



## International Standards

The following charts are designed to help specify equipment for foreign countries. This White Paper will discuss the 3 primary factors that affect the compatibility of audio/video electronics when moved from one country to another. These factors are:

- 1) What is the typical AC outlet voltage and frequency in use.
- 2) What is the TV system in use.
- 3) What is the color format in use.

### AC POWER SPECS

In the United States, our power ranges from 110VAC to 120VAC (power company tolerances typically allow a 5% variance, so the voltage could be as high as 127VAC). Because this is an AC (Alternating Current) the voltage swings from positive to negative and back again several times a second. The rate at which this occurs is described by the frequency specification which is given in units of “Hertz” (Hz). In the USA, our AC power works at 60Hz.

In most foreign countries, the outlet power ranges from 220VAC to 240VAC and it works at a frequency of 50Hz.

Most of our products come with external power supplies (A.K.A “wall worts” or “power bricks”). Some of these power supplies are universal, and are capable of accepting an input voltage of 110 - 240VAC at a frequency of either 50 or 60Hz. These universal power supplies can be used anywhere in the world (a plug adaptor may be needed). The power supplies which are not universal can only accept 110-120VAC at a frequency of 60Hz, which means they cannot be used in countries with higher voltage specifications. It may still be possible for the customer to use the product, if they are willing to source a power supply that will work in their country.

See **Appendix A** and **B** for helpful information.

### TV SYSTEM SPECS

TV channel systems differ from country to country and each system is designated by a letter. For example, system “G” and “M” are the two most commonly used systems.

**Countries that use system “M” can use the same Channel Vision’s modulators that are sold in the USA** (although they may need to change the power supply).

**Countries that use system “G” can use Channel Vision’s E2200IR-PAL and E4200IR-PAL.** Although system “G” is often associated with the PAL color format, this is actually a false association which is deeply rooted in the industry that it has affected our product model numbers. It would actually be more accurate to call these models E2200IR-G and E4200IR-G, but that may be confusing to many customers. When, using the charts on the following pages, **always look to the letter designator for the system to determine which modulator to use in a given country.** For example, the color format in Brazil is PAL, but they use the “M” system, so customers in Brazil should order Channel Vision’s standard modulators (not the PAL version).

### COLOR FORMAT

There are different specifications for the formatting of baseband color video signal. In the USA, we use the NTSC format, while most of the world uses PAL. There are a few countries that use a format called SECAM. SECAM is the only color format that really affects the selection of modulators in foreign countries. **None of our modulators will work in systems that only use SECAM.**

Color format is important when choosing surveillance cameras because the camera needs to produce the color format that the monitor expects to receive. Channel Vision cameras are made for the NTSC format, but if a customer is willing to purchase a large number of cameras we may be able to produce a PAL version of some models.

### MULTI-FORMAT TVs

End users in foreign countries often have multi-format TVs which can automatically detect the color format and TV system type of a broadcast and display it correctly. These TVs can receive a PAL-G signal on one channel and an NTSC-M signal on another channel. However, we should never assume that all international customers are using multi-format TVs.

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## International Standards

The following information was compiled from multiple sources which did not always agree. An attempt has been made to be as accurate as possible.

