General information

Emission standards

For full details of broadcasting emission standards, please see

- *Technical Planning Guidelines Appendix 1 Emission standard for the Australian Amplitude Modulation Sound Broadcasting Service.*
- *Technical Planning Guidelines Appendix 2 Emission standard for the Australian Frequency Modulation Sound Broadcasting Service.*
- *Technical Planning Guidelines Appendix 3 Emission standard for the Australian Analog Terrestrial Television Service.*
- Australian Standard *AS4599-1999 Digital Television – Terrestrial Broadcasting – Characteristics of digital terrestrial television transmissions.*

The following sections are extracts from those standards.

Australian MF AM Radio Stereo Standard

Australian MF AM radio stations may broadcast stereophonic sound. The Government approved a single standard based on the Motorola C-QAM system, after the then Department of Communications conducted a comprehensive test program in conjunction with representatives of the broadcasting and receiver industry.

THE C-QAM SIGNAL

The AM stereo system adopted by Australia is fully compatible with existing monophonic receivers. The amplitude of the transmitted carrier frequency is modulated by the sum of the left and right channel signals. The stereo information is encoded in the instantaneous phase of the transmitted carrier frequency. At the transmitter, the carrier frequency is divided into two components which are separated by 90 degrees relative to each other, that is, they are in quadrature.

One component is modulated by the sum of the left and right channel signals, while the other is modulated by the difference between the left and right channel signals. Thus, two double sideband suppressed carrier signals in quadrature are generated. These signals are then added vectorially to the carrier. The modulated component due to the sum signal is in phase, and that due to the difference is in quadrature, with the carrier.

Australian VHF FM Radio Standard

Australia uses the 'pilot-tone' system commonly used throughout the world. Principal characteristics of the system used in Australia are set out below:

Frequency Range:	88 – 108 MHz (i)
Channel Centre Frequencies:	88.1, 88.3, ... 107.7, 107.9 MHz
Deviation:	75 kHz
Pre-emphasis/de-emphasis:	50 μseconds
Stereo Channel Subcarrier Frequency:	38 kHz
Pilot Frequency:	19 kHz

The stereo baseband signal occupies a frequency range of 53 kHz.

(i) Note : low power open narrowcasting services are licensed to operate in the band 87.5 MHz to 88.0 MHz.

ANCILLARY COMMUNICATIONS SERVICES

Ancillary communication services (ACS) may also be added to the main program channel. The emission standard for the Australian Frequency Modulation Sound Broadcasting Service permits use of specified sub-carrier frequencies on condition that:

- the use of such sub-carriers does not cause interference to or degradation of the main channel or other channels
- the deviation of the main carrier due to the entire baseband signal, including all ACS signals, does not exceed ±75 kHz and
- the deviation of the main carrier by any one ACS sub-carrier alone does not exceed ±7.5 kHz.

Transmission Standard For The Australian Analog Terrestrial Television Service

RADIATED SIGNAL CHARACTERISTICS

Television channels

The width of the television channel shall be 7 MHz. The channels allocated for Australian television services are shown on page 519.

Location of carriers within the channel

- The nominal vision carrier frequency shall be 1.25 MHz above the lower frequency limit of the channel.
- The frequency of the unmodulated sound carrier for single sound carrier operation, or the lower frequency sound carrier of a dual sound carrier channel shall be 5.5 MHz above the vision carrier frequency.
- The frequency of the unmodulated second sound carrier of a dual sound carrier channel shall be 15.5 times the line frequency (242.1875 kHz) above the frequency of the first unmodulated sound carrier.
- Frequency offsets from the nominal vision carrier frequency may be prescribed by the Australian Communications and Media Authority.

Vision carrier modulation

The vision carrier shall be amplitude modulated by the video signal. Negative modulation shall be employed, that is, a decrease in brightness shall cause an increase in mean vision carrier amplitude.

Modulation levels of the vision carrier

Reference black and blanking levels shall be co-incident and correspond to 76% of the peak vision carrier amplitude. Black level shall be independent of light and shade in the picture. Reference white level shall correspond to 20% of the peak vision carrier amplitude.

Sound carrier modulation

The sound carrier(s) shall be frequency modulated to a maximum frequency deviation of ± 50 kHz by the audio signal. Pre-emphasis shall be 50 μseconds.

Polarisation of the radiated signals

The polarisation of the radiated sound and vision signals shall be the same and shall be as specified by the Australian Communications and Media Authority.

Vision to sound power ratio

The nominal ratio of the vision carrier power at the sync pulse tips to the mean power output of the sound carrier or carriers shall be:

- 10 dB where the station transmits a single sound channel only, or
- 13 dB and 20 dB for the first and second sound carriers respectively where the station transmits dual sound signals.

