = 2.89 kHz	2K89R3CMN
Analogue facsimile; frequency modulation of an audio frequency sub-carrier which modulates the main carrier, single-sideband suppressed carrier	$B_n = 2M + 2DK$ $M = \frac{N}{2}$ $K = 1.1$ (typically)	$N = 1\ 100$ $D = 400$ Hz Bandwidth: 1 980 Hz = 1.98 kHz	1K98J3C --
6. Composite Emissions			
Double-sideband, television relay	$B_n = 2C + 2M + 2D$	Video limited to 5 MHz, audio on 6.5 MHz frequency modulated sub-carrier, sub-carrier deviation = 50 kHz: $C = 6.5 \times 10^6$ $D = 50 \times 10^3$ Hz $M = 15\ 000$ Bandwidth: $13.13 \times 10^6$ Hz = 13.13 MHz	13M1A8W --

## AP6-9

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Double-sideband radio-relay system, frequency division multiplex	$B_n = 2M$	10 voice channels occupying baseband between 1 kHz and 164 kHz; $M = 164\ 000$ Bandwidth: 328 000 Hz = 328 kHz	328KA8E --
Double-sideband emission of VOR with voice (VOR = VHF omnidirectional radio range)	$B_n = 2C_{max} + 2M + 2DK$ $K = 1$ (typically)	The main carrier is modulated by: – a 30 Hz sub-carrier – a carrier resulting from a 9 960 Hz tone frequency modulated by a 30 Hz tone – a telephone channel – a 1 020 Hz keyed tone for continual Morse identification. $C_{max} = 9\ 960$ $M = 30$ $D = 480\text{ Hz}$ Bandwidth: 20 940 Hz = 20.94 kHz	20K9A9WWF
Independent sidebands; several telegraph channels with error-correction together with several telephone channels with privacy; frequency division multiplex	$B_n = \text{sum of } M \text{ for each sideband}$	Normally composite systems are operated in accordance with standardized channel arrangements (e.g. CCIR Rec. 348-2). 3 telephone channels and 15 telegraphy channels require the bandwidth 12 000 Hz = 12 kHz	12K0B9WWF

## AP6-10

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
III-A. FREQUENCY MODULATION			
1. Signal with Quantized or Digital Information			
Telegraphy without error-correction (single channel)	$B_n = 2M + 2DK$ $M = \frac{B}{2}$ $K = 1.2$ (typically)	$B = 100$ $D = 85 \text{ Hz}$ (170 Hz shift) Bandwidth: 304 Hz	304HF1BBN
Telegraphy, narrow-band direct-printing with error-correction (single channel)	$B_n = 2M + 2DK$ $M = \frac{B}{2}$ $K = 1.2$ (typically)	$B = 100$ $D = 85 \text{ Hz}$ (170 Hz shift) Bandwidth: 304 Hz	304HF1BCN
Selective calling signal	$B_n = 2M + 2DK$ $M = \frac{B}{2}$ $K = 1.2$ (typically)	$B = 100$ $D = 85 \text{ Hz}$ (170 Hz shift) Bandwidth: 304 Hz	304HF1BCN
Four-frequency duplex telegraphy	$B_n = 2M + 2DK$ $B =$ Modulation rate in bauds of the faster channel. If the channels are synchronized: $M = \frac{B}{2}$ (otherwise $M = 2B$ ) $K = 1.1$ (typically)	Spacing between adjacent frequencies = 400 Hz; Synchronized channels $B = 100$ $M = 50$ $D = 600 \text{ Hz}$ Bandwidth: 1 420 Hz = 1.42 kHz	1K42F7BDX
2. Telephony (Commercial Quality)			
Commercial telephony	$B_n = 2M + 2DK$ $K = 1$ (typically, but under certain conditions a higher value may be necessary)	For an average case of commercial telephony, $D = 5\,000 \text{ Hz}$ $M = 3\,000$ Bandwidth: 16 000 Hz = 16 kHz	16K0F3EJN

## AP6-11

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
3. Sound Broadcasting			
Sound broadcasting	$B_n = 2M + 2DK$ $K = 1$ (typically)	Monaural $D = 75\,000\text{ Hz}$ $M = 15\,000$ Bandwidth: $180\,000\text{ Hz}$ $= 180\text{ kHz}$	180KF3EGN
4. Facsimile			
Facsimile by direct frequency modulation of the carrier; black and white	$B_n = 2M + 2DK$ $M = \frac{N}{2}$ $K = 1.1$ (typically)	$N = 1\,100\text{ elements/sec;}$ $D = 400\text{ Hz}$ Bandwidth: $1\,980\text{ Hz}$ $= 1.98\text{ kHz}$	1K98F1C --
Analogue facsimile	$B_n = 2M + 2DK$ $M = \frac{N}{2}$ $K = 1.1$ (typically)	$N = 1\,100\text{ elements/sec;}$ $D = 400\text{ Hz}$ Bandwidth: $1\,980\text{ Hz}$ $= 1.98\text{ kHz}$	1K98F3C --
5. Composite Emissions (see Table III-B)			
Radio-relay system, frequency division multiplex	$B_n = 2f_p + 2DK$ $K = 1$ (typically)	60 telephone channels occupying baseband between 60 kHz and 300 kHz; rms per-channel deviation: 200 kHz; continuity pilot at 331 kHz produces 100 kHz rms deviation of main carrier. $D = 200 \times 10^3 \times 3.76 \times 2.02 = 1.52 \times 10^6\text{ Hz;}$ $f_p = 0.331 \times 10^6\text{ Hz;}$ Bandwidth: $3.702 \times 10^6\text{ Hz}$ $= 3.702\text{ MHz}$	3M70F8EJF

## AP6-12

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
Radio-relay system, frequency division multiplex	$B_n = 2M + 2DK$ $K = 1$ (typically)	960 telephone channels occupying baseband between 60 kHz and 4 028 kHz; rms per-channel deviation: 200 kHz; continuity pilot at 4 715 kHz produces 140 kHz rms deviation of main carrier. $D = 200 \times 10^3 \times 3.76 \times 5.5 = 4.13 \times 10^6 \text{ Hz};$ $M = 4.028 \times 10^6;$ $f_p = 4.715 \times 10^6;$ $(2M + 2DK) > 2f_p$ Bandwidth: $16.32 \times 10^6 \text{ Hz}$ $= 16.32 \text{ MHz}$	16M3F8EJF
Radio-relay system, frequency division multiplex	$B_n = 2f_p$	600 telephone channels occupying baseband between 60 kHz and 2 540 kHz; rms per-channel deviation: 200 kHz; continuity pilot at 8 500 kHz produces 140 kHz rms deviation of main carrier. $D = 200 \times 10^3 \times 3.76 \times 4.36 = 3.28 \times 10^6 \text{ Hz};$ $M = 2.54 \times 10^6;$ $K = 1;$ $f_p = 8.5 \times 10^6;$ $(2M + 2DK) < 2f_p$ Bandwidth: $17 \times 10^6 \text{ Hz}$ $= 17 \text{ MHz}$	17M0F8EJF
Stereophonic sound broadcasting with multiplexed subsidiary telephony sub-carrier	$B_n = 2M + 2DK$ $K = 1$ (typically)	Pilot tone system; $M = 75\,000$ $D = 75\,000 \text{ Hz}$ Bandwidth: $300\,000 \text{ Hz}$ $= 300 \text{ kHz}$	300KF8EHF



### III-B. MULTIPLYING FACTORS FOR USE IN COMPUTING $D$ , PEAK FREQUENCY DEVIATION, IN FM FREQUENCY DIVISION MULTIPLEX (FM/FDM) MULTI-CHANNEL EMISSIONS

For FM/FDM systems the necessary bandwidth is:

$$B_n = 2M + 2DK$$

The value of  $D$ , or peak frequency deviation, in these formulae for  $B_n$  is calculated by multiplying the rms value of per-channel deviation by the appropriate "Multiplying factor" shown below.

