

# Application Note

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## *Broadcast and Cable Television Frequency Standards*

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# Broadcast and Cable TV Frequency Standards

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## ***Purpose***

The purpose of this application note is to define the standards used, and give a general indication of the countries using those standards.

In the process of defining these standards, the video and audio frequencies for the assigned channels are set forth, for reference.

Note that, while this document is believed to be accurate at the time of publication, it is the ultimate responsibility of the reader to verify the information contained herein before integrating it into the product. This application note is only intended as an early introduction into the RF world for those not yet acquainted. Final responsibility rests with the reader. It may be wise to check with the manufacturer of the specific tuner used for the latest information.

## ***Introduction to the RF world***

RF television channels are initially categorized, by international treaty, into two bands, VHF, which stands for Very High Frequency, and covers the entire spectrum from 30 to 300 MHz, and UHF, which stands for Ultra High Frequency, and covers the spectrum from 300 MHz to 3 GHz. The VHF band is usually further broken into a lower and upper band, known simply as VHF Low Band, and VHF High Band. The FM broadcast band lives in between. This leaves us with VHF-Lo, VHF-Hi, and UHF, for a total of three bands.

There are also three basic standards of transmitting video, depending mostly on the method of encoding color onto the monochrome signal. They are NTSC, PAL, and SECAM.

Within these categories, there are various methods of sending audio, as well as intermixing of standards, resulting in each of the standards being further defined by letters. This evolved over a long period of time, with some abandoned along the way, some still in use, and new ones always being defined.

The standards in current use are listed in Table 1.

Table 1. Comparison of Standards

System	B/G/H	D/K	I	L	M	N <sup>(1)</sup>
Color System	PAL/SECAM		PAL	SECAM	NTSC/PAL-M	PAL
Total Lines	625				525	625
Field Rate	50				59.94	50
Line Rate	15625				15734	15625
Sub-carrier F = (MHz)	4.43361875			$f_{or}=4.40625$ $f_{ob}=4.25000$	3.579545/ 3.575611(PAL-M)	4.43361875 (3.58205625)
Setup (IRE)	0				7.5	7.5 (0)
Channel B/W (MHz)	B7 G/H 8	8			6	6
Video Band- width (MHz)	5	6	5.5	6	4.2	5.0 (4.2)
Audio Carrier F= (MHz)	5.5	6.5	6.0	6.5	4.5	4.5
Notes: (1) Values in parenthesis are referred to as N-Combination.						



## NTSC Overview

The standard used in the United States is referred to as NTSC M.

On December 17, 1953, the Federal Communications Commission (FCC) approved the color television broadcast standards, compatible with the existing 525-line, 60-field/second, 2:1 interlaced monochrome service. This was based on specifications developed by the National Television Standards Committee (NTSC), a voluntary consortium of technical experts from research labs, manufacturers, and broadcasters. Although limited color broadcasting service to the public began on January 23, 1954, it was not generally accepted for another ten years.

The NTSC standards define the method employed to add color information to the originally monochrome signal, by comparing the FM subcarrier frequency to the sampled source burst frequency of 3.579545 MHz, +/- 10 Hz. The compatibility was achieved with older systems, because older systems didn't have the bandwidth to display the carrier in the luminance path. The burst signal was added to turn on the color capacity of color sets, through a circuit in the color receiver known as a color-killer, which was otherwise used to disable color when no burst signal is present.

The letter "M" refers to the line and field rates (525/59.94), video bandwidth (4.2 MHz), FM audio carrier frequency (4.5 MHz), and chroma subcarrier frequency of 3.579545 MHz, with an RF channel bandwidth of 6 MHz.

Figure 1 shows a summary of the ITU designations for NTSC (M) systems.

**Figure 1. Summary ITU Designation for NTSC (M) Systems**

M
Line/Field Rate = 525
FH = 15.734 kHz
FV = 59.94 Hz
FSC = 3.579545 MHz
Blanking Setup = 7.5 IRE
Video Bandwidth = 4.2 MHz
Audio Carrier = 4.5 MHz
Channel Bandwidth = 6 MHz

## NTSC Broadcast Frequencies

### NTSC (M) Broadcast

NTSC (M) is used for both VHF and UHF television broadcast systems. However, in some countries, NTSC (M) is only used for VHF broadcast systems. The following countries use, or are planning to use the NTSC (M) for both VHF and UHF:

Antigua	Aruba
Bolivia	Canada
Chile	Colombia
Costa Rica	Cuba
Caracas	Ecuador
Guatemala	Honduras
Japan	Mexico
Nicaragua	Panama
Peru	Philippines
Puerto Rico	South Korea
USA	Venezuela

The following countries use, or are planning to use NTSC (M) for only VHF broadcast system:

Belize	Bermuda
British Virgin Islands	Burma
El Salvador	Guam
Montserrat	Myanmar
Samoa	St. Christopher and Nevis
Suriname	Taiwan
Trinidad/Tobago	

Table 2 lists the channel assignments for NTSC (M) systems VHF and UHF broadcast frequencies.

**Table 2. VHF and UHF Broadcast Frequencies for NTSC (M) Systems in North and South America (1 of 2)**

Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)	Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)
2	55.25	59.75	54-60	36	603.25	607.75	602-608
3	61.25	65.75	60-66	37	609.25	613.75	608-614
4	67.25	71.75	66-72	38	615.25	619.75	614-620
5	77.25	81.75	76-82	39	621.25	625.75	620-626
6	83.25	87.75	82-88	40	627.25	631.75	626-632
7	175.25	179.75	174-180	41	633.25	637.75	632-638
8	181.25	185.75	180-186	42	639.25	643.75	638-644

