

# VERDIER VENTURES, Inc.

## Wide Screen Considerations for the Large Screen Display Industry

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#### ABSTRACT

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*The Television Broadcast community is moving from Standard to Wide Screen television. Conversion from the NTSC television aspect ratio of 4X3 to the Wide Screen ratio of 16X9 is inevitable. Professionals in the Large Screen Video Display (LSVD) industry need to understand all aspects of this transition to plan wisely for the conversion of their own systems. This paper explores and presents key areas that should be considered by LSVD professionals when transitioning to Wide Screen operation. It provides the information needed to make informed artistically based technology decisions on what equipment to purchase for the smoothest transition to Wide Screen operation.*

#### 1. INTRODUCTION

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LSVD professionals are asking many questions about the new wide screen format. Do I need to upgrade my facility to a wide screen display? What are the advantages and disadvantages of the wide screen format? What areas need to be reviewed and addressed to make my transition proceed smoothly? What new equipment will I need? What currently owned equipment can be utilized with the wide screen format? Will I be able to run programming from my archives in the wide screen format? What is happening in the broadcasting community regarding wide screen



displays and HDTV and how does this affect me? When do I need to be up and running with wide screen displays to keep current and profitable?

These are some of the key questions that LSVD professionals are asking regarding wide screen technology. These questions and more are answered and addressed below.

## **2. OVERVIEW OF WIDE SCREEN ASPECT RATIO**

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The overwhelming majority of Large Screen Video Displays in North America, be they JumboTrons, Diamond Visions, Astrovisions, or LEDs are constructed with a standard television aspect ratio. While they vary in size and resolution they all, with two notable exceptions, have a width to height ratio of 4X3 or very close to 4X3.

Because of the resolution limitations of every large screen display technology, standard definition (NTSC) signals have two to nine times greater picture resolution than current LSVD screens can reproduce. Unfortunately, the twelve times improvement in resolution, offered by High Definition Television over standard analog television, is wasted in the Large Screen Display environment. Even if current large screen displays could reproduce high definition television, the resolving ability of the human eye, at typical event viewing distances, limits the perceived picture detail.

Therefore, for the purposes of this discussion, we will examine the impact of Wide Screen aspect ratios, not the absolute resolution or detail quality of the presented image.

## **3. DRIVING THE CHANGE - THE FCC HDTV MANDATE**

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On December 24, 1996 the Federal Communications Committee (FCC) issued the technical standard for digital television and high-definition television (SDTV & HDTV). On April 3, 1997 the FCC issued the final table of digital channel assignments for free over-the-air television to the general public. The Broadcast community has the following mandated time frame:

- The four major networks (ABC, NBC, CBS, & FOX) will have their top ten market stations on the air with DTV by May 1, 1999.
- Six months later, the 11<sup>th</sup> through 30<sup>th</sup> markets of the same networks must be on the air with digital TV.
- By the year 2006 the current NTSC analog television service will terminate and that spectrum be reclaimed for reassignment.

It is clear that the Broadcast Community has its marching orders. ABC, NBC, & FOX have voluntarily pledged to be on the air in digital by November 1, 1998, however the end date for NTSC, 2006, may only see an 85% digital implementation by broadcasters.

Despite these real world milestone variances, it is clear that the digital train is rolling.

HDTV has an aspect ratio of 16X9 and SDTV has a choice of aspect ratios, 16X9 or 4X3. To the casual observer, Wide Screen (16X9) is synonymous with High Definition Television, and High Definition is synonymous with Digital. While they are related, due to industry and regulatory standards, it is possible to have analog High Definition



Television, as in Japan, and Wide Screen presentations can be made on standard definition (NTSC) television, using letterbox techniques. These differences are important to note, to avoid potential confusion when discussing wide screen technologies

What does the FCC mandate mean to the Large Screen Display Industry? Wide screen Television presentations to the in-home general public are inevitable. That same public, viewing their favorite TV shows at home, will want and will expect wide screen presentations as part of their out-of-home experience, just as they have come to expect the replay, scoring, and statistical information they now get. Wide screen sportscasting also needs to be considered. A number of sports facilities have had mobile digital production rigs pull up to their truck dock. Are wide screen sports teleproductions far behind?