In the case where a continuity pilot of frequency  $f_p$  exists above the maximum modulation frequency  $M$ , the general formula becomes:

$$B_n = 2f_p + 2DK$$

In the case where the modulation index of the main carrier produced by the pilot is less than 0.25, and the rms frequency deviation of the main carrier produced by the pilot is less than or equal to 70% of the rms value of per-channel deviation, the general formula becomes either

$$B_n = 2f_p \quad \text{or} \quad B_n = 2M + 2DK$$

whichever is greater.

Number of telephone channels $N_c$	Multiplying factor <sup>1</sup>	
	(peak factor) x antilog	$\left[ \frac{\text{value in dB above modulation reference level}}{20} \right]$
$3 < N_c < 12$	4.47 x antilog	$\left[ \frac{\text{a value in dB specified by the equipment manufacturer or station licensee, subject to administration approval}}{20} \right]$
$12 \leq N_c < 60$	3.76 x antilog	$\left[ \frac{2.6 + 2 \log N_c}{20} \right]$

<sup>1</sup> In the above chart, the multipliers 3.76 and 4.47 correspond to peak factors of 11.5 dB and 13.0 dB, respectively.

## AP6-14

Number of telephone channels $N_c$	Multiplying factor <sup>1</sup>	
	(peak factor) x antilog	$\left[ \frac{\text{value in dB above modulation reference level}}{20} \right]$
$60 \leq N_c < 240$	3.76 x antilog	$\left[ \frac{-1 + 4 \log N_c}{20} \right]$
$N_c \geq 240$	3.76 x antilog	$\left[ \frac{-15 + 10 \log N_c}{20} \right]$

<sup>1</sup> In the above chart, the multiplier 3.76 corresponds to a peak factor of 11.5 dB.

## AP6-15

Description of Emission	Necessary Bandwidth		Designation of Emission
	Formula	Sample Calculation	
IV. PULSE MODULATION			
1. Radar			
Unmodulated pulse emission	$B_n = \frac{2K}{t}$ <p><math>K</math> depends upon the ratio of pulse duration to pulse rise time. Its value usually falls between 1 and 10 and in many cases it does not need to exceed 6</p>	<p>Primary Radar Range resolution: 150 m <math>K = 1.5</math> (triangular pulse where <math>t \propto t_r</math>, only components down to 27 dB from the strongest are considered)</p> $\text{Then } t = \frac{2 \times (\text{range resolution})}{\text{velocity of light}}$ $= \frac{2 \times 150}{3 \times 10^8}$ $= 1 \times 10^{-6} \text{ seconds}$ <p>Bandwidth: <math>3 \times 10^6 \text{ Hz}</math> <math>= 3 \text{ MHz}</math></p>	3M00P0NAN
2. Composite Emissions			
Radio-relay system	$B_n = \frac{2K}{t}$ <p><math>K = 1.6</math></p>	<p>Pulse position modulated by 36 voice channel baseband; pulse width at half amplitude = <math>0.4 \mu\text{s}</math> Bandwidth: <math>8 \times 10^6 \text{ Hz}</math> <math>= 8 \text{ MHz}</math> (Bandwidth independent of the number of voice channels)</p>	8M00M7EJT

AAP	-	AUSTRALIA	KCNA	-	KOREA
BAKHAR	-	AFGANISTAN	KUNA	-	KUWAIT
ATA	-	ALBANIA	KPL	-	LAOS
APS	-	ALGERIA	JANA	-	LIBYA
ANGOP	-	ANGOLA	AP	-	LONDON
ANS	-	ARGENTINA	LPS	-	LONDON
DYN	-	ARGENTINA	REUTERS	-	LONDON
SAPORITI	-	ARGENTINA	ANSAMEX	-	MEXICO
NA	-	ARGENTINA	INFORMEX	-	MEXICO
TELAM	-	ARGENTINA	MONTSAME	-	MONGOLIA
BSS	-	BANGLADESH	MAP	-	MORROCCO
BTA	-	BULGARIA	APN	-	MOSCOW
ADN	-	BERLIN	TASS	-	MOSCOW
ZINHUA	-	CHINA	AIM	-	MOZAMBIQUE
PL	-	CUBA	NAN	-	NIGERIA
CETEKKA	-	CZECHOSLOVAKIA	ROGALAND R	-	NORWAY
MENA	-	EGYPT	PAP	-	POLAND
AFP	-	FRANCE	ATCC	-	PYONGYANG
ATE	-	GREECE	AGERPRES	-	ROMANIA
ATHENS R	-	GREECE	PANA	-	SENEGAL
GNA	-	GHANA	SUNA	-	SUDAN
DPA	-	HAMBURG	BERNE R	-	SWITZERLAND
MTI	-	HUNGARY	SANA	-	SYRIA
INFOIND	-	INDIA	SPA	-	SAUDI ARABIA
SAMACHAR	-	INDIA	IINA	-	SAUDI ARABIA
PTI	-	INDIA	YONHAP	-	SEOUL
ANTARA	-	INDONESIA	BONN PRESS	-	SINGAPORE
OANA	-	INDONESIA	CNA	-	TAIWAN
IRNA	-	IRAN	TAP	-	TUNISIA
INA	-	IRAQ	AA	-	TURKEY
ANSA	-	ITALY	VOA	-	USA
JIJI	-	JAPAN	UPI	-	USA
KYODO	-	JAPAN	USIA	-	USA
JPS	-	JAPAN	VNA	-	VIETNAM
JNA	-	JORDON	ANA	-	YEMEN
PETRA	-	JORDON	TANJUG	-	YUGOSALVIA
SPK	-	KAMPUCHEA	AZAP	-	ZAIRE
			ZIANA	-	ZAMBIA
			GNA	-	BAHRAIN

RECOMMENDED PUBLICATIONS

THE FOLLOWING PUBLICATIONS ARE RECOMMENDED REFERENCE MATERIAL  
FOR MONITORING SYSTEM PERSONNEL.