**Table 2. VHF and UHF Broadcast Frequencies for NTSC (M) Systems in North and South America (2 of 2)**

Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)	Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)
9	187.25	191.75	186-192	43	645.25	649.75	644-650
10	193.25	197.75	192-198	44	651.25	655.75	650-656
11	199.25	203.75	198-204	45	657.25	661.75	656-662
12	205.25	209.75	204-210	46	663.25	667.75	662-668
13	211.25	215.75	210-216	47	669.25	673.75	668-674
14	471.25	475.75	470-476	48	675.25	679.75	674-680
15	477.25	481.75	476-482	49	681.25	685.75	680-686
16	483.25	487.75	482-488	50	687.25	691.75	686-692
17	489.25	493.75	488-494	51	693.25	697.75	692-698
18	495.25	499.75	494-500	52	699.25	703.75	698-704
19	501.25	505.75	500-506	53	705.25	709.75	704-710
20	507.25	511.75	506-512	54	711.25	715.75	710-716
21	513.25	517.75	512-518	55	717.25	721.75	716-722
22	519.25	523.75	518-524	56	723.25	727.75	722-728
23	525.25	529.75	524-530	57	729.25	733.75	728-734
24	531.25	535.75	530-536	58	735.25	739.75	734-740
25	537.25	541.75	536-542	59	741.25	745.75	740-746
26	543.25	547.75	542-548	60	747.25	751.75	746-752
27	549.25	553.75	548-554	61	753.25	757.75	752-758
28	555.25	559.75	554-560	62	759.25	763.75	758-764
29	561.25	565.75	560-566	63	765.25	769.75	764-770
30	567.25	571.75	566-572	64	771.25	775.75	770-776
31	573.25	577.75	572-578	65	777.25	781.75	776-782
32	579.25	583.75	578-584	66	783.25	787.75	782-788
33	585.25	589.75	584-590	67	789.25	793.75	788-794
34	591.25	595.75	590-596	68	795.25	799.75	794-800
35	597.25	601.75	596-602	69	801.25	805.75	800-806

UHF frequencies from channel 70 to channel 83, formerly allocated to television broadcasting, have been re-allocated. Operation, on a secondary basis, of some television transmitters may continue on these frequencies. They have not been included in this document.

## NTSC in Japan Broadcast Frequencies

Japan also uses NTSC (M), but they have different channel assignments. Table 3 lists the TV channel assignments for NTSC broadcast frequencies in Japan.

**Table 3. VHF and UHF Broadcast Frequencies for NTSC (M) in Japan**

Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
1	91.25	95.75	90-96
2	97.25	101.75	96-102
3	103.25	107.75	102-108
4	171.25	175.75	170-176
5	177.25	181.75	176-182
6	183.25	187.75	182-188
7	189.25	193.75	188-194
8	193.25	197.75	192-198
9	199.25	203.75	198-204
10	205.15	209.75	204-210
11	211.25	215.75	210-216
12	217.25	221.75	216-222
45	663.25	667.75	662-668
46	669.25	673.75	668-674
47	675.25	679.75	674-680
48	681.25	685.75	680-686
49	687.25	691.75	686-692
50	693.25	697.75	692-698
51	699.25	703.75	698-704
52	705.25	709.75	704-710
53	711.25	715.75	710-716
54	717.25	721.75	716-722
55	723.25	727.75	722-728
56	729.25	733.75	728-734
57	735.25	739.75	734-740
58	741.25	745.75	740-746
59	747.25	751.75	746-752
60	753.25	757.75	752-758
61	759.25	763.75	758-764
62	765.25	769.75	764-770

## **NTSC Cable TV Frequencies**

Cable TV is known as Community Antenna Television or CATV. One of the limitations on the number of channels a cable system can carry is the distortion due to intermodulation and cross-modulation products of the numerous carriers. Composite triple beat is a term applied to third and higher-order products, which can greatly degrade the performance of a system. One method used to reduce these effects is the employment of coherent oscillators to regenerate (and convert) carrier frequencies such that they are harmonically related (HRC).

### **HRC**

HRC stands for Harmonic Related Carriers. This is a cable transmission system that transmits on picture carrier frequencies that are multiples of 6 MHz, and starts at 54 MHz. It involves frequency displacements of -1.25 MHz on all standard and supplementary channels except channels 5 and 6, where the displacement is +0.75 MHz.

### **IRC**

IRC stands for Incremental Related Carriers. This is a cable transmission system that transmits on picture carrier frequencies starting at 55.25 MHz and increments each channel by 6 MHz. The result is the same as standard frequencies with the exception of the channels between 67.25 MHz and 91.25 MHz.

The NTSC (M) channel assignment for Cable TV frequencies in North and South America are listed in Table 4, and NTSC (M) for Japan are listed in Table 5.

Table 4. Cable TV Frequencies for NTSC (M) in North and South America (1 of 4)

Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandspread (MHz)	HRC Video Carrier (MHz)	IRC Video Carrier (MHz)
1	73.25	77.75	72-78	72.0036	73.2625
2	55.25	59.75	54-60	54.0027	55.2625
3	61.25	65.75	60-66	60.0030	61.2625
4	67.25	71.75	66-72	66.0033	67.2625
5	77.25	81.75	76-82	78.0039	79.2625
6	83.25	87.75	82-88	84.0042	85.2625
7	175.25	179.75	174-180	174.0087	175.2625
8	181.25	185.75	180-186	180.0090	181.2625
9	187.25	191.75	186-192	186.0093	187.2625
10	193.25	197.75	192-198	192.0096	193.2526
11	199.25	203.75	198-204	198.0099	199.2625
12	205.25	209.75	204-210	204.0102	205.2625
13	211.25	215.75	210-216	210.0105	211.2625
14	121.25	125.75	120-126	120.0060	121.2625
15	127.25	131.75	126-132	126.0063	127.2625
16	133.25	137.75	132-138	132.0066	133.2625
17	139.25	143.75	138-144	138.0069	139.2625
18	145.25	149.75	144-150	144.0072	145.2625
19	151.25	155.75	150-156	150.0075	151.2625
20	157.25	161.75	156-162	156.0078	157.2625
21	163.25	167.75	162-168	162.0081	163.2625
22	169.25	173.75	168-174	168.0084	169.2625
23	217.25	221.75	216-222	216.0108	217.2625
24	223.25	227.75	222-228	222.0111	223.2625
25	229.25	233.75	228-234	228.0114	229.2625
26	235.25	239.75	234-240	234.0117	235.2625
27	241.25	245.75	240-246	240.0120	241.2625
28	247.25	251.75	246-252	246.0123	247.2625
29	253.25	257.75	252-258	252.0126	253.2625
30	259.25	263.75	258-264	258.0129	259.2625
31	265.25	269.75	264-270	264.0132	265.2625
32	271.25	275.75	270-276	270.0135	271.2625
33	277.25	281.75	276-282	276.0138	277.2625