COUNTRY	- STANDARDS-		- AC SUPPLY-		COUNTRY	- STANDARDS-		- AC SUPPLY-	
	UHF	COLOR	VOLTAGE	FREQ.(Hz)		UHF	COLOR	VOLTAGE	FREQ.(Hz)
<b>A</b>					<b>F</b>				
Afghanistan	-	PAL	220-240	50	Finland	G	PAL	220-240	50
Albania	G	PAL	220-240	50	France	L	SECAM	120 / 240	50
Algeria	G	PAL	120 / 240	50					
Angola	-	PAL	220-240	50	G				
Argentina	N	PAL	220-240	50					
Australia	H	PAL	220-240	50	Gabon	K1	SECAM	220-240	50
Austria	G	PAL	220-240	50	Gambia	I	PAL	220-240	50
Azores	-	PAL	220-240	50	Germany	G	PAL	220-240	50
<b>B</b>					Ghana	G	PAL	220-240	50
Bahamas	M	NTSC	110-120	60	Gibraltar	H	PAL	220-240	50
Bahrein	G	PAL	220-240	50	Greece	G	SECAM	220-240	50
Bangladesh	-	PAL	220-240	50	Greenland	-	PAL	220-240	50
Belgium	H	PAL	220-240	50	Guadeloupe	K1	SECAM	220-240	50
Benin	K	SECAM	220-240	50	Guam	M	NTSC		
Bolivia	M	NTSC	120 / 240	50/60	Guatemala	M	NTSC	110-120	60
Botswana	I	PAL	220-240	50	Guiana	K1	PAL	220-240	50
Brazil	M	PAL	120 / 240	50/60	Guyana	K	SECAM	220-240	50
Brunei	B	PAL			<b>H</b>				
Bulgaria	K	SECAM	220-240	50	Haiti	M	NTSC	110 / 220	50/60
Burkina Faso	K	SECAM	220-240	50	Honduras	M	NTSC	110-120	60
Burma	M	NTSC	220-240	50	Hong Kong	I	PAL	220-240	50
Burundi	K1	SECAM	220-240	50	Hungary	K	SECAM	220-240	50
<b>C</b>					<b>I</b>				
Cambodia	M	NTSC	110 / 240	50	Iceland	G	PAL	220-240	50
Cameroon	K1	PAL	120 / 240	50	India	B	PAL	220-240	50
Canada	M	NTSC	110-120	60	Indonesia	G	PAL	110 / 220	50
Canary Islands	G	PAL	120 / 240	50	Iran	G	SECAM	220-240	50
Cent. African rep.	K1	SECAM	220-240	50	Iraq	-	SECAM	220-240	50
Chad	K1	SECAM	220-240	50	Ireland	I	PAL	220-240	50
Chile	M	NTSC	220-240	50	Israel	G	PAL	220-240	50
China	K	PAL	220-240	50	Italy	G	PAL	110 / 220	50
Colombia	M	NTSC	110-120	60	Ivory Coast	K1	SECAM	220-240	50
Congo	K	SECAM	220-240	50	<b>J</b>				
Costa Rica	M	NTSC	110-120	60	Jamaica	M	NTSC	110-120	50
Cuba	M	NTSC	110-120	60	Japan	M	NTSC	110-120	50/60
Cyprus	G	PAL	220-240	50	Jordan	G	PAL	220-240	50
Czechoslovakia	K	PAL	220-240	50					
<b>D</b>									
Dahomey	K1	SECAM	220-240	50					
Denmark	G	PAL	220-240	50					
Dominican Rep.	M	NTSC	110-120	60					
<b>E</b>									
Ecuador	M	NTSC	110-120	60					
Egypt	B/H	SECAM	120 / 240	50					
El Salvador	M	NTSC	110-120	60					
Ethiopia	G	PAL	220-240	50					