I.T.U. CONVENTION - NAIROBI 1982	(1) (2) (5)
RADIO REGULATION OF GENEVA 1979	(1) (2) (5)
KLINGENFUSS RADIOTELETYPE CODE MANUAL	(3) (5)
WORLD RADIO T.V. HANDBOOK	(4) (5)
C.C.I.R. HANDBOOK FOR MONITORING STATIONS	(1) (5)

THE BOOKS ARE AVAILABLE FROM:

- (1) I.T.U. GENEVA
- (2) NATIONAL ADMINISTRATIONS
- (3) KLINGENFUSS PUBLICATION, PANORAMASTRASSE 81  
HAGELLOCH  
D-7400 TUEDINGEN  
FEDERAL REPUBLIC OF GERMANY
- (4) NATIONAL DISTRIBUTORS - WORLDWIDE
- (5) AVAILABLE IN SEVERAL LANGUAGES

C.W. CODES

THE RECOMMENDED PROCEDURE FOR DEALING WITH CW CODES WHICH INCLUDE ACCENTED LETTERS OR LETTERS FROM FOREIGN ALPHABETS, IS TO TAKE DOWN THE CODE AS IF IT WERE INTERNATIONAL MORSE USING THE SYMBOLS IN THE LEFT-HAND COLUMN TO RECORD THE NON-STANDARD CHARACTERS. IT WILL BE CONSIDERABLY EASIER TO DO THIS IF YOU MAKE A RECORDING AND WORK FROM THAT, AS YOU WILL THEN BE ABLE TO REPEAT THE UNFAMILIAR CHARACTERS UNTIL YOU ARE SURE THAT YOU HAVE THEM CORRECTLY.

TO GET SOME CLUE ABOUT THE LANGUAGE WITH WHICH YOU MAY BE DEALING, LOOK FOR THE LETTERS E, P, Q, V, W, X, Y AND á . THE PRESENCE OF E OR P WILL ELIMINATE ARABIC AS A CANDIDATE, Q, W, OR X WILL ELIMINATE TURKISH, V, X OR Y, WILL ELIMINATE HEBREW AND á WILL ELIMINATE ALL THREE AND RUSSIAN AS WELL.

HAVING IDENTIFIED THE PARTICULAR LANGUAGE YOU WOULD THEN HAVE TO TRANSLITERATE YOUR RECEIVED TEXT INTO THE NATIONAL SCRIPT AND SEEK THE ASSISTANCE OF A TRANSLATOR TO READ IT.

NOTE:

THE PRESENCE OF A CODE IN THESE TABLES SHOULD NOT BE TAKEN AS AN INDICATION THAT AMATEURS OF THE APPROPRIATE LANGUAGE GROUP DO NOT USE THAT CODE.

EXAMPLE: SUPPOSE YOU RECEIVE THE FOLLOWING MORSE MESSAGE SENT IN CYRILLIC CODE -

" O S W O B O D I T E L IM B I T E L X S K I J D I A P A Z O N "

USING THE TRANSLITERATION KEY THIS BECOMES, IN CYRILLIC SCRIPT,

ОСВОБОДИТЕ ЛЮБИТЕЛЬСКИЙ ДИАПАЗОН

WHICH, WHEN READ BY A RUSSIAN READER, SAYS -

"GET OUT OF THE AMATEUR BAND"

# C.W. CODES

## CODE MORSE INTERNATIONAL ET SIGNAUX CONVENTIONNELS

- (1) Un trait est égal à trois points; (2) l'espace entre les signaux d'une même lettre est égal à un point;  
(3) l'espace entre deux lettres est égal à trois points; (4) l'espace entre deux mots est égal à sept points.

A . —	Ä (allemand) = Æ (danois)	1 . — — —
B — . . .	• — . — (RT)	2 . . — —
C — . — .	Á ou Ā (espagnol ou scandinave)	3 . . . —
D — . .	• — . —	4 . . . —
E .	Ch (allemand ou espagnol)	5 . . . .
F . . . .	— — — — (OT)	6 — . . . .
G — . — .	É (français)	7 — — . . .
H . . . .	• . . . .	8 — — — . .
I . .	Ñ (espagnol)	9 — — — — .
J . — — —	— . . . —	0 — — — —
K — . .	Ö (allemand) ou Ø (danois)	
L . — . .	— — . . (OE)	
M — —	Ü (allemand)	
N — .	• . — — (UT)	
O — — —		
P . — — .		
Q — — . —		
R . — .		
S . . .		
T —		
U . . —		
V . . . —		
W . — —		
X — . . .		
Y — . . —		
Z — — . .		

Point . . . . .	— . . . .	Signal de commencement de transmission (doit précéder chaque transmission) . . . . . (CT)	— . . . .
Virgule . . . . .	— — . — —	Appel général à toutes les stations . . . . . (CQ)	— . . . — — — —
Deux points . . . . .	— — — . .	De . . . . . (DE)	— . . .
Point d'interrogation ou demande de répétition d'une transmission non comprise . . . . . (IMI)	• . — . .	Invitation à transmettre . . . . . (K)	— . . —
Apostrophe . . . . .	• — — — —	Attente . . . . . (AS)	• . . . .
Trait d'union ou tiret . . . . .	— . . . —	Compris . . . . . (VE)	• . . — .
Barre de fraction ou signe de division . . . . . (NR)	— . . . .	Erreur . . . . .	• . . . . .
Parenthèses: parenthèse de gauche [ ( ) ] . . . . .	— . — — .	Reçu . . . . . (R)	• — .
parenthèse de droite [ ) ] . . . . .	— . — — —	Indication de la position (doit précéder tous les messages de position) . . . . . (TR)	— . — .
Guillemets . . . . .	• — . . . .	Fin de message (aussi croix ou signe d'addition) . . . . . (AR)	• — . . . .
Double trait (interruption) . . . . . (IT)	— . . . —	Fin de transmission (fin du travail) (fin de correspondance) (VA)	• . . . — —
Appel de détresse . . . . . (SOS)	• . . — — — . . . .		

Int. Letter	Symbol	Turkish	Greek	Cyrillic (Russian)
A	..	A	Α α A	А а A
B	....	B	Β β B	Б б B
C	....	C	Θ θ Th	Ц ц Ts
D	---	D	Δ δ D	Д д D
E	.	E	Ε ε E	Э э, Е е E
F	....	F	Φ φ Ph	Ф ф F
G	---	G	Γ γ G	Г г G
H	....	H	Η η Ē	Х х H
I	..	I	Ι ι I	И и I
J	----	J	Υ υ I U I	Й й Y
K	---	K	Κ κ K	К к K
L	....	L	Λ λ L	Л л L
M	--	M	Μ μ M	М м M
N	--	N	Ν ν N	Н н N
O	---	O	Ο ο O	О о O
P	....	P	Π π P	П п P
Q	----		Ψ ψ Ps	Щ щ Shch



R	...	R	P p R	P p R
S	...	S	Σ σ,ς S	C c S
T	-	T	T T T	T T T
U	...	U	O Y o u ou	Y y u
V	....	V	H Y η u ē u	Ж ж J
W	...		Ω ω ō	B b v
X	....		Ξ ξ x	Ь ь, b <sub>mute</sub>
Y	....	Y	Y u u	Ы ы I
Z	....	Z	Z ζ z	З з z
ā	....		A I a I AI	Я я Ya
ä	....			
ch	----	ç	X x Ch	Ш ш Sh
é	....			Э э E
ñ	----			
ö	----	ö	E Y ε u EU	ү ү Ch
ü	....	ü		Ю ю Yu
ç	....	ç		
ß	....		O I o I OI	