**Table 4. Cable TV Frequencies for NTSC (M) in North and South America (2 of 4)**

Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandspread (MHz)	HRC Video Carrier (MHz)	IRC Video Carrier (MHz)
34	283.25	287.75	282-288	282.0141	283.2625
35	289.25	293.75	288-294	288.0144	289.2625
36	295.25	299.75	294-300	294.0147	295.2625
37	301.25	305.75	300-306	300.0150	301.2625
38	307.25	311.75	306-312	306.0153	307.2625
39	313.25	317.75	312-318	312.0156	313.2625
40	319.25	323.75	318-324	318.0159	319.2625
41	325.25	329.75	324-330	324.0162	325.2625
42	331.25	335.75	330-336	330.0165	331.2625
43	337.25	341.75	336-342	336.0168	337.2625
44	343.25	347.75	342-348	342.0171	342.2625
45	349.25	353.75	348-354	348.0174	349.2625
46	355.25	359.75	354-360	354.0177	355.2625
47	361.25	365.75	360-366	360.0180	361.2625
48	367.25	371.75	366-372	366.0183	367.2625
49	373.25	377.75	372-378	372.0186	373.2625
50	379.25	383.75	378-384	378.0189	379.2625
51	385.25	389.75	384-390	384.0192	385.2625
52	391.25	395.75	390-396	390.0195	391.2625
53	397.25	401.75	396-402	396.0198	397.2625
54	403.25	407.75	402-408	402.0201	403.2625
55	409.25	413.75	408-414	408.0204	409.2625
56	415.25	419.75	414-420	414.0207	415.2625
57	421.25	425.75	420-426	420.0210	421.2625
58	427.25	431.75	426-432	426.0213	427.2625
59	433.25	437.75	432-438	432.0216	433.2625
60	439.25	443.75	438-444	438.0219	439.2625
61	445.25	449.75	444-450	444.0222	445.2625
62	451.25	455.75	450-456	450.0225	451.2625
63	457.25	461.75	456-462	456.0228	457.2625
64	463.25	467.75	462-468	462.0231	463.2625
65	469.25	473.75	468-474	468.0234	469.2625
66	475.25	479.75	474-480	474.0237	475.2625

Table 4. Cable TV Frequencies for NTSC (M) in North and South America (3 of 4)

Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandspread (MHz)	HRC Video Carrier (MHz)	IRC Video Carrier (MHz)
67	481.25	485.75	480-486	480.0240	481.2625
68	487.25	491.75	486-492	486.0243	487.2625
69	493.25	497.75	492-498	492.0246	493.2625
70	499.25	503.75	498-504	498.0249	499.2625
71	505.25	509.75	504-510	504.0252	505.2625
72	511.25	515.75	510-516	510.0255	511.2625
73	517.25	521.75	516-522	516.0258	517.2625
74	523.25	527.75	522-528	522.0261	523.2625
75	529.25	533.75	528-534	528.0264	529.2625
76	535.25	539.75	534-540	534.0267	535.2625
77	541.25	545.75	540-546	540.0270	541.2625
78	547.25	551.75	546-552	546.0273	547.2625
79	553.25	557.75	552-558	552.0276	553.2625
80	559.25	563.75	558-564	558.0279	559.2625
81	565.25	569.75	564-570	564.0282	565.2625
82	571.25	575.75	570-576	570.0285	571.2625
83	577.25	581.75	576-582	576.0288	577.2625
84	583.25	587.75	582-588	582.0291	583.2625
85	589.25	593.75	588-594	588.0294	589.2625
86	595.25	599.75	594-600	594.0297	595.2625
87	601.25	605.75	600-606	600.0300	601.2625
88	607.25	611.75	606-612	606.0303	607.2625
89	613.25	617.75	612-618	612.0306	613.2625
90	619.25	623.75	618-624	618.0309	619.2625
91	625.25	629.75	624-630	624.0312	625.2625
92	631.25	635.75	630-636	630.0315	631.2625
93	637.25	641.75	636-642	636.0318	637.2625
94	643.25	647.75	642-648	642.0321	643.2625
95	91.25	95.75	90-96	90.0045	91.2625
96	97.25	101.75	96-102	96.0048	97.2625
97	103.25	107.75	102-108	102.0051	103.2625
98	109.25	113.75	108-114	108.0250	109.2750
99	115.25	119.75	114-120	114.0250	115.2750



**Table 4. Cable TV Frequencies for NTSC (M) in North and South America (4 of 4)**

Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandspread (MHz)	HRC Video Carrier (MHz)	IRC Video Carrier (MHz)
100	649.25	653.75	648-654	—	—
101	655.25	659.75	654-660	—	—
102	661.25	665.75	660-666	—	—
103	667.25	671.75	666-672	—	—
104	673.25	677.75	672-678	—	—
105	679.25	683.75	678-684	—	—
106	685.25	689.75	684-690	—	—
107	691.25	695.75	690-696	—	—
108	697.25	701.75	696-702	—	—
109	703.25	707.75	702-708	—	—
110	709.25	713.75	708-714	—	—
111	715.25	719.75	714-720	—	—
112	721.25	725.75	720-726	—	—
113	727.25	731.75	726-732	—	—
114	733.25	737.75	732-738	—	—
115	739.25	743.75	738-744	—	—
116	745.25	749.75	744-750	—	—
117	751.25	755.75	750-756	—	—
118	757.25	761.75	756-762	—	—
119	763.25	767.75	762-768	—	—
120	769.25	773.75	768-774	—	—
121	775.25	779.75	774-780	—	—
122	781.25	785.75	780-786	—	—
123	787.25	791.75	786-792	—	—
124	793.25	797.75	792-798	—	—
125	799.25	803.75	798-804	—	—

Table 5. Cable TV Frequencies for NTSC in Japan (1 of 2)

Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)	Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)
1	91.25	95.75	90-96	—	—	—	—
2	97.25	101.75	96-102	—	—	—	—
3	103.25	107.75	102-108	—	—	—	—
4	171.25	175.75	170-176	—	—	—	—
5	177.25	181.75	176-182	—	—	—	—
6	183.25	187.75	182-188	—	—	—	—
7	189.25	193.75	188-194	—	—	—	—
8	193.25	197.75	194-198	—	—	—	—
9	199.25	203.75	198-204	—	—	—	—
10	205.25	209.75	204-210	—	—	—	—
11	211.25	215.75	210-216	—	—	—	—
12	217.25	221.75	216-222	—	—	—	—
C13	109.25	113.75	108-114	C39	319.25	323.25	318-324
C14	115.25	119.75	114-120	C40	325.25	329.75	324-330
C15	121.25	125.75	120-126	C41	331.25	335.75	330-336
C16	127.25	131.75	126-132	C42	337.25	341.75	336-342
C17	133.25	137.75	132-138	C43	343.25	347.75	342-348
C18	139.25	143.75	138-144	C44	349.25	353.75	348-354
C19	145.25	149.75	144-150	C45	355.25	359.75	354-360
C20	151.25	155.75	150-156	C46	361.25	365.75	360-366
C21	157.25	161.75	156-162	C47	367.25	371.75	366-372
C22	165.25	169.75	164-170	C48	373.25	377.75	372-378
C23	223.25	227.75	222-228	C49	379.25	383.75	378-384
C24	231.25	235.75	230-236	C50	385.25	389.75	384-390
C25	237.25	241.75	236-242	C51	391.25	395.75	390-396
C26	243.25	247.75	242-248	C52	397.25	401.75	396-402
C27	249.25	253.75	248-254	C53	403.25	407.75	402-408
C28	253.25	257.75	252-258	C54	409.25	413.75	408-414
C29	259.25	263.75	258-264	C55	415.25	419.75	414-420
C30	265.25	269.75	264-270	C56	421.25	425.75	420-426
C31	271.25	275.75	270-276	C57	427.25	431.75	426-432
C32	277.25	281.75	276-282	C58	433.25	437.75	432-438

**Table 5. Cable TV Frequencies for NTSC in Japan (2 of 2)**

Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)	Cable Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Band-Spread (MHz)
C33	283.25	287.75	282-288	C59	439.25	443.75	438-444
C34	289.25	293.75	288-294	C60	445.25	449.75	444-450
C35	295.25	299.75	294-300	C61	451.25	455.75	450-456
C36	301.25	305.75	300-306	C62	457.25	461.75	456-462
C37	307.25	311.75	306-312	C63	463.25	467.75	462-468
C38	313.25	317.75	312-318	–	–	–	–

## PAL Overview

PAL stands for Phase Alternate Line system. It was based on the NTSC system then enhanced to overcome the high order of phase and amplitude integrity required during broadcast to avoid color distortion. Europe delayed adapting a color television standard, evaluating various systems between 1953 and 1967 that were compatible with their 625-line, 50-field/second, 2:1-interlaced monochrome standard. The PAL system implements a line-by-line reversal of the phase of the color signal components. Broadcasting began in 1967 in Germany and United Kingdom, with each using a slightly different variant of PAL system.

Figure 2 shows the ITU designations for PAL systems. The letters “I, B, G, H, M, D/K, N, and combination N” refer to the monochrome standard for line and field rate (typically 625/50), video bandwidth (4.2, 5.0, 5.5, or 6.0 MHz), audio carrier relative frequency, color reference subcarrier frequency, and RF channel bandwidth (6.0, 7.0, or 8.0 MHz). The “PAL” refers to the method employed to add color information to the monochrome signal.

**Figure 2. Summary ITU Designation for PAL Systems**

<p><b>I</b></p> <p>Line/Field = 625 FH = 15.625 kHz FV = 50 Hz FSC = 4.43361875 MHz</p> <p>Blanking Setup = 0 IRE Video Bandwidth = 5.5 MHz Audio Carrier = 6.0 MHz Channel Bandwidth = 8 MHz</p>	<p><b>B, G, H</b></p> <p>Line/Field = 625 FH = 15.625 kHz FV = 50 Hz FSC = 4.43361875 MHz</p> <p>Blanking Setup = 0 IRE Video Bandwidth = 5.0 MHz Audio Carrier = 5.5 MHz Channel Bandwidth: B = 7 MHz G, H = 8 MHz</p>
<p><b>M</b></p> <p>Line/Field = 525 FH = 15.750 kHz FV = 59.94 Hz FSC = 3.57561149 MHz</p> <p>Blanking Setup = 7.5 IRE Video Bandwidth = 4.2 MHz Audio Carrier = 4.5 MHz Channel Bandwidth = 6 MHz</p>	<p><b>D/K</b></p> <p>Line/Field = 625 FH = 15.625 kHz FV = 50 Hz FSC = 4.43361875 MHz</p> <p>Blanking Setup = 0 IRE Video Bandwidth = 6.0 MHz Audio Carrier = 6.5 MHz Channel Bandwidth = 8 MHz</p>
<p><b>N</b></p> <p>Line/Field = 625 FH = 15.625 kHz FV = 50 Hz FSC = 4.43361875 MHz</p> <p>Blanking Setup = 7.5 IRE Video Bandwidth = 4.2 MHz Audio Carrier = 4.5 MHz Channel Bandwidth = 6 MHz</p>	<p><b>Combination N</b></p> <p>Line/Field = 625 FH = 15.625 kHz FV = 50 Hz FSC = 3.58205625 MHz</p> <p>Blanking Setup = 0 IRE Video Bandwidth = 4.2 MHz Audio Carrier = 4.5 MHz Channel Bandwidth = 6 MHz</p>

## PAL Broadcast Frequencies

### PAL (B)

PAL (B) is used for only VHF transmission, except for Australia. Australia supports both VHF and UHF transmission.

