



ITU Emission Designators

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Classification of emissions and necessary
bandwidths

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1 Introduction

The International Telecommunication Union (ITU) uses an internationally agreed system for classifying radio frequency signals¹. Each type of radio emission is classified according to its bandwidth, method of modulation, nature of the modulating signal, and type of information transmitted on the carrier signal. It is based on characteristics of the signal, not on the transmitter used.

This document outlines the ITU Classification Designators and provides an example of how a designation is derived.

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¹ ITU- Radio Regulations (ITU-RR) Appendix - AP1

2 Classification of emissions and necessary bandwidths

2.1 Necessary Bandwidth

The necessary bandwidth is expressed by three numerals and one letter. The letter occupies the position of the decimal point and represents the unit of bandwidth. The first character shall neither be zero nor K, M or G and should follow the ranges set out in table 1. Examples can be found in Section 3 of this document.

Min Freq	Max Freq	Unit		Letter
0.001	999	Hz	shall be represented by the Letter	H
1	999	kHz	shall be represented by the Letter	K
1	999	MHz	shall be represented by the Letter	M
1	999	GHz	shall be represented by the Letter	G

Table 1 Necessary Bandwidth²

2.2 Classification

The class of emission is a set of characteristics classified and symbolized according to their basic characteristics. The basic characteristics are:

first symbol – type of modulation of the main carrier;

second symbol – nature of signal(s) modulating the main carrier;

third symbol – type of information to be transmitted.

fourth symbol – details of signal(s) (optional characteristics for the classification of emissions)

fifth symbol – nature of multiplexing (optional characteristics for the classification of emissions)

Modulation used only for short periods and for incidental purposes (such as, in many cases, for identification or calling) may be ignored provided that the necessary bandwidth as indicated is not thereby increased.

² ITU-RR AP1 Section I – Necessary bandwidths AP1-1.

2.2.1 First symbol – Type of modulation of the main carrier³

	Description	Symbol	
1.1	Emission of an unmodulated carrier	N	
1.2	Emission in which the main carrier is amplitude-modulated (including cases where sub-carriers are angle-modulated)		
	Double-sideband	A	
	Single-sideband, full carrier	H	
	Single-sideband, reduced or variable level carrier	R	
	Single-sideband, suppressed carrier	J	
	Independent sidebands	B	
	Vestigial sideband	C	
1.3	Emission in which the main carrier is angle-modulated		
	Frequency modulation	F	
	Phase modulation	G	
	Emission in which the main carrier is amplitude and angle-modulated either simultaneously or in a pre-established sequence		D
1.4	Emission of Pulses ²		
	Sequence of unmodulated pulses	P	
1.5	A sequence of Pulses		
	Modulated in amplitude	K	
	Modulated in width/duration	L	
	Modulated in position/phase	M	
	In which the carrier is angle-modulated during the angle-period of the pulse		Q
	Which is a combination of the foregoing or is produced by other means		V
	Cases not covered above, in which an emission consists of the main carrier modulated, either simultaneously or in a pre-established sequence, in a combination of two or more of the following modes: amplitude, angle, pulse		W
	Cases not otherwise covered		X

³ ITU-RR AP1 Section IIA – Basic Characteristics AP1-2.

2.2.2 Second symbol – Nature of signal(s) modulating the main carrier⁴

	Description	Symbol
2.1	No modulating signal	0
2.2	A single channel containing quantized or digital information without the use of a modulating sub-carrier ⁵	1
2.3	A single channel containing quantized or digital information with the use of a modulating sub-carrier ⁵	2
2.4	A single channel containing analogue information	3
2.5	Composite system with one or more channels containing quantized or digital information, together with one or more channels containing analogue information	7
2.6	Two or more channels containing analogue information	8
2.7	Composite system with one or more channels containing quantized or digital information, together with one or more channels containing analogue information	9
2.8	Cases not otherwise covered	X

2.2.3 Third symbol – Type of information to be transmitted⁶

	Description	Symbol
3.1	No information transmitted	N
3.2	Telegraphy – for aural reception	A
3.3	Telegraphy – for automatic reception	B
3.4	Facsimile	C
3.5	Data transmission, telemetry, telecommand	D
3.6	Telephony (including sound broadcasting)	E
3.7	Television (video)	F
3.8	Combination of the above	W
3.9	Cases not otherwise covered	X

⁴ ITU-RR AP1 Section IIA AP1-3.

⁵ This excludes time-division multiplex

⁶ In this context the word "information" does not include information of a constant, unvarying nature such as is provided by standard frequency emissions, continuous wave and pulse radars, etc.

2.3 Optional Characteristics for the Classification of Emissions

2.3.1 Fourth symbol – Details of signal(s) (Optional Characteristics for the Classification of Emissions)⁷

	Description	Symbol
4.1	Two-condition code with elements of differing numbers and/or durations	A
4.2	Two-condition code with elements of the same number and duration without error-correction	B
4.3	Two-condition code with elements of the same number and duration with error- correction	C
4.4	Four-condition code in which each condition represents a signal element (or one or more bits)	D
4.5	Multi-condition code in which each condition represents a signal element (of one or more bits)	E
4.6	Multi-condition code in which each condition or combination of conditions represents a character	F
4.7	Sound of broadcasting quality (monophonic)	G
4.8	Sound of broadcasting quality (stereophonic or quadraphonic)	H
4.9	Sound of commercial quality (excluding categories given in 1.10 and 1.11)	J
4.10	Sound of commercial quality with the use of frequency inversion or band- splitting	K
4.11	Sound of commercial quality with separate frequency-modulated signals to control the level of demodulated signal	L
4.12	Monochrome	M
4.13	Colour	N
4.14	Combination of the above	W
4.15	Cases not otherwise covered	X

⁷ ITU-RR AP1 Section IIB AP1-4.

2.3.2 Fifth symbol – Nature of multiplexing (Optional Characteristics for the Classification of Emissions)⁸

	Description	Symbol
5.1	None	N
5.2	Code-division multiplex ⁹	C
5.3	Frequency-division multiplex	F
5.4	Time-division multiplex	T
5.5	Combination of frequency-division multiplex and time-division multiplex	W
5.6	Other types of multiplexing	X

⁸ ITU-RR AP1 Section IIB AP1-5.

⁹ This includes bandwidth expansion techniques.

3 Examples of Emission Designators

Below is an example different bandwidths and how they are written correctly according to ITU standards.

Bandwidth	Unit	Bandwidth Designation
0.002	Hz	H002
0.1	Hz	H100
25.3	Hz	25H3
400	Hz	400H
2.4	kHz	2K40
6	kHz	6K00
12.5	kHz	12K5
180.4	kHz	180K
180.4	kHz	181K
180.7	kHz	181K

Table 1 Examples of Different Bandwidth Designations.

The Emission Designator ‘10M0 G7W WW’ is explained as follows:

Symbol	Description
10M0	10 MHz Bandwidth
G	Phase modulation
7	Composite system with one or more channels containing quantized or digital information, together with one or more channels containing analogue information
W	Combination of type of information to be transmitted
W	Combination of Signal Details
W	Combination of frequency-division multiplex and time-division multiplex

Table 2 Example Emission Designator ‘10M0 G7W WW’ Explained.