Int. Letter	Symbol	Hebrew	Arabic
A	..	א	ا
B	....	ב Bh, B	ب B
C	....	ס S	ث Th
D	...	ד Dh, D	د D
E	.	ו W	
F	....	פ Ph	ف F
G	---	ג Gh, G	غ Gh
H	....	ח H	ح H
I	..	י Y	ي Y
J	----	ע 'e	ج J

Int. Letter	Symbol	Hebrew	Arabic
K	---	ככך Kh, K	ك K
L	....	ל L	ل L
M	--	מם M	م M
N	--	נן N	ن N
O	---	ה H	خ Kh
P	....	פ P	
Q	---	ק Q	ق Q
R	---	ר R	ر R
S	...	שׁ שׂ ש׃ S, Š	س S
T	-	תת Th, T	ت T

Int. Letter	Symbol	Hebrew	Arabic
U	---	ט	ט
V	----		ض
W	---	צ	و
X	----		ص
Y	----		ظ
Z	----	ז	ذ
ä	---		ع
ch	----		ش
é	----		ه
ö	----		ز
	-----		ل

## CALLSIGNS

MOST AMATEURS WILL BE AWARE THAT THE ALLOCATION OF DISTINCTIVE CALLSIGNS, WHICH SIGNIFY THE COUNTRY OF THE STATION USING THE CALLSIGN, IS A MATTER COVERED BY THE INTERNATIONAL RADIO REGULATIONS (ARTICLE 25).

ANY AMATEUR OF MORE THAN A FEW HOURS EXPERIENCE WILL KNOW THAT THIS REGULATION REGARDING IDENTIFYING IS FREQUENTLY IGNORED BY INTRUDERS IN THE AMATEUR BANDS.

THE MILITARY SERVICES OF MANY COUNTRIES USE TACTICAL CALLSIGNS WHICH DO NOT CONFORM WITH THE I.T.U. ALLOCATIONS. THESE SHOULD STILL BE RECORDED AS THE CALLSIGN OF THE INTRUDER, EVEN WHEN IT IS CLEARLY A TACTICAL CALL. OVER A PERIOD OF TIME THE SAME CALLSIGNS RECUR AND MAY BE PIECED TOGETHER WITH OTHER CLUES TO PROVIDE THE ORIGIN AND IDENTITY OF THE STATION. ONE MAY ALSO FIND BY LISTENING TO A STATION USING THESE TACTICAL CALLS, REFERENCES TO OTHER FREQUENCIES. MONITORING THESE OTHER FREQUENCIES OFTEN REWARDS THE PATIENT LISTENER WITH THE TRUE IDENTITY OR CALLSIGN OF THE STATION WHICH USES ONLY TACTICAL CALLSIGNS WHEN OPERATING IN THE AMATEUR BAND.

IT SHOULD ALSO BE NOTED BY MONITORS THAT NOT ALL COUNTRIES ARE MEMBER OF THE I.T.U. NON-MEMBERS ARE NOT ALLOCATED BLOCKS OF CALLSIGNS AND MUST OF NECESSITY INVENT THEIR OWN. ALSO SOME MEMBERS OF THE I.T.U. MAY FOR SOME PURPOSES, SUCH AS MILITARY OPERATIONS, ADOPT THEIR OWN SERIES OF CALLSIGNS. A LIST OF KNOWN NON-I.T.U. CALLSIGNS FOLLOWS.

## FIXED CALLSIGNS NOT LISTED BY THE I.T.U.

<u>CALLSIGN</u>	<u>LOCATION</u>	<u>ADMIN</u>	<u>COMMENTS</u>
ADP		URS	Called by RCF
BBD	Hanoi	VTN	
BFR		URS	Called by RCF
BMO		YUG	Diplomatic Station
BXL		URS	Called by RCF
BWH	Teheran	CENTO	Works with TCX
CAI		URS	Called by RCF
CP95		VTN	

<u>CALLSIGN</u>	<u>LOCATION</u>	<u>ADMIN</u>	<u>COMMENTS</u>
CO5		VTN	
CWY	Rawalapindi	CENTO	Works with TCX
DEW	Prague	YUG	Diplomatic station
ECF		URS	Called by RCF
EKP	Stockholm	YUG	Diplomatic station
ENT		URS	Called by RCF
EOL	Lagos	YUG	Diplomatic station
FDS	Addis Ababa	YUG	Diplomatic station Changed to MGE
F9T		VTN	
GEO	Conakry	YUG	Diplomatic station
GLK		URS	Called by RCF
GST		URS	Called by RCF
GZX	Belgrade	YUG	Diplomatic station
HBL		TUR	
HNO		URS	Called by RCF
HVY	Hanoi	VTN	
HZV	Hanoi	VTN	Diplomatic/Press Station
KDW	Tehran	YUG	Diplomatic station
KPA	Hanoi	VTN	
KUA		URS	Called by RCF
K21	Karachi	PAK	Diplomatic station
MGE	Addis Ababa	YUG	Diplomatic station Ex FDS
MPU	Hanoi	VTN	
M41		PAK	Diplomatic station
NBJ		VTN	
NGT		YUG	Diplomatic station ex XDS
OM2	Prague	TCH	Diplomatic service control station
PON		URS	Called by RCF
P32	Islamabad	PAK	Diplomatic station
P62	Islambad	PAK	Diplomatic station
RAD		URS	Called by RCF
RBS	Dar-es-Salaam	YUG	Diplomatic station Ex VJQ

<u>CALLSIGN</u>	<u>LOCATION</u>	<u>ADMIN</u>	<u>COMMENTS</u>
RCF	Moscow	URS	Calls: ADP,BFR,BXL CAI,ECF,ENT GKL.GST,HNO KUA,PON,RAD TIK,WXT,YCA
RFM		URS	Called by RCF
SGF		YUG	Diplomatic station
SSB		PAK	Diplomatic station
SUL		YUG	Diplomatic station
TCX	Ankara	CENTO	Control station
TIK		URS	Called by RCF
TVL	Belgrade	YUG	Diplomatic station
UCU	Kinshasa	YUG	Diplomatic station
VJQ	Dar-es-Salaam	YUG	Diplomatic station Changed to RBS
VNB	Hanoi	VTN	Used on commercial circuits with figure suffix. Vietnam is not allocated this block.
VRQ	Hanoi	VTN	
WAB		TUR	
WUZ	Nairobi	YUG	Diplomatic station
WXT		URS	Called by RCF
XDS		YUG	Diplomatic station Changed to NGT
YCA		URS	Called by RCF
ZGA	Lusaka	YUG	Diplomatic station
Z57		PAK	Diplomatic station
ZC6	Cairo	TCH	Diplomatic station Works to OMZ
ZD6	Tehran	TCH	Diplomatic station Works to OMZ
3G5	Algiers	TCH	Diplomatic station Works to OMZ
3K5	Beyroth	TCH	Diplomatic station Works to OMZ
3L5	Hanoi	TCH	Diplomatic station Works to OMZ
4XF		TCH	Diplomatic station Works on OMZ