### VHF Broadcast Frequencies

The following countries use PAL (B) for VHF transmission:

Albania	Algeria
Australia	Austria
Bahrain	Bangladesh
Belgium	Bosnia-Herzegovina
Brunei Darussalam	Cambodia
Cameroon	Croatia
Cyprus	Denmark
Egypt	Equatorial Guinea
Ethiopia	Finland
Germany	Ghana
Gibraltar	Greenland
Iceland	India
Indonesia	Israel
Italy	Jordan
Kenya	Kuwait
Liberia	Libya
Luxembourg	Malaysia
Maldives	Malta
Nepal	Netherlands
New Zealand	Nigeria
Norway	Oman
Pakistan	Papua New Guinea
Portugal	Qatar
Sao Tome and Principe	Saudi Arabia
Seychelles	Sierra Leone
Singapore	Slovenia
Somali	Spain
Sri Lanka	Sudan
Swaziland	Sweden
Switzerland	Syria
Thailand	Tunisia
Turkey	Uganda
United Arab Emirates	Yemen

Table 6 lists the video and audio frequencies for the assigned channels of PAL (B) systems in Europe, Italy, New Zealand, and Australia.

Table 6. PAL (B) VHF Frequencies (1 of 2)

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
Europe (except Italy, France, OIRT)	2	48.25	53.75	47-54
	3	55.25	60.75	54-61
	4	62.25	67.75	61-68
	5	175.25	180.75	174-181
	6	182.25	187.75	181-188
	7	189.25	194.75	188-195
	8	196.25	201.75	195-202
	9	203.25	208.75	202-209
	10	210.25	215.75	209-216
	11	217.25	222.75	216-223
	12	224.25	229.75	223-230
Italy	A	53.75	59.25	52.5-59.5
	B	62.25	67.75	61-68
	C	82.25	87.75	81-88
	D	175.25	180.75	174-181
	E	183.75	189.25	182.5-189.5
	F	192.25	197.75	191-198
	G	201.25	206.75	200-207
	H	210.25	215.75	209-216
	H-1	217.25	222.75	216-223
	H-2	224.25	229.75	223-230
New Zealand	1	45.25	50.75	44-51
	2	55.25	60.75	54-61
	3	62.25	67.75	61-68
	4	175.25	180.75	174-181
	5	182.25	187.75	181-188
	6	189.25	194.75	188-195
	7	196.25	201.75	195-202
	8	203.25	208.75	202-209
	9	210.25	215.75	209-216
	10	217.25	222.75	216-223

**Table 6. PAL (B) VHF Frequencies (2 of 2)**

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
Australia	0	46.25	51.75	45-52
	1	57.25	62.75	56-63
	2	64.25	69.75	63-70
	3	86.25	91.75	85-92
	4	95.25	100.75	94-101
	5	102.25	107.75	101-108
	5A	138.25	143.75	137-144
	6	175.25	180.75	174-181
	7	182.25	187.75	181-188
	8	189.25	194.75	188-195
	9	196.25	201.75	195-202
	10	209.25	214.75	108-215
	11	216.25	221.75	215-222

**UHF Broadcast Frequencies**

Australia also uses PAL (B) for UHF broadcast. Their channel assignments are in Table 7.

**NOTE:** Starred (\*) European channels 21-27 are used for cable systems in Australia.

**Table 7. PAL (B) UHF Frequencies (1 of 2)**

Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Channel	Video Carrier (MHz)	Audio Carrier (MHz)
21 E*	471.25	476.75	46	653.25	658.75
22 E*	479.25	485.75	47	660.25	665.75
23 E*	487.25	492.75	48	667.25	672.75
24 E*	495.25	500.75	49	674.25	679.75
25 E*	503.25	508.75	50	681.25	686.75
26 E*	511.25	516.75	51	688.25	693.75
27 E*	519.25	524.75	52	695.25	700.75
28	527.25	532.75	53	702.25	707.75
29	534.25	539.75	54	709.25	714.75
30	541.25	546.75	55	716.25	721.75
31	548.25	553.75	56	723.25	728.75
32	55.25	560.75	57	730.25	735.75
33	562.25	567.75	58	737.25	742.75

Table 7. PAL (B) UHF Frequencies (2 of 2)

Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Channel	Video Carrier (MHz)	Audio Carrier (MHz)
34	569.25	574.75	59	744.25	749.75
35	576.25	581.75	60	751.25	765.75
36	583.25	588.75	61	758.25	763.75
37	590.25	595.75	62	765.25	770.75
38	597.25	602.75	63	772.25	777.75
39	604.25	609.75	64	779.25	784.75
40	611.25	616.75	65	786.25	791.75
41	618.25	623.75	66	793.25	798.75
42	625.25	630.75	67	800.25	805.75
43	632.25	637.75	68	807.25	812.75
44	639.25	644.75	69	814.25	819.75
45	646.25	651.75	–	–	–

**PAL (D/K)**

PAL (D/K) is used for both VHF and UHF transmission. Korea and Romania only support VHF. Tables 8 and 9 list the video and audio frequencies for the assigned VHF and UHF channels, respectively, of the countries using a PAL (D/K) system.

**VHF Broadcast Frequencies**

Table 8. PAL (D/K) VHF Frequencies

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
China Korea Romania	1	49.75	56.25	48.5-56.5
	2	57.75	64.25	56.5-64.5
	3	65.75	72.25	64.5-72.5
	4	77.25	83.75	76.0-84.0
	5	85.25	91.75	84.0-92.0
	6	168.25	174.75	167-175
	7	176.25	182.75	175-183
	8	184.25	190.75	183-191
	9	192.25	198.75	191-199
	10	200.25	206.75	199-207
	11	208.25	214.75	207-215
	12	216.25	222.75	215-223



## UHF Broadcast Frequencies

Table 9. PAL (D/K) UHF Frequencies (1 of 2)

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
China	13	471.25	477.75	470-478
	14	479.25	485.75	478-486
	15	487.25	493.75	486-494
	16	493.25	501.75	494-502
	17	503.25	509.75	502-510
	18	511.25	517.75	510-518
	19	519.25	525.75	518-526
	20	527.25	533.75	526-534
	21	535.25	541.75	534-542
	22	543.25	549.75	542-550
	23	551.25	557.75	550-558
	24	559.25	565.75	558-566
	25	607.25	613.75	606-614
	26	615.25	621.75	614-622