GENERAL

The Australian television system uses 625 lines and a field frequency of 50 Hz. The colour subcarrier frequency is 4.43361875 MHz and the phase alternation line (PAL) system is used.

Transmission Standard For The Australian Digital Terrestrial Television Service

RADIATED SIGNAL CHARACTERISTICS

Planning for Digital Terrestrial Television Broadcasting (DTTB) is based on the Australian Standard AS4599–1999 *Digital television – Terrestrial broadcasting – Characteristics of digital terrestrial television transmissions.* This standard is based on the European standard for terrestrial digital video broadcasting (DVB-T), but includes a number of variations specific to Australia.

Television channels

The width of the digital television channel shall be 7 MHz, the same as for analog television. Digital television services are also planned using the same channel allocation scheme (as shown on page 519) as for analog television, but not all of these channels are used for digital television as the following table illustrates:

VHF Band I	Channels 0, 1 and 2	Not suitable for digital television broadcasting transmissions as these channels are prone to interference from electrical noise.
VHF Band II	Channels 3, 4 and 5	Used for FM radio and thus no new television services in Australia will be planned using these channels.
VHF Band III	Channels 5A – 12	Suitable for digital transmissions, although no new television services in Australia will be planned using channel 5A as it has been allocated internationally to other services.
UHF Band IV	Channels 28 – 35	Suitable for digital transmissions.
UHF Band V	Channels 36 – 69	Suitable for digital transmissions.

Modulation schemes

DVB-T offers flexibility in the use of transmission mode by supporting a range of modulation schemes, code rates and guard intervals to accommodate different broadcasting requirements. For the purpose of digital channel planning, the reference modulation listed in the table below will be employed. However broadcasters have the option of using other modulation schemes to improve DTTB coverage or data capacity.

Modulation	*Code Rate*	*C/N*	*Guard Interval*	*Carrier Mode*
64–QAM	2/3	20 dB	1/8	8k

Carriers and guard interval

The DVB-T transmission standard allows for the use of either 1705 carriers (known as '2k' mode), or 6817 carriers ('8k' mode). Australian DVB-T receivers are expected to be capable of receiving both 2k and 8k modes.

The centre frequency of the digital television channel is shown in the service listings in this book. It should be noted that for implementation reasons, broadcasters may choose to operate with a +/- 125 kHz offset from the nominal channel centre frequency.

Television Channel Numbers and Frequency Limits

VHF		*UHF*			
BAND I[1]		BAND IV		47	659–666 MHz
0	45– 52 MHz	28	526–533 MHz	48	666–673 MHz
1	56– 63 MHz	29	533–540 MHz	49	673–680 MHz
2	63– 70 MHz	30	540–547 MHz	50	680–687 MHz
		31	547–554 MHz	51	687–694 MHz
BAND II[1]		32	554–561 MHz	52	694–701 MHz
3	85– 92 MHz	33	561–568 MHz	53	701–708 MHz
4	94–101 MHz	34	568–575 MHz	54	708–715 MHz
5	101–108 MHz	35	575–582 MHz	55	715–722 MHz
				56	722–729 MHz
BAND III		BAND V		57	729–736 MHz
5A[2]	137-144 MHz	36	582–589 MHz	58	736–743 MHz
6	174–181 MHz	37	589–596 MHz	59	743–750 MHz
7	181–188 MHz	38	596–603 MHz	60	750–757 MHz
8	188–195 MHz	39	603–610 MHz	61	757–764 MHz
9	195–202 MHz	40	610–617 MHz	62	764–771 MHz
9A	202–209 MHz	41	617–624 MHz	63	771–778 MHz
10[3]	208–215 MHz (superseded)	42	624–631 MHz	64	778–785 MHz
	209–216 MHz (current)	43	631–638 MHz	65	785–792 MHz
11[3]	215–222 MHz (superseded)	44	638–645 MHz	66	792–799 MHz
	216–223 MHz (current)	45	645–652 MHz	67	799–806 MHz
12	223–230 MHz	46	652–659 MHz	68	806–813 MHz
				69	813–820 MHz

Notes:

1. Television Band I (channels 0, 1 & 2) and Band II (channels 3, 4 & 5) are not being considered for new analog television services or for the introduction or ongoing transmission of digital television services.

2. VHF channel 5A is currently within the broadcasting services bands (BSB) and has been recommended for clearance to allow for the introduction of other radiocommunication services. Channel 5A is not being considered for new analog television services or for the introduction or ongoing transmission of digital television services.

3. The majority of existing services on channels 10 and 11 were assigned under the superseded channel arrangement. Services on channels 10 and 11 may be required to shift frequency to align with the current channel arrangement. Any such requirement will be considered on a case by case basis. New services on channels 10 and 11 will be assigned according to the current channel arrangement ie. channel 10 (209–216 MHz) and channel 11 (216–223 MHz).