<u>CALLSIGN</u>	<u>LOCATION</u>	<u>ADMIN</u>	<u>COMMENTS</u>
T7S			Works to Y5K (East Germany)
Z3N			Works to Y5K (East Germany)
K2W			Works to Y5K (East Germany)
5F3	Bucharest	TCH	Diplomatic station works to OMZ
5Q3	Conakry	TCH	Diplomatic station works to OMZ
5T3		TCH	Diplomatic station works to OMZ
5W3	Moscow	TCH	Diplomatic station works to OMZ
5X3		TCH	Diplomatic station works to OMZ
5Y3	Nairobi	TCH	Diplomatic station works to OMZ
6M2	Phnom Penh	TCH	Diplomatic station works to OMZ
6X2		TCH	Diplomatic station works to OMZ
7A1	Baghdad	TCH	Diplomatic station works to OMZ
7L1	Djakarta	TCH	Diplomatic station works to OMZ
7X1		TCH	Diplomatic station works to OMZ



## BAUDOT (ITA NO. 2) AND CYRILLIC 5-UNIT CODES

BAUDOT		CYRILLIC NO.2		CYRILLIC ST35		"G5XB CYR."	
LET	FIG	LATIN	FIG	CYR	LATIN	FIG	CYR
A	-	A		А	P		П
B	?	B	?	Б	K		К
C	:	C	:	Ц	F	Э Ф	
D	+	D	<WRU>	Д	J	Б Й	Й В
E	3	E	3	Е	A	1	А
F	!	F		Э Ф	C	9	Ц
G	@	G		Ш Г	M		М
H		H		Щ Х	S	.	С
I	8	I	8	И	I		Ш И
J	'	J		Ю Й	H	+	Х
K	(	K	(	К	D	0	Д
L	)	L	)	Л	X	,	Ь
M	.	M	.	М	R	-	Р
N	,	N	,	Н	B	8	Б
O	9	O	9	О			Я
P	0	P	0	П	W		В

## BAUDOT (ITA NO. 2) AND CYRILLIC 5-UNIT CODES

BAUDOT		CYRILLIC NO.2			CYRILLIC ST35			"G5XB CYR."	
LET	FIG	LATIN	FIG	CYR	LATIN	FIG	CYR	FIG	CYR
Q	1	Q	1	Я	У		Ж	1	У
R	4	R	4	Р	G	7	Г	4	Н
S	'	S	'	С	U	4	У	'	Ы
T	5	T	5	Т	<LATIN>			5	Г
U	7	U	7	У	0	5	О	7	З
V	=	V	=	Ж	N		ЮН		И
W	2	W	2	В	Z	3	З	2	К
X	/	X	/	Ь	Q	/	Щ	:	С
Y	6	Y	6	Ы	T		ЧТ	6	Ш
Z	+	Z	+	З	<SPACE>			/	Я
<C.RET>		<C.RETURN>			<FIGURES>			<C.RET>	
<L.FEED>		<L.FEED>			E	2	Е	<L.FEED>	
<LETTER>		<LATIN>			<CYRILLIC>			<LETTER>	
<FIGURE>		<FIGURE>			L	=	Л	<FIGURE>	
<SPACE>		<SPACE>			Y	3	Ы	<SPACE>	
<NULL>		<CYRILLIC>			<BELL>			<NULL>	

RTTY CODES

LATIN		ARABIC		TRANSLITERATION	
LET	FIG	LET	FIG	LET	FIG
A	-	ص ص		Ş	Ş
B	?	ع ا			
C	:	ي ي		Y	Y
D	+	ق ق		Q	Q
E	3	ط ٧		T	7
F	!	ة ف		F	T
G	@	ع ع			
H		ا هـ		H	accent
I	8	ب ٢		B	2

<u>LATIN</u>		<u>RITTY CODES</u>		<u>TRANSLITERATION</u>	
LET	FIG	LET	FIG	LET	FIG
J	'	ه	ا	H	H
K	(	ك	ح	H	H
L	)	ل	ج	J	J
M	.	م	م	M	M
N	,	ن	ن	N	N
O	9	ت	ا	T	1
P	0	أ	٠	'	0
Q	1	ل	ا	L	9
R	4	ر	٦	D	6

RTTY CODES

LATIN		ARABIC		TRANSLITERATION	
LET	FIG	LET	FIG	LET	FIG
S	'	ی ٹ		T	Y
T	5	ہ و		W	5
U	7	ث ۳		Th	3
V	=	ل ال		'L	L
W	2	ا ۸		L'	8
X	/	س ۛ		S	S
Y	6	ر ۴		R	4
Z	+	ش ۛ		Sh	Sh
<C.RET>		ک ۛ		K	K

## SPECIAL MONITORING CAMPAIGNS

WHERE SPECIAL MONITORING CAMPAIGNS ARE CALLED FOR BY THE I.A.R.U.-M.S., OR REGIONAL CO-ORDINATORS, THE FOLLOWING I.F.R.B. FORM AND INSTRUCTIONS SHOULD BE USED IN SUBMITTING REPORTS. ANY SUCH CAMPAIGNS SHOULD BE FOR LIMITED PERIODS ONLY AND CONCENTRATE ON SPECIFICS, i.e. CERTAIN BANDS OR PARTS THEREOF, DESIGNATED "INTRUDERS", DESIGNATED MODES OF EMISSION, ETC. AS IT IS POSSIBLE THAT THE REPORTS COULD BE SENT TO THE I.F.R.B. THE INSTRUCTIONS FOR COMPLETING THE FORM SHOULD BE ADHERED TO. "LOCAL" VARIATIONS OF THE FORM MAY BE REJECTED.

Administration IARU MONITORING SYSTEM  
Administration  
Administration

Nom de la station de contrôle \_\_\_\_\_  
 Name of the Monitoring Station \_\_\_\_\_  
 Nombre de la estación de comprobación técnica \_\_\_\_\_

Annie \_\_\_\_\_ Mol is \_\_\_\_\_  
 Year \_\_\_\_\_ Month \_\_\_\_\_  
 Afo \_\_\_\_\_ Men \_\_\_\_\_

Précision de la mesure de la fréquence  
Accuracy of Frequency Measurement  
Precisión de medida de la frecuencia

### Formule de relevé

A utiliser pour présenter à l'ITRB  
des renseignements sur les stations  
fonctionnant dans les bandes de  
fréquences suivantes

- a) bandes 2 170 - 2 194 kHz et bandes attribuées en exclusivité au service mobile maritime entre 4 063 kHz et 25 110 kHz;
- b) bandes comprises entre 2 850 kHz et 22 000 kHz attribuées en exclusivité au service mobile aéronautique (A);
- c) autres bandes d'ondes décimétriques attribuées à des services autres que la radiodiffusion;

### Form of Report

To be used to supply to the IFRB  
information on the stations operating  
in the following frequency bands

- a) band 2 170 - 2 194 kHz and the bands allocated exclusively to the maritime mobile service between 4 063 kHz and 25 110 kHz;
- b) bands between 2 850 kHz and 22 000 kHz allocated exclusively to the aeronautical mobile (R) service;
- c) other HF bands allocated to services other than broadcasting

### Modelo de informes

Para comunicar a la IFRB la información procedente de la comprobación técnica sobre las estaciones que funcionan en las bandas de frecuencias siguientes:

- a) bandas 2 170 - 2 194 kHz y bandas atribuidas exclusivamente al servicio móvil marítimo comprendidas entre 4 063 kHz y 25 110 kHz;
- b) bandas comprendidas entre 2 850 kHz y 22 000 kHz atribuidas exclusivamente al servicio móvil aeronáutico (R);
- c) otras bandas de ondas decimétricas atribuidas a servicios distintos del servicio de radiodifusión

[illegible]

## INSTRUCTIONS

for completing the Form of Report for use in submitting to the IFRB monitoring information on stations operating in the HF bands allocated to services other than broadcasting

### I. INTRODUCTION

The International Frequency Registration Board proposes the form given in this Annex for use by the monitoring stations for submitting their observations on the stations mentioned above. The form has been divided into eight sections:

- time of observation (date and hour)
- measured frequency
- identification of the station (name, call sign, country, location or any information relating to the corresponding station)
- class of station
- class of emission
- bearing
- remarks
- for IFRB use.