Table 9. PAL (D/K) UHF Frequencies (2 of 2)

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
China	27	623.25	629.75	622-630
	28	631.25	637.75	630-638
	29	639.25	645.75	638-646
	30	647.25	653.75	646-654
	31	655.25	661.75	654-662
	32	663.25	669.75	662-670
	33	671.25	677.75	670-678
	34	679.25	685.75	678-686
	35	687.25	693.75	686-694
	36	695.25	701.75	694-702
	37	703.25	709.75	702-710
	38	711.25	717.75	710-718
	39	719.25	725.75	718-726
	40	727.25	733.75	726-734
	41	735.25	741.75	734-742
	42	743.25	749.75	742-750
	43	751.25	757.75	750-758
	44	759.25	765.75	758-766
	45	767.25	773.75	766-774
	46	775.25	781.75	774-782
	47	783.25	789.75	782-790
	48	791.25	797.75	790-798
	49	799.25	805.75	798-806
	50	807.25	813.75	806-814
	51	815.25	821.75	814-822
	52	823.25	829.75	822-830
	53	831.25	837.75	830-838
	54	839.25	845.75	838-846
	55	847.25	853.75	846-854
	56	855.25	861.75	854-862
	57	863.25	869.75	862-870

**PAL (M)**

PAL (M) is used for both VHF and UHF transmission. Only Brazil uses PAL (M). Table 10 lists the channel assignments and frequencies for the PAL (M) VHF/UHF broadcast system.

**Table 10. PAL (M) VHF/UHF Frequencies**

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)
Brazil	2	55.25	59.75
	3	61.25	66.75
	4	67.25	71.75
	5	77.25	81.75
	6	83.25	87.75
	7	175.25	179.75
	8	181.25	185.75
	9	187.25	191.75
	10	193.25	197.75
	11	199.25	203.75
	12	205.25	209.75
	13	211.25	215.75

**PAL (N)**

PAL (N) is used for both VHF and UHF transmission. Argentina, Paraguay, Uruguay are using PAL (N) for their broadcast TV. Uruguay only supports VHF transmission, and Argentina uses a modified PAL (N), called “combination N”.

Table 11 lists the TV channel assignments for the countries using PAL (N) broadcast frequencies.

**Table 11. PAL (N) VHF/UHF Frequencies**

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)
Argentina Paraguay Uruguay	2	55.25	59.75
	3	61.25	65.75
	4	67.25	71.75
	5	77.25	81.75
	6	83.25	87.75
	7	175.25	179.75
	8	181.25	185.75
	9	187.25	191.75
	10	193.25	197.75
	11	199.25	203.75
	12	205.25	209.75
	13	211.25	215.75

**PAL (G, H, I)**

PAL (I) is used for both VHF and UHF transmission. PAL (G) and PAL (H) are used for only UHF transmission.

**VHF Broadcast Frequencies**

The following countries use PAL (I) for VHF transmission:

Angola	Botswana
Gambia	Guinea-Bissau
Ireland	Lesotho
Malawi	Namibia
South Africa	Tanzania
United Kingdom	Zanzibar

Table 12 lists the video and audio frequencies for the assigned channels of PAL (I) system in Ireland, South Africa, and Angola.

**Table 12. PAL (I) VHF Frequencies**

Countries	Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
Ireland	A	45.75	51.75	44.5-52.5
	B	53.75	59.75	52.5-60.5
	C	61.75	67.75	60.5-68.5
	D	175.25	181.25	174-182
	E	183.25	189.25	182-190
	F	191.25	197.25	190-198
	G	199.25	205.25	198-206
	H	207.25	213.25	206-214
	J	215.25	221.25	214-222
South Africa	4	175.25	181.25	174-182
	5	183.25	189.25	182-190
	6	191.25	197.25	190-198
	7	199.25	205.25	198-206
	8	207.25	213.25	206-214
	9	215.25	221.25	214-222
	10	223.25	229.25	222-230
	11	231.25	237.25	230-238
	12	239.25	245.25	238-246
	13	247.43	253.43	246-254
Angola	1	43.25	49.25	43.5-49.5
	2	52.25	58.25	52.5-58.5
	3	60.25	66.25	60.5-66.5
	4	175.25	181.25	174-182
	5	183.25	189.25	182-190
	6	191.25	197.25	190-198
	7	199.25	205.25	198-206
	8	207.25	213.25	206-214
	9	215.25	221.25	214-222

**UHF Broadcast Frequencies**

The following countries use PAL (G) for UHF transmission:

Albania	Algeria	Austria
Bahrain	Bosnia	Cambodia
Cameroon	Croatia	Cyprus
Denmark	Egypt	Ethiopia
Equatorial Guinea	Finland	Germany
Gibraltar	Greenland	Iceland
Israel	Italy	Jordan
Kenya	Kuwait	Liberia
Libya	Luxembourg	Malaysia
Monaco	Mozambique	Netherlands
New Zealand	Norway	Oman
Pakistan	Papua New Guinea	Portugal
Qatar	Romania	Sierra Leone
Singapore	Slovenia	Somalia
Spain	Sri Lanka	Sudan
Swaziland	Sweden	Switzerland
Syria	Thailand	Tunisia
Turkey	Yemen	United Arab Emirates
Zambia	Zimbabwe	

Only Belgium uses PAL (H), while Hong Kong and the United Kingdom use PAL (I) for UHF transmission.

Table 13 lists the UHF frequencies and channel assignments for PAL (G, H, I) systems that are used in the above countries.

