Types of Radio Emissions

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The International Telecommunication Union uses an internationally agreed system for classifying radio frequency signals. 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.

An emission designation is of the form **BBBB 123 45**, where **BBBB** is the bandwidth of the signal, **1** is a letter indicating the type of modulation used, **2** is a digit representing the type of modulating signal, **3** is a letter corresponding to the type of information transmitted, **4** is a letter indicating the practical details of the transmitted information, and **5** is a letter that represents the method of multiplexing. The **4** and **5** fields are optional.

This designation system was agreed at the 1979 World Administrative Radio Conference (WARC 79), and gave rise to the Radio Regulations that came into force on 1 January 1982.

Designation details

Bandwidth

The bandwidth is expressed as three digits and a letter that occupies the position normally used for a decimal point. The letter indicates what unit of frequency is used to express the bandwidth. **H** indicates hertz, **K** indicates kilohertz, **M** indicates megahertz, and **G** indicates gigahertz. For instance, "500H" means 500 Hz, and "2M50" means 2.5 MHz.

Type of modulation

N	Unmodulated carrier
A	Double-sideband amplitude modulation (e.g. AM broadcast radio)
H	Single-sideband with full carrier (e.g. as used by CHU)
R	Single-sideband with reduced or variable carrier
J	Single-sideband with suppressed carrier (e.g. Shortwave utility and amateur stations)
B	Independent sideband (two sidebands containing different signals)
C	Vestigial sideband (e.g. NTSC)
F	Frequency modulation (e.g. FM broadcast radio)
G	Phase modulation
D	Combination of AM and FM or PM
P	Sequence of pulses without modulation
K	Pulse amplitude modulation
L	Pulse width modulation (e.g. as used by WWVB)
M	Pulse position modulation

Q	Sequence of pulses, phase or frequency modulation within each pulse
V	Combination of pulse modulation methods
W	Combination of any of the above
X	None of the above

Type of modulating signal

0	No modulating signal
1	One channel containing digital information, no subcarrier
2	One channel containing digital information, using a subcarrier
3	One channel containing analogue information
7	More than one channel containing digital information
8	More than one channel containing analogue information
9	Combination of analogue and digital channels
X	None of the above

Type of transmitted information

N	No transmitted information
A	Aural telegraphy, intended to be decoded by ear, such as Morse code
B	Electronic telegraphy, intended to be decoded by machine (Radioteletype and digital modes)
C	Facsimile (Still images)
D	Telemetry or Telecommand (Remote control or data collection)
E	Telephony (voice or music intended to be listened to by a human)
F	Video (television signals)
W	Combination of any of the above
X	None of the above

Details of information

A	Two-condition code, elements vary in quantity and duration
B	Two-condition code, elements fixed in quantity and duration
C	Two-condition code, elements fixed in quantity and duration, error-correction included
D	Four-condition code, one condition per "signal element"
E	Multi-condition code, one condition per "signal element"
F	Multi-condition code, one character represented by one or more conditions
G	Monophonic broadcast-quality sound
H	Stereophonic or quadraphonic broadcast-quality sound
J	Commercial-quality sound (non-broadcast)

K	Commercial-quality sound—frequency inversion and-or "band-splitting" employed
L	Commercial-quality sound, independent FM signals, such as pilot tones, used to control the demodulated signal
M	Greyscale images or video
N	Full-color images or video
W	Combination of two or more of the above
X	None of the above

Multiplexing

N	None used
C	Code-division (excluding spread spectrum)
F	Frequency-division
T	Time-division
W	Combination of Frequency-division and Time-division
X	None of the above

Common and important examples

N0N
: Continuous, unmodulated carrier - as previously commonly used for radio direction finding (RDF) in marine and aeronautical navigation.

A1A
: Signalling by keying the carrier directly (aka CW or OOK) - as currently used in amateur radio. This is often but not necessarily Morse code.

A2A
: Signalling by keying a tone modulated onto a carrier so that it can easily be heard using an ordinary AM receiver - as previously used for station idents of some RDF transmissions. This is usually but not exclusively Morse code. (An example of modulated continuous wave)

A3E
: AM speech communication - as used for aeronautical VHF communications

F3E
: FM speech communication - as used for marine and many other VHF communications

J3E
: SSB speech communication - as used on HF bands by marine, aeronautical and amateur users

A3E or A3EG
: Normal AM broadcast - as found on public LF and MF bands

F1B
: FSK telegraphy, such as RTTY. [1]

F2D
: Data transmission by frequency modulation of a radio frequency carrier with an audio frequency FSK subcarrier. Often called AFSK/FM.

F8E or F8EH
: Normal FM stereo broadcast - as found on public VHF band, and as the audio component of broadcast television transmissions

G1B
: PSK31 (BPSK31)

C3F or C3FN
: Broadcast television video signals

Note that there is some overlap, so a signal might legitimately be described by two or more designators. In such cases, there is often a traditionally preferred designator