

# AUDIOTRENDS

L E A R N I N G C E N T R E

## Digital Television – A Basic Explanation

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*Since my start in the audio video business a little more than 35 years ago, I have not encountered any products that create as much confusion as today's televisions. Quite understandably, many people are overwhelmed by all the different features and specifications of these high-tech products. As a result, many are spending large amounts of money on new televisions that do not necessarily meet their expectations. Since I don't want you to make this mistake, I have written this short article to help you understand the basics. – Stephen Lee*

### How A Television Works – Very Simply!

You will probably be familiar with how a movie is projected onto a screen. A powerful light shines through a series of 'still' images contained on a reel of film. Every piece of each image is projected simultaneously onto the screen. Television is not this simple.

In fact, no technology has yet been developed that allows for an entire image to be captured, transmitted, received and then displayed simultaneously – not even live broadcasts. Instead tiny portions of the image are scanned by the camera and then 'painted' onto the television display in perfect coordination. It only takes 1/50th of a second for a 'basic' 50Hz (50 cycles per second) TV to 'paint' a complete screen. In other words, the picture is replaced or refreshed 50 times per second. Interestingly, the German TV manufacturer Loewe introduced 100Hz technology in the early 90's. This doubles the refresh rate to 100 times per second and virtually eliminates the 'flicker' associated with 50Hz sets.

### Television Standards – Old and New

Analog Television transmissions started in Australia in 1956 and for around 45 years, the system (cameras, transmitters and television receiver) was only capable of

dividing an image into 625 horizontal or 'interlaced' lines. Basically, this 625-line 'interlaced' scan rate means that a television screen is made up of 625 horizontal lines that 'refresh' in an interlaced pattern. (In other words, lines 1, 3, 5, etc. would refresh and then lines 2, 4, 6, etc. would refresh.) This electronic interlacing was done to minimise image flicker – progressive scan was not possible in those days! The standard of the day also established a 4:3 aspect ratio (the ratio of screen width to height) similar to a movie theatre screen.

Until 1975 broadcasts were in Black & White. At that time the colour television broadcasting system based on the European PAL television system, was introduced, still with 625-line resolution and still with a 4:3 aspect ratio. It has served us well, or at least until technology enabled manufacturers to build significantly larger Televisions.

However, since January 2001 there has been a revolution in television technology – a revolution which has the potential to greatly increase the quality of what we see and hear when compared with the old analog system with its inherent limitations. Things like 'ghosting' are a thing of the past!

### The Digital Revolution

Digital television is an exciting new technology which provides improved picture

and sound quality, widescreen images, plus extra channels. First discussions about its introduction go back a long way, but implementation wasn't straight forward. Choosing a digital television standard had to be made and the choice was not easy! There were at least three contenders, the Advanced Television Standards Committee system (ATSC) from the USA, the Digital Video Broadcasting system (DVB-T) from Europe and the Japanese DiBEG system.

The June 1998 report of the DTTB Selection Panel here in Australia recommended adoption of the European DVB-T standard and later recommended the adoption of Dolby AC-3 sound, or as it is now known Dolby Digital. Part of this new standard was the establishment of two classifications of resolution quality – SD or Standard Definition and HD or High Definition.

### Are widescreen TVs and digital television the same thing?

No. Although a widescreen Television (including Plasma and LCD displays) may have an aspect ratio of 16:9, it will not reproduce digital signals natively. To achieve this, it needs either a digital Set Top Box (STB) or an in-built digital 'tuner'. With an SD STB, widescreen Televisions can display 'free-to-air' pictures at a resolution of **up to** 576 lines interlaced or 576i – which is slightly better than the resolution as delivered by a DVD.

Another important point to remember is that not all widescreen sets are designed to display true High Definition (HD) pictures. You need the appropriate HD television **and** HD STB. So, what is the difference between Standard Definition and High Definition?

### Standard Definition



Standard Definition (SD) is the digital equivalent of the old analog system. It is

only broadcast in an interlaced (i) pattern of up to 576 lines of resolution – typically designated 576i. An interlaced SD picture is superior to an analog signal with the same resolution, because it is not subject to analog distortions like "snow" and "ghosting." With a 576i signal, all of the even numbered lines are transmitted simultaneously, followed by all of the odd numbered lines. So, only 288 lines are transmitted at one time – not 576! The SD format does not do progressive scan, only HD will.

### High Definition



High Definition is the highest resolution. It has three sub-standards. The first two are progressive (p) and scan at either 576p or 720p horizontal lines. The third is 1080i horizontal lines scanned in an interlaced pattern. Arguments rage as to which is best but simply put, they are both very good! Although it does not increase the resolution of the picture, progressive scanning provides for a smooth, stable image and is particularly good on fast moving action. In addition to providing the highest picture resolution when connected to a HD digital STB, High Definition (HD) can also deliver Dolby Digital audio when used with a compatible surround sound system.



4:3 screen – correct



**4:3 with letterbox bars**



**16:9 screen – correct**

The conventional squarish 4:3 screen is fine for standard Television shows, but widescreen material is displayed with "letterbox" bars above and below the image. A 16:9 screen will eliminate or reduce black bars on widescreen sources, but standard 4:3 programs will have "side pillars." Widescreen Televisions can also stretch an image to fill the screen.

Now is an exciting time to be shopping for a TV. If your home is like most, the TV is the A/V component that gets the most use. With such a big investment and so many widescreen and high-definition models, there is sure to be one that's right for you!

- **Direct-View:** Traditional CRT (cathode-ray tube) TV's are still a popular choice. We stock Loewe and Toshiba. Their sharp, bright images provide a vivid viewing experience in virtually all rooms and lighting conditions. The largest size usually gives a 76cm viewable picture.
- **Rear-Projection:** Nothing beats the impact of a big picture – especially for movies and sport. The latest DLP and LCOS models have very slim cabinets and picture quality that has to be seen to be believed. All are 16:9 widescreen and many are 1080i HDTV ready when used with a HD STB.
- **Flat Panel:** Plasma and LCD performance and reliability has improved *dramatically* over the past couple of years. Prices have also come down. A Plasma or LCD panel's space-saving size and light weight allow you to enjoy their crisp, bright images just about anywhere. Hang on the wall TV is here!
- **Projection:** Once only for the rich and famous, the market is now inundated with Projectors. However, a word of caution. Cheaper units are basically Data products capitalising on the growth in Home Cinema. What are the differences and how much should you spend? We are ready to help.

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10 Argent Place, Ringwood, VIC 3134

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