### II. INSTRUCTIONS FOR COMPLETING INDIVIDUAL COLUMNS

Indicate at the top of the form:

- the name of the administration supplying the information
- the name of the monitoring station
- the year
- the month
- the accuracy of frequency measurement at the monitoring station in parts per million.

#### 1. Column 1 - Time of observation

##### 1.1 Date

Indicate the day of the month of observation by two digits, as follows, 01 etc., up to 31.

##### 1.2 Hour (in Coordinated Universal Time) and

1.3 Indicate the period of observation during which the observations were made in the manner shown in the form, expressed in hours and minutes in Coordinated Universal Time, as follows, 0000 etc., up to 2359.



2. Column 2 - Measured Frequency

Indicate the frequency measured in kilohertz and fractions thereof up to two decimals, the last figure after the decimal point being rounded to 0 or 5.

3. Column 3 - Station Identification

The station identification may be given by:

- the station name
- the name of the operating agency
- the station call sign
- any other means of identification used by the monitored station.

If information is available on more than one of the items listed above, all of them should be provided.

In case of doubtful identification, the identification should be preceded by a question mark thus (? —).

Column 4 - Class of station

Indicate the class of the monitored station (see Appendix 10 of the Radio Regulations).

Column 5 - Class of emission

Indicate the class of emission used by the monitored station (see Article 4 (RR271, 272 and 273) of the Radio Regulations and IFRB Circular-letter No. 457 of 2 June 1980).

Column 6 - Bearing

When it is not possible to identify the monitored station and if the monitoring station is equipped with the direction-finding facilities, indicate in degrees from True North the bearing of the station concerned.

Column 7 - Remarks

Any information other than that given in Columns 1 to 3 which may assist in a positive identification of the monitored station should be given in this Column.

Column 8 - For IFRB use

This column should be left blank.

1. The reports should be sent to the IARU Monitoring Service Coordinator as soon as possible following the end of the period.

2. Where possible monitoring observations for a given band on a particular day should be presented on the same sheet(s).

3. If required, additional sheets can be used. In such a case, it will be sufficient to indicate the page number on top and use the column numbers only.

For example:

Page 2 of 4

1.1	1.2	1.3	2	3	4	5	6	7	8

Report of the International Study Group  
Geneva, August 1985

I. At the annual meeting of the IARU Administrative Council, 28 July 1984, the following resolution was adopted:

Resolution 84-1

The IARU Administrative Council, 28 July 1984,  
taking into account Administrative Council Resolution 83-1;  
taking into account the Recommendation of the Region I Conference, Cefalu 1984, entitled "IARU Monitoring System":  
recognizing the need for a realistic review of international monitoring for the protection of the amateur bands ("Monitoring Service")  
noting the desirability of forming an international working group being convened under the chairmanship of the President of IARU, or his delegate from the Administrative Council,

RESOLVES

1. That an International Working Group be formed, under the chairmanship of the President of the IARU, or his delegate from the Administrative Council, and including one representative from each Region;
2. That the International Working Group so formed may meet where and when determined by the Chairman, after consultation with the Administrative Council;
3. That the terms of reference of the International Working Group shall include, without limiting the generality of its terms of reference,
  - 3.1 Defining realistic objectives, and identifying the framework within which those objectives can be achieved.
  - 3.2 Having regard to 3.1, defining the role and method of the international coordination of the Monitoring Service.
  - 3.3 Recommending the best methods of improving the efficacy of the Monitoring Service, including special reference to the reporting systems used, guidelines

4. That the International Working Group report to the Administrative Council by not later than 1 September 1985.

II. Those participating in the work of the International Study Group (the "Group") were Joeke van der Velde, PAØVDV, representing Region I; Alberto Shaio, HK3DEU, representing Region II; Robert Knowles, ZL1BAD, representing Region III; Colin Thomas, G3PSM, observer from RSGB; Merle Glunt, W3CKN, observer from Region II; David Rankin, 9V1RH, chairman of Region III and observer; Masayoshi Fujioka, JM1UXU, secretary of Region III and observer; and Richard L. Baldwin, W1RU, president of IARU and chairman (and secretary) of the meeting.

The meeting was held in Room IX of the Geneva International Conference Center, rue de Varembe, Geneva -- this space having been kindly arranged for by ITU Secretary-General Richard E. Butler. The meeting was convened promptly at 0900 on Monday, August 5, 1985, and continued (with a one-hour break for lunch) until 1900 that evening. The meeting resumed at 0900 on Tuesday, August 6, 1985, and continued (with a one-hour break for lunch) until its adjournment at 1735 on that day.

The chairman announced that hopefully all decisions reached by the Group would be by consensus, but that if it became necessary to vote on any issue, only the three regional representatives would vote, and that the chairman would vote only in the remote possibility of a tie. Observers, although not voting, would have full freedom to participate in the Group discussions.

The Group briefly reviewed the new IARU Constitution, including the objectives listed in Article I and particularly that objective which establishes the principle of defending amateur radio:

"2. Its objectives shall be the protection, promotion, and advancement of the Amateur and Amateur-Satellite Services, especially within the framework of regulation established by the International Telecommunication Union, and to provide support to Member-Societies in the pursuit of these objectives at the national level . . . ."

Early in its discussion the Group decided that the name of the activity it was studying should be changed from the "IARU Intruder Watch" to the "IARU Monitoring System." It will henceforth, in this report and elsewhere, also be referred to as IARUMS, MS, or Monitoring System. This does not preclude a national society from using some other appropriate name by which to designate its individual activity which seeks to eliminate harmful interference.

The Group agreed that the organizational structure of the IARU Monitoring System should follow that of the IARU itself.

After extensive discussion, including an hour-long presentation by Mr. Sant of the International Frequency Registration Board (IFRB), it was agreed that it would be in the best interests of the IARU and the IARU monitoring System if all liaison between the IARUNS and the ITU were made through a single IARU channel. Therefore, the following resolution was prepared for the approval of and adoption by the IARU Administrative Council.

Whereas, at its meeting in Geneva on 6 August 1985 the members of the International Study Group had a most productive session with a senior staff representative of the International Frequency Registration Board, and

Whereas, during this meeting there was extensive discussion of the most effective process of liaison between the IARU and ITU, particularly in respect to matters relating to harmful interference and monitoring, and

Considering, that the primary objective of IARU is the representation of the Amateur Service at and between international telecommunications conferences, and

Considering, that for reasons of consistency and continuity it is essential that all contact with ITU follow a common pattern, therefore, be it

RESOLVED, that all ITU contact involving matters relating to the IARU Monitoring System and its activities shall be made only through the Administrative Council.