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	UHF	COLOR	VOLTAGE	FREQ.(Hz)		UHF	COLOR	VOLTAGE	FREQ.(Hz)
<b>K</b>					<b>Q</b>				
Kenya	G	PAL	220-240	50	Qatar	B	PAL	220-240	50
Korea (South)	M	NTSC	110 / 220	60					
Kuwait	G	PAL	220-240	50	<b>R</b>				
<b>L</b>					Romania	K	PAL	220-240	50
Laos	B	PAL	220-240	50	Rwanda	K1	SECAM	220-240	50
Latvia	G	PAL	220-240	50	<b>S</b>				
Lebanon	G	SECAM	110 / 220	50	Samoa	M	NTSC	220-240	50
Liberia	H	PAL	110-120	60	Saudi Arabia	G	PAL/SECAM	120 / 240	50
Libya	G	SECAM	120 / 240	50	Senegal	K1	SECAM	110-120	50
Lithuania	G	PAL/SECAM	220-240	50	Sierra Leone	G	PAL	220-240	50
Luxemburg	G	PAL/SECAM	110 / 220	50	Singapore	G	PAL	220-240	50
<b>M</b>					Somalia	G	PAL	120 / 240	50
Madeira	-	PAL	220-240	50	South Africa	I	PAL	220-240	50
Malawi	G	PAL	220-240	50	Spain	G	PAL	120 / 240	50
Malaysia	G	PAL	220-240	50	Sri Lanka	B	PAL	220-240	50
Mali	K1	SECAM	220-240	50	Sudan	G	PAL	220-240	50
Malta	H	PAL	220-240	50	Surinam	M	NTSC	110-120	60
Martinique	-	SECAM	220-240	50	Swaziland	G	PAL	110-120	60
Mauretania	-	SECAM	220-240	50	Sweden	G	PAL	120 / 240	50
Mauritius	-	SECAM	220-240	50	Switzerland	G	PAL	120 / 240	50
Mexico	M	NTSC	110-120	50/60	Syria	H	SECAM	120 / 240	50
Monaco	G	SECAM	120 / 240	50	<b>T</b>				
Morocco	H	SECAM	120 / 240	50	Tahiti	K1	SECAM	110-120	60
<b>N</b>					Taiwan	M	NTSC	110-120	60
Nepal	-	PAL	220-240	50	Tanzania	I	PAL	220-240	50
Netherlands	G	PAL	220-240	50	Thailand	-	PAL	220-240	50
Neth.Antillies	M	NTSC	120 / 240	50/60	Togo Rep.	K1	SECAM	120 / 240	50
New Caledonia	K1	SECAM	220-240	50	Tunisia	-	SECAM	120 / 240	50
New Guinea	G	PAL			Turkey	G	PAL	110 / 240	50
New Zealand	G	PAL	220-240	50	<b>U</b>				
Nicaragua	M	NTSC	110-120	60	Uganda	G	PAL	220-240	50
Niger	K1	SECAM	220-240	50	U.A.E	G	PAL	220-240	50
Nigeria	G	PAL	220-240	50	United Kingdom	I	PAL	220-240	50
Norway	G	PAL	220-240	50	Upper Volta	K1	-	220-240	50
<b>O</b>					Uruguay	N	PAL	220-240	50
Oman	G	PAL	220-240	50					
<b>P</b>									
Pakistan	B	PAL	220-240	50					
Panama	M	NTSC	110-120	60					
Paraguay	N	PAL	220-240	50					
Peru	M	NTSC	110-120	60					
Philippines	M	NTSC	110-120	60					
Poland	K	SECAM	220-240	50					
Portugal	G	PAL	110 / 220	50					
Puerto Rico	M	NTSC	110-120	60					

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COUNTRY U-continued	- STANDARDS-		- AC SUPPLY-	
	UHF	COLOR	VOLTAGE	FREQ.(Hz)
USA	M	NTSC	110-120	60
USSR	K	SECAM	220-240	50
V				
Venezuela	M	NTSC	110-120	50-60
Vietnam	G	PAL	120 / 240	50
Y				
Yemen	-	PAL	220-240	50
Yugoslavia	H	PAL	220-240	50
Z				
Zaire	-	SECAM	220-240	50
Zambia	G	PAL	220-240	50
Zanziar	I	PAL	220-240	50
Zimbabwe	G	PAL	220-240	50

### Appendix B

The following Channel Vision products are powered by other products that have universal power supplies:

A0125  
A0127  
A0301  
A0313  
AB-124  
AB-301  
AB-313  
AB-404

### Appendix A

The following Channel Vision products have universal power supplies:

A1260  
A4603  
A4623  
A0240  
A0314  
AB-2454  
P-1014  
P-1044  
P-1420  
P-2014  
P-2044  
P-6014

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