**Table 13. PAL (G, H, I) UHF Frequencies (1 of 2)**

Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	
		PAL (G, H)	PAL (I)
21	471.25	476.75	477.25
22	479.25	484.75	485.25
23	487.25	492.25	493.25
24	495.25	500.75	501.25
25	503.25	508.75	509.25
26	511.25	516.75	517.25
27	519.25	524.75	525.25
28	527.25	532.75	533.25
29	535.25	540.75	541.25
30	543.25	548.75	549.25
31	551.25	556.75	557.25
32	559.25	564.75	565.25
33	567.25	572.75	573.25
34	575.25	580.75	581.25
35	583.25	588.75	589.25
36	591.25	596.75	597.25
37	599.25	604.75	605.25
38	607.25	612.75	613.25
39	615.25	620.75	621.25
40	623.25	628.75	629.25
41	631.25	636.75	637.25
42	639.25	644.75	645.25
43	647.25	652.75	653.25
44	655.25	660.75	661.25
45	663.25	668.75	669.25
46	671.25	676.75	677.25
47	679.25	684.75	685.25
48	687.25	692.75	693.25
49	695.25	700.75	701.25
50	703.25	708.75	709.25
51	711.25	716.75	717.25
52	719.25	724.75	725.25

Table 13. PAL (G, H, I) UHF Frequencies (2 of 2)

Broadcast Channel	Video Carrier (MHz)	Audio Carrier (MHz)	
		PAL (G, H)	PAL (I)
53	727.25	732.75	733.25
54	735.25	740.75	741.25
55	743.25	748.75	749.25
56	751.25	756.75	757.25
57	759.25	764.75	765.25
58	767.25	772.75	773.25
59	775.25	780.75	781.25
60	783.25	788.75	789.25
61	791.25	796.75	797.25
62	799.25	804.75	805.25
63	807.25	812.75	813.25
64	815.25	820.75	821.25
65	823.25	828.75	829.25
66	831.25	836.75	837.25
67	839.25	844.75	845.25
68	847.25	852.75	853.25
69	855.25	860.75	861.25
70	863.25	878.75	869.25
71	871.25	876.75	877.25
72	879.25	884.75	885.25
73	887.25	892.75	893.25
74	895.25	900.75	901.25
75	903.25	908.75	909.25
76	911.25	916.75	917.25
77	919.25	924.75	925.25
78	927.25	932.75	933.25
79	935.25	940.75	941.25



## PAL Cable TV Frequencies

Table 14 lists the channel assignments for Cable frequencies of PAL (B, G).

**Table 14. PAL (B, G) Cable Frequencies**

CABLE CHANNEL	VIDEO CARRIER (MHZ)	AUDIO CARRIER (MHZ)	CHANNEL RANGE (MHZ)	CABLE CHANNEL	VIDEO CARRIER (MHZ)	AUDIO CARRIER (MHZ)	CHANNEL RANGE (MHZ)
E 2	48.25	53.75	47-54	S 15	259.25	264.75	258-265
E 3	55.25	60.75	54-61	S 16	266.25	271.75	265-272
E 4	62.25	67.75	61-68	S 17	273.25	278.75	272-279
S 01	69.25	74.75	68-75	S 18	280.25	285.75	279-286
S 02	76.25	81.75	75-82	S 19	287.25	292.75	286-293
S 03	83.25	88.75	82-89	S 20	294.25	299.75	293-300
S 1	105.25	110.75	104-111	S 21	303.25	308.75	302-310
S 2	112.25	117.75	111-118	S 22	311.25	316.75	310-318
S 3	119.25	124.75	118-125	S 23	319.25	324.75	318-326
S 4	126.25	131.75	125-132	S 24	327.25	332.75	326-334
S 5	133.25	138.75	132-139	S 25	335.25	340.75	334-342
S 6	140.75	145.75	139-146	S 26	343.25	348.75	342-350
S 7	147.75	152.75	146-153	S 27	351.25	356.75	350-358
S 8	154.75	159.75	153-160	S 28	359.25	364.75	358-366
S 9	161.75	166.75	160-167	S 29	367.25	372.75	366-374
S 10	168.75	173.75	167-174	S 30	375.25	380.75	374-382
E 5	175.25	180.75	174-181	S 31	383.25	388.75	382-390
E 6	182.25	187.75	181-188	S 32	391.25	396.75	390-398
E 7	189.25	194.75	188-195	S 33	399.25	404.75	398-406
E 8	196.25	201.75	195-202	S 34	407.25	412.75	406-414
E 9	203.25	208.75	202-209	S 35	415.25	420.75	414-422
E 10	21.25	215.75	209-216	S 36	423.25	428.75	422-430
E 11	217.25	222.75	216-223	S 37	431.25	436.75	430-438
E 12	224.25	229.75	223-230	S 38	439.25	444.75	438-446
S 11	231.25	236.75	230-237	S 39	447.25	452.75	446-454
S 12	238.25	243.75	237-244	S 40	455.25	460.75	454-462
S 13	245.25	250.75	244-251	S 41	463.25	468.75	462-470
S 14	252.25	257.75	251-258	—	—	—	—

## SECAM Overview

SECAM stands for *Sequentiel Couleur Avec Memoire* or *Sequential Color with Memory*. It was developed in France, with broadcasting starting in 1967. The two pieces of color information (hue and saturation) that need to be added to a monochrome signal (intensity) could be transmitted on alternate lines, avoiding the possibility of crosstalk between the color components. The receiver requires a one-line memory to store one line so that it is concurrent with the next line and also requires the addition of the line-switching identification technique. Like PAL, SECAM is a 625-line, 50-field/second, 2:1 interlaced system. The sub-carrier phase information in the SECAM system carries no picture information. SECAM also requires some means of identifying the line-switching sequence between the encoding and decoding functions.

Figure 3 shows the ITU designation for SECAM systems. The letters “D, K, K1, L, B, G” refer to the monochrome standard for line and field rates (625/50), video bandwidth (5.0 or 6.0 MHz), audio carrier relative frequency, and RF channel bandwidth. The SECAM refers to the technique to add color information to the monochrome signal.

**Figure 3. ITU Designation for SECAM Systems**

D, K, K1, L	B, G
Line/Field = 625 FH = 15.625 kHz FV = 50 Hz  Blanking Setup = 0 IRE Video Bandwidth = 6.0 MHz Audio Carrier = 6.5 MHz Channel Bandwidth = 8 MHz	Line/Field = 625 FH = 15.625 kHz FV = 50 Hz  Blanking Setup = 0 IRE Video Bandwidth = 5.0 MHz Audio Carrier = 5.5 MHz Channel Bandwidth: B = 7 MHz G = 8 MHz

## SECAM Usage by Country

**NOTE:** Due to limited availability of SECAM frequency information for some formats, not all channel frequencies are listed here. The formats are still listed, however, as placeholders, and to inform the reader to be aware they exist.