III. The following objectives, definitions, and responsibilities were developed to guide the work of the IARU Monitoring System:

#### Objectives of the IARU Monitoring System

- a) To collect data on the use of the amateur bands.
- b) To constitute a picture of harmful interference.
- c) To take steps to eliminate that harmful interference.
- d) To encourage monitoring activities by national societies.
- e) To have available on a regional basis monitoring stations that meet the technical standards recommended by the CCIR.

#### Definitions

National Coordinator -- is the IARC member society in the country concerned.

Regional Coordinator -- is an individual appointed by the regional organization who coordinates the Monitoring System activities in his region.

International Coordinator -- is an individual appointed by the Administrative Council who coordinates the Monitoring System activities of the three regions.

Harmful Interference -- Interference which seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with the Radio Regulations. (From 2002 of the Nairobi Convention.) In the work of the IARU Monitoring System this includes both out-of-band emissions and spurious emissions, as defined below.

Out-of-Band Emissions -- Emissions on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions.

Spurious Emissions -- Emissions on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products, and frequency conversion products, but exclude out-of-band emissions.

Amateur band -- is any band which has an allocation to the Amateur or Amateur-Satellite Service, regardless of the category of service (that is, regardless of whether the amateur allocation is exclusive, secondary, etc.)

### Responsibilities

#### International Coordinator

- a) Shall require regular reports from the Regional Coordinators on the status of the IARU Monitoring System, including but not limited to summaries of progress not only of the routine administration of the System but also of the cases of harmful interference processed. He shall specify all reporting formats.
- b) Shall encourage the inter-regional cooperation on designated cases of harmful interference.
- c) Shall report on a yearly basis to the Administrative Council (30 days prior to their annual meeting) on the overall performance of the Monitoring System, and shall include his recommendations for possible action by the Administrative Council.
- d) Shall distribute a regular status report through Regional Coordinators to the National societies.
- e) Shall recognize all appropriate political and practical considerations in handling cases of harmful interference which can not be resolved through the efforts of a national society or its Regional Coordinator.
- f) Shall, with the assistance of the Regional and National Coordinators, be responsible for the distribution of educational material relating to the work of the Monitoring System.
- g) Shall respond to such specialized requests as may be made of him from time to time by the

## Regional Coordinators

- a). Shall compile regional data and progress reports and forward them to the International Coordinator.
- b). Shall distribute to member societies information received from the International Coordinator.
- c). Shall assist National Coordinators in effectively carrying out their functions within the IARU Monitoring System.
- d). Shall acknowledge all reports and inquiries received from National Coordinators and periodically summarize to a national society the status of its reports.
- e). Shall keep National Coordinators adequately informed of current developments.
- f). May receive and process reports from individuals in those countries where there is no IARU member society.

## National Coordinator

- a). Is the central point in a country to whom all monitoring information should be reported.
- b). Shall be responsible for submitting to its administration appropriate and relevant monitoring information received.
- c). Is urged to give suitable recognition to those who participate in the work of the IARUNS, both those who may be named to manage the activity and those who file reports of harmful interference.
- d). Shall forward to the Regional Coordinator copies of all relevant monitoring information which has been received.
- e). Shall adequately train suitable personnel in monitoring techniques.
- f). Shall use a format in submitting monitoring information which conforms with the guidelines laid down by the International Coordinator.
- g). Shall cooperate with the International and Regional Coordinators in carrying out monitoring requests.
- h). Shall strive to encourage enthusiastic participation in the IARU Monitoring System by its members.
- i). Shall be the only channel through which reports of harmful interference shall be accepted from non-members of national societies.
- j). In exceptional circumstances a National Coordinator, with the assistance of the Regional Coordinator, may request the assistance of another National Coordinator in resolving a national interference problem.

IV. The Group also discussed the following items and took such action as may be noted in each case.

- a) With regard to funding of the IARU Monitoring System, it was agreed that funding of the International Coordinator would be by the Administrative Council,

- funding of the Regional Coordinators would be by their respective Regional organizations, and that funding of the National Coordinators would be by the respective national member society.
- b) The Group discussed the necessity for a common world-wide manual for the guidance of all of those involved in the IARUMS, and agreed that it should be prepared by the International Coordinator, with input as necessary from all three regions. The scope of the manual is to be such that it includes, inter alia, the following:
- i) the work and the organization of the IARUMS
  - ii) extracts of pertinent Radio Regulations
  - iii) emission designators
  - iv) type of training
  - v) type of reporting
  - vi) signals to be heard
  - vii) methods of reporting
  - viii) reporting formats
  - ix) level of competence of participants

Existing regional manuals may be used as appropriate as source material for the new international manual.

It was agreed that the IARUMS manual would be initially funded, produced, and distributed in limited quantities by the Administrative Council, and that it would be subsequently reproduced and distributed to national societies at regional expense, and that it would eventually be reproduced and distributed to individual participants at the expense of the national societies. It was believed by the Group that this sharing of the expense of reproducing and distributing the manual in the required quantities was the most equitable arrangement.

- c) It was agreed that the president of IARU would formally address the Administrative Council to set in motion the process for soliciting nominations from the regions for the post of International Coordinator. It was noted that this is a most important post which will require the selection of someone who is primarily an excellent administrator but with a sufficient knowledge of and experience in monitoring.
- d) The Group considered the difficulty of the adequate translation into languages other than English of the various titles established in the organizational structure of the IARUMS, but after extensive discussion found no acceptable alternatives.
- e) The Group discussed, without reaching any formal conclusion, the problem of unlicensed operation in the vhf/uhf in certain geographical areas, caused by the unrestricted sale of amateur transmitting equipment to non-amateurs.
- f) The Group discussed at some length a "System of Quantitative Measure of Harmful Interference," but because of the complexity of the matter, no conclusion was reached.



- g) The question of IARU Monitoring Stations was discussed extensively. Consideration was given to the pros and cons of having IARU establish its own Monitoring Stations on a regional basis. The technical requirements were examined. Funding, location, and maintenance were reviewed. The final consensus, as indicated in Objective (e) in Section III of this report, was that it was not appropriate for IARU to establish its own official IARU Monitoring Stations at this time, but that the regional organizations should be encouraged to locate private amateur stations that meet the standards or requirements of the CCIR, stations which could assist the IARU Monitoring System in its work.
- h) The Group discussed, without any decision, the possibility of using the IARU Monitoring System for monitoring of various frequency bands in anticipation of the next General WARC.

V. As a result of its deliberations, the International Study Group established by the Administrative Council believes that it has developed a viable plan for enhancing the operation of the IARU Monitoring System. It therefore presents the following Resolution for the approval of and adoption by the Administrative Council.