#### **4. MANAGEMENT OF ASPECT RATIO AT THE PRODUCTION LEVEL**

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The FCC's 1996 SDTV / HDTV document allows for 18 variations of resolution and aspect ratio within the standard. Determination of aspect ratio now becomes a programming / production issue not the limitation of the transport medium.

Aspect ratio is the issue and it is essentially independent of technology. Yes, each technology is predicated on a given aspect ratio, but it's possible to alter the aspect ratio of any film or television technique from the ratio implicit in that technique.

##### - Aspect Ratio Accommodation

A wide screen show can be produced using conventional analog NTSC 4X3

equipment. Conversely, a 4X3 presentation can be produced on a CinemaScope screen. At a minimum, all that is needed is to frame the original material in the same way that a camera shot is framed. If the wings (sides) or borders (top & bottom) have no information they can be black or cropped. In a movie theater curtains are moved to mask the unused portion of the frame. In television masking with drapes isn't possible so we see the black borders during letterbox reduction of feature films.

##### - Pan and Scan

When transferring from wide screen feature film to conventional television, there is another transfer option - pan & scan. Since the television image is narrower, the motion picture image needs to be cropped to fit the TV frame. Information is lost in the process. Gradual panning or rapid repositioning (cutting) between frames insures that the key action areas of the wide screen material are seen within the narrower frame. It is easy to understand that this technique is filled with compromises and continues to be a hot issue with the production community. As far back as silent movies, directors and cinematographers such as Westerberg, Eisenstein and Griffith have argued the artistic and production merits of the "cropping" process and its impact to picture content.

The cable based Bravo, Arts & Entertainment, and American Movie Classics channels do both letter boxing and pan & scan every day, in fact the same movie has been aired in each technique at different times of the day.



Management of aspect ratio becomes a significant production issue. It is entirely possible for sports broadcasts to be originated as multiple channels of 4X3-aspect ratio, progressive scanned, Standard Definition (digital) Television within the 1996 FCC standard. It's also possible to air a feature motion picture as a single channel, 16X9-aspect ratio, interlace scanned, High Definition (digital) Television presentation without changing any of the transmission, or receiving equipment used for the broadcast.

## **5. MIGRATION FROM STANDARD TO WIDE SCREEN**

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The expectation of the fan and government mandates on broadcasters are compelling LSVD facilities to install 16X9 screens in their scoreboard structures.

In the short term, providing the viewer / fan a wide screen presentation gives them something they can't experience at home. In the long term it will match the fan's in-home experience.

Below is a brief overview of the options available for upgrading to a 16X9 screen.

### WIDE SCREEN 16 x 9 CONSTRUCTION

To achieve the wide screen aspect ratio, a 4X3 screen can have additional display units added to each side to widen it out from 12X9 to 16X9. As an example, a 32 X 24 foot screen, with a 4X3 (12X9) aspect ratio, is made up of display units that are stacked 36 high by 18 wide. The screen can be built out to 16X9 by adding 6 columns of display units 36 high or 3 columns of

units to each side. The new screen now becomes 36 units high by 24 units wide.

While this works for new construction, additional issues, such as picture element matching have to be considered when doing any 16X9 retrofit additions to existing screens. The number of hours any screen has operated will determine the maximum brightness the board can produce. Adding new picture elements for the wing(s) means that the older part of the screen can't be as bright as the new wing(s). Even if the brightness of the new elements can be adjusted to match, issues of color balance may remain. In some cases, it may be better to replace the entire screen than to add on units.

Widening the display screen is only part of the challenge, all be it a significant one. There are a number of options available for screen enlargement. Further details will be left to other papers.

### CURRENT 4X3 SCREENS

Outdoor screen sizes range from a nominal 22X16 feet to 40X30 feet and are typically either 26X20 or 32X24 feet in size. Indoor screen sizes range from 10X7 feet to 16X12 feet with the typical size being 12X9. Some "indoor" screens have been used outdoors with a size of up to 24X18 feet.

A 32X24 foot screen actually has a viewable area of 31.23' by 23.43', made up of stacked display units, with framing elements that bring the screen out to its nominal rated size. The actual display units each have a 4X3 aspect ratio giving the overall screen the familiar television look.

## 6. PROGRAM CONTENT

Once the wide screen is in place, what is shown on it?