**SECAM (B)**

SECAM (B) is used only for VHF transmission. The following countries use SECAM (B) system.

Djibouti	Iraq
Greece	Lebanon
Iran	Mali
Mauritania	Mauritius
Morocco	

Table 15 lists the video and audio frequencies for the assigned channels of SECAM (B) system in Morocco.

**Table 15. SECAM (B) VHF Broadcast Frequencies for Morocco**

Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
4	163.25	168.75	162-169
5	171.25	176.75	170-177
6	179.25	184.75	178-185
7	187.25	192.75	186-193
8	195.25	200.75	194-201
9	203.25	208.75	202-209
10	211.25	216.75	210-217

**SECAM (D)**

The following countries use SECAM (D) system. SECAM (D) is used only for VHF.

Afghanistan	Kazakhstan
Armenia	Lithuania
Azerbaijan	Mongolia
Belarus	Moldova
Bulgaria	Poland
Czech Republic	Russia
Estonia	Slovak Republic
Georgia	Ukraine
Hungary	Vietnam

**SECAM (G)**

The following countries use SECAM (G). SECAM (G) is used only for UHF transmission.

Greece	Mauritius
Iran	Morocco
Iraq	Saudi Arabia
Mali	

**SECAM (K)**

The following countries use SECAM (K). SECAM (K) is used only for UHF transmission.

Armenia	Lithuania
Azerbaijan	Madagascar
Bulgaria	Moldova
Czech Republic	Poland
Estonia	Russia
Georgia	Slovak Republic
Hungary	Ukraine
Kazakhstan	Vietnam

**SECAM (K1)**

The following countries use the SECAM (K1) system. SECAM (K1) is used for both VHF and UHF transmission unless only VHF or UHF is supported (as indicated by V or U).

Benin	Cape Verde
Burkina Faso	Central African Republic
Burundi	Chad
Niger	Comoros
Rwanda	Congo
Senegal	Gabon
Togo	Madagascar (V)
Zaire	Djibouti (V)

**SECAM (L)**

Only France uses SECAM (L). SECAM (L) is used for both VHF and UHF transmission.

Table 16 lists the video and audio frequencies of the assigned channels for VHF SECAM (L) system in France.

**Table 16. SECAM (L) VHF Broadcast Frequencies for France**

Channel	Video Carrier (MHz)	Audio Carrier (MHz)	Bandwidth (MHz)
A	47.75	41.25	41-49
B	55.75	49.25	49-57
C	63.75	57.25	57-65
C1	60.50	54.00	53.75-61.75
1	176.0	182.50	174.75-182.75
2	184.0	190.50	182.75-190.75
3	192.0	198.50	190.75-198.75
4	200.0	206.50	198.75-206.75
5	208.0	214.50	206.75-214.75
6	216.0	222.50	214.75-222.75

Table 17 lists the video and audio frequencies of the assigned channels for the countries using UHF SECAM (G, K, and L) systems.

**Table 17. SECAM (G, K, L) UHF Broadcast Frequencies for France (1 of 2)**

Channel	Bandwidth (MHz)	Video Carrier (MHz)	Audio Carrier (MHz)	
			SECAM (G)	SECAM (K, L)
21	470-478	471.25	476.75	477.75
22	478-486	479.25	484.75	485.75
23	486-494	487.25	492.25	493.75
24	494-502	495.25	500.75	501.75
25	502-510	503.25	508.75	509.75
26	510-518	511.25	516.75	517.75
27	518-526	519.25	524.75	525.75
28	526-534	527.25	532.75	533.75
29	534-542	525.25	540.75	541.75
30	542-550	543.25	548.75	549.75
31	550-558	551.25	556.75	557.75
32	558-566	559.25	564.75	565.75

Table 17. SECAM (G, K, L) UHF Broadcast Frequencies for France (2 of 2)

Channel	Bandwidth (MHz)	Video Carrier (MHz)	Audio Carrier (MHz)	
			SECAM (G)	SECAM (K, L)
33	566-574	567.25	572.75	573.75
34	574-582	575.25	580.75	581.75
35	582-590	583.25	588.75	589.75
36	590-598	591.25	596.75	597.75
37	598-606	599.25	604.75	605.75
38	606-614	607.25	612.75	613.75
39	614-622	615.25	620.75	621.75
40	622-630	623.25	628.75	629.75
41	630-638	631.25	636.75	637.75
42	638-646	639.25	644.75	645.75
43	646-654	647.25	652.75	653.75
44	654-662	655.25	660.75	661.75
45	662-670	663.25	668.75	669.75
46	670-678	671.25	676.75	677.75
47	678-686	679.25	684.75	685.75
48	686-694	687.25	692.75	693.75
49	694-702	695.25	700.75	701.75
50	702-710	703.25	708.75	709.75
51	710-718	711.25	716.75	717.75
52	718-726	719.25	724.75	725.75
53	726-734	727.25	732.75	733.75
54	734-742	735.25	740.75	741.75
55	742-750	743.25	748.75	749.75
56	750-758	751.25	756.75	757.75
57	758-766	759.25	764.75	765.75
58	766-774	767.25	772.75	773.75
59	774-782	775.25	780.75	781.75
60	782-790	783.25	788.75	789.75
61	790-798	791.25	796.75	797.75
68	846-854	799.25	804.75	853.75
69	854-862	807.25	812.75	861.75

## **Summary**

Video and audio bandwidths of NTSC and PAL systems differ, therefore the channel assignment for TV Broadcast and Cable TV of NTSC and PAL also vary. PAL video systems have several variations of video bandwidth and audio subcarriers, and it was based on NTSC but enhanced to avoid color distortion. SECAM is similar to PAL, but it requires the addition of a line-switching identification technique.

## **Credits**

The tables of video and audio frequencies for assigned channels of NTSC, PAL, and SECAM video systems listed in this application note were based on the ITU-R BT.470-4 (1995) documentation, the book “Video Demystified”, by Keith Jack, and the Color TV Pattern Generator, Model No. PM5415/PM5418 manual, by Philips.







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