Whereas, at its meeting in Paris, France, on July 28, 1985, the IARU Administrative Council adopted Resolution 84-1 establishing an International Working Group to seek ways and means of revitalizing the IARU Intruder Watch, and

Whereas, the International Working Group completed its work in Geneva on August 5 and 6, 1985, and

Considering, that the report of the International Working Group which has been submitted to the Administrative Council addresses the issues of concern and presents a reorganization of the IARU Monitoring System which is in accordance with the goals of the Administrative Council, therefore

the Administrative Council adopts the report of the International Working Group and hereby

RESOLVES to implement that portion of the report relating to the appointment of an International Coordinator and

Recommends, that the report be ratified and implemented by the three regional organizations at the earliest opportunity, and further

the IARU Administrative Council commits itself to a program for gaining additional recognition of the IARU Monitoring System by world-wide and regional telecommunications organizations.

In conclusion, the chairman of this International Study Group wishes to express his thanks to the regional representatives and observers who made possible the successful conclusion of this harmonious and productive meeting. It is a pleasure to be associated with such an enthusiastic and dedicated group of international radio amateurs.

Respectfully submitted,

*Rich L. Baldwin*

Richard L. Baldwin, W1RU  
Chairman

## **Extracts from ITU Convention and Radio Regulations**

### **International Telecommunication Convention**

#### **ARTICLE 35**

##### **Harmful Interference**

- 158 1. All stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Members or of recognized private operating agencies, or of other duly authorized operating agencies which carry on radio service, and which operate in accordance with the provisions of the Radio Regulations.
- 159 2. Each Member undertakes to require the private operating agencies which it recognizes and the other operating agencies duly authorized for this purpose, to observe the provisions of No. 158.
- 160 3. Further, the Members recognize the desirability of taking all practicable steps to prevent the operation of electrical apparatus and installations of all kinds from causing harmful interference to the radio services or communications mentioned in No. 158.

#### **ARTICLE 38**

##### **Installations for National Defence Services**

- 163 1. Members retain their entire freedom with regard to military radio installations of their army, naval and air forces.
- 164 2. Nevertheless, these installations must, so far as possible, observe statutory provisions relative to giving assistance in case of distress and to the measures to be taken to prevent harmful interference, and the provisions of the Administrative Regulations concerning the types of emission and the frequencies to be used, according to the nature of the service performed by such installations.
- 165 3. Moreover, when these installations take part in the service of public correspondence or other services governed by the Administrative Regulations annexed to this Convention, they must, in general, comply with the regulatory provisions for the conduct of such services.

## General Rules for the Assignment and Use of Frequencies

- 342 § 4. Administrations of the Members shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall not be

RR1-21

## Section VII. Frequency Sharing

- 160 7.1 *Interference*: The effect of unwanted energy due to one or a combination of *emissions*, *radiations*, or inductions upon reception in a *radiocommunication* system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy.
- 161 7.2 *Permissible Interference*<sup>1</sup>: Observed or predicted *interference* which complies with quantitative *interference* and sharing criteria contained in these Regulations or in CCIR Recommendations or in special agreements as provided for in these Regulations.
- 162 7.3 *Accepted Interference*<sup>1</sup>: *Interference* at a higher level than that defined as *permissible interference* and which has been agreed upon between two or more administrations without prejudice to other administrations.
- 163 7.4 *Harmful Interference*: *Interference* which endangers the functioning of a *radionavigation service* or of other *safety services* or seriously degrades, obstructs, or repeatedly interrupts a *radio-communication service* operating in accordance with these Regulations.
- 164 7.5 *Protection Ratio (R.F.)*: The minimum value of the wanted-to-unwanted signal ratio, usually expressed in decibels, at the receiver input, determined under specified conditions such that a specified reception quality of the wanted signal is achieved at the receiver output.
- 165 7.6 *Coordination Area*: The area associated with an *earth station* outside of which a *terrestrial station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a permissible level.
- 166 7.7 *Coordination Contour*: The line enclosing the *coordination area*.

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161.1 }  
162.1 } <sup>1</sup> The terms "permissible interference" and "accepted interference" are used in the coordination of frequency assignments between administrations.

## ARTICLE 20

## International Monitoring

- 1872 § 1. To assist to the extent practicable in the implementation of these Regulations, in particular to help ensure efficient and economical use of the radio frequency spectrum and to help in the prompt elimination of harmful interference, administrations agree to continue the development of monitoring facilities and, to the extent practicable, to cooperate in the continued development of the international monitoring system.
- 1873 § 2. The international monitoring system comprises only those monitoring stations which have been so nominated by administrations in the information sent to the Secretary-General in accordance with No. 1879. These stations may be operated by an administration or, in accordance with an authorization granted by the appropriate administration, by a public or private enterprise, by a common monitoring service established by two or more countries, or by an international organization.
- 1874 § 3. Administrations will, as far as they consider practicable, conduct such monitoring of both a general and a specific nature as may be required of them by the International Frequency Registration Board or by other administrations. In requesting monitoring observations, the Board and administrations should take into account the monitoring facilities set forth in the List of International Monitoring Stations (List VIII, see Article 26), and should clearly specify both the purpose for which the observations are requested and the parameters of the requested monitoring work (including appropriate schedules). The results of such monitoring forwarded to other administrations may also be sent to the Board, if appropriate.
- 1875 § 4. Each administration or common monitoring service established by two or more countries, or international organizations participating in the international monitoring system, shall designate a centralizing office to which all requests for monitoring information shall be addressed and through which monitoring information will be forwarded to the Board or to centralizing offices of other administrations.
- 1876 § 5. Administrations agree that monitoring requests from international organizations not participating in the international monitoring system should be coordinated by the Board and, if appropriate, forwarded by it to administrations.
- 1877 § 6. However, these provisions shall not affect private monitoring arrangements made for special purposes by administrations, international organizations, or public or private enterprises.

- 1878 § 7. The technical standards recommended by the CCIR to be observed by monitoring stations shall be recognized by the Board as the optimum practicable technical standards for monitoring stations participating in the international monitoring system. However, to meet some needs for monitoring data, stations observing lower technical standards may participate in the international monitoring system at the discretion of their administrations.
- 1879 § 8. Administrations having determined whether the monitoring stations meet adequate technical standards, shall notify to the Secretary-General pertinent information on the centralizing office and on the stations they wish to have included in List VIII, clearly identifying those stations which may participate in the international monitoring system (see Article 26 and Appendix 9).
- 1880 § 9. (1) Results of measurements forwarded to the Board or other administrations shall indicate the estimated accuracy obtained at the time the measurements were made.
- 1881 (2) Where the results supplied by any monitoring station appear to be doubtful or insufficient for its purposes, the Board shall advise the administration or international organization concerned giving the appropriate details.
- 1882 § 10. When rapid action is required, communications between the Board and centralizing offices should be transmitted by the most expeditious means available.
- 1883 § 11. Administrations shall make every effort to arrange for monitoring observations (see Appendix 21) to be submitted to the Board as soon as possible.
- 1884 § 12. Centralizing offices may request the help of other centralizing offices in order to implement the provisions of this Article and of Article 22.
- 1885 § 13. The Board shall record the results supplied by the monitoring stations participating in the international monitoring system, and shall prepare periodically, for publication by the Secretary-General, summaries of the useful monitoring data received by it, including a list of the stations contributing the data.
- 1886 § 14. When an administration, in supplying monitoring observations from one of its monitoring stations taking part in the international monitoring system, states to the Board that a clearly identified emission is not in conformity with these Regulations, the Board shall draw the attention of the administration concerned to those observations.