- How is all the archive 4X3 material already “in the can” presented on a new 16X9 Wide Screen?
- When legacy 4X3 material is played back on the wide screen, what about the unused 4X9-picture area?
- Use reverse letterboxing, or stretch the image?
- How are live camera shots framed to get the most impact from the screen’s panorama while getting the viewer as close as possible to the action?

### PRODUCTION AFTER THE WIDE SCREEN IS INSTALLED

#### - Existing Material

There is a considerable amount of material in LSVD archive libraries. The vast majority of it, if not all of it, is 4X3 sized film or tape. Several options for converting wide screen pictures into the 4X3 format have been discussed. However, conversion from 4X3 to 16X9, while maintaining picture content, does not fill the wide screen. The equivalent of a 4X9 picture area ends up unused, and because the existing program content doesn’t fill out the wide screen, the image appears smaller.

#### - Filling Out the Wings – POP

Filling out these unused wings is the challenge. Stretching the 4X3 picture distorts the human form and any added graphics. If the aspect ratio is left alone, the archive 4X3 picture can be center positioned & reverse

letterboxed, to create two 2X9 wings with a 12X9 center. If the archive program is justified all the way to the left or right edge, the two 2X9 wings become one 4X9 wing.

By creating and filling that 4X9 wing, a “Polyscreen Display” or POP - Picture Out of Picture is created. Presenting two images on the same screen is multicasting, and that mode provides several possibilities, frankly opportunities. The reclaimed 4X9 area is essentially a narrow portrait style display, or it can be configured as three 4X3 pictures stacked one on top of the other. Stills, graphics, clips and animation can be placed in what was wasted area.

With proper sizing, framing, positioning, and scaling the source material and with the addition of select pieces of video equipment, an electronic signboard or “auxiliary scoreboard” operating simultaneously with the archive presentation is possible. (Please note that image, logo and font sizes have to be carefully considered when programming these “polyscreen” wing(s) due to the inherent resolution limitations of the large screen technologies.)

#### - Live Shots – Shoot and Protect

Live camera shots present a different challenge. The first issue is panorama vs. close-ups. The second issue is saving 16X9 shots back to the traditional 4X3 aspect ratio for archive and distribution. Both wide screen and conventional aspect ratios need to be accommodated at the same time. Plus shots need to be framed to insure maximum height (size) of the action covered. The technique called “shoot and protect” is used to do accomplish both goals.



During production, the captured image is framed to make the live action look correct in a smaller 4X3 frame while a larger area is protected to allow images to be seen in the 16X9 frame without unwanted edges, equipment, or activity becoming visible in the wider shot. The safe action area becomes the 4X3 frame, and it can be defined by putting reticle marks on the camera viewfinders and monitor wall monitors. That inner safe area is termed the reticle region and the outer frame is called the aperture region. The area between reticle and aperture, where significant action is to be avoided, has been labeled "fluff".

Shoot and Protect techniques allow facilities to accommodate both wide and standard aspect ratios. In the short term, it insures that images shot now will play in the 4X3 world, and in the long term it insures that the images shot today will be compatible when wide screen presentations are the norm. Shoot and Protect allows action shots to be framed as tall as possible, utilizing the full height of the screen. The determination of what is primary action and what is fluff and how they are framed for the different aspect ratio systems, is in reality an artistic / production decision.

#### PRODUCTION SOLUTIONS

Shoot & Protect and Picture Out of Picture techniques hopefully will put to rest many production questions raised by the Large Screen Display Industry during its migration to wide screen.

#### 7. ESSENTIAL CONFLICT - STAY WITH 3X4 OR EXPAND TO 16X9

Ok, so we've got production options and wide screen material can be sized to fit within the existing screen creating the familiar letterbox presentation. Why not stay in the 4X3 analog world and add the minimum equipment needed for letterbox and Picture Out of Picture presentation?

#### CREATE WIDE SCREEN ON A 4X3 SCREEN WITHOUT UPGRADING

Most Large Screen Video Display front-end control rooms in the United States and Canada are equipped with analog NTSC television equipment. At a minimum, all that is needed to present wide screen source material is to size down the material to fit within the width of the existing 4X3 screen. Although the height of the active screen is reduced thus creating the familiar letterbox presentation, it will work. But does this option meet the needs of the viewers?

#### THE VIEWER'S PERSPECTIVE

The goal of the Large Screen Video Display, in the out-of-home setting is:

- To enhance the in-game / event experience.
- To provide the viewer / fan with information and entertainment he or she can't get from their seat.
- To get the viewer / fan more involved in the action by using replays, statistics, highlights, close-ups, and contests.

The at-home viewer is relatively close to the screen, sitting at a distance six to ten times picture height. Whereas, the stadium viewer is often seated at a distance 25 to 50 times the screen height. No question that the larger the screen the happier everyone is, and the larger the screen the more easily each fan can see the presentation. Don't forget that a larger screen image is



perceived as a better image! Large font graphics and close-up framing are the order of the day.

### BRING THE FAN CLOSER vs. PANORAMA

So there's the dilemma: The broadcast industry is headed to the wide screen panorama experience, while the Large Screen presenter's goal is to enhance the in-game / event experience by involving the fan and bringing him or her closer to the action. To maintain impact, Large Screen Display heights need to be maintained or enhanced as the screen widens from 4X3 (12X9) to 16X9

Staying with a 4x3 screen using letterboxing may be a short-term answer but it is not a long-term solution. To stay current, screens will need to be updated to the wide screen 16x9 format for the long term.

## **8. EQUIPMENT REQUIREMENTS - OVERVIEW**

### CURRENT 4x3 FRONT END CONTROL ROOMS

While many large screen production facilities have purchased digital postproduction editing equipment, and a few control rooms have been built with three wire component analog video technology, almost all Large Screen Video Display front-end control rooms in the United States and Canada are equipped with analog, composite, 4X3 aspect ratio, NTSC television equipment. Control rooms are being designed with digital equipment interconnected by the serial digital interface SDI standard, but one can count the number in operation on one hand.

### STAY IN ANALOG? OR CONVERT TO DIGITAL

Remember those digital trucks pulling up to the dock? The broadcast community has to go digital by the end of the decade. At minimum, their on air transmission equipment will be upgraded to digital, and it makes sense that their studio and remote equipment will be also be upgraded. The broadcast industry is standardizing on a digital signal stream. It won't be long before the signals available from those production trucks, such as camera-ISO and switcher program will only be available in the digital format.

Like it or not technology marches on. Two-inch quad machines are gone, one-inch helical machines are gone, tube cameras are gone, and analog synchronizers are gone. It won't be too long before our old friend analog NTSC is also gone. At least one major manufacturer has announced that all of its analog products have been discontinued. Very soon Television equipment will only be talking digital.

### LEAST DISRUPTIVE MIGRATION PATH

This may be the point for some to panic – so hang on. There is a migration path, and it doesn't have to be enormously disruptive. Good planning with careful resource allocation are key elements of this solution.

When beginning any facility construction or upgrade, you must look in the near term (one to three years) and in the long term (over three years). Where is the LSVD industry going in the next five years? – DIGITAL!

## **9. EQUIPMENT REQUIREMENTS – THREE YEAR PLAN**

### EXISTING CONTROL ROOMS



To modify an existing analog control rooms for wide screen presentations is definitely possible, and may be appropriate for the short term. The following are the minimum equipment additions needed to pull off the adaptation.

### MINIMUM ADDITIONS

#### - Multicasting

The production solutions presented earlier section suggest that, when presenting 4X3 material on the new 16X9 screen, the wings need to be "filled out". To do that, multicasting is needed. The main picture channel needs to be combined with, additional picture channels. The screen becomes a composite layering, or "Polyscreen Display" of the archive 12X9 picture and the 4X9-wing image.

#### - Additional Sources

To generate two picture elements, additional still storage, graphics, and moving image playback equipment is needed.

#### - Format Layering

Some method is needed to interleave those two pictures. A "compositing generator" is needed to provide the Picture Out of Picture presentation. When shoot and protect camera signals are displayed, the generator has to crop the live signal into the 16X9 aspect ratio of the new screen. When 4X3-legacy material is displayed, the generator has to layer the separate "filler" information to one side and behind the standard ratio image.

The generator essentially "places" the legacy image over and to one side of the wing image. Pre-production of the wing picture elements can be done with conventional 4X3 aspect ratio

analog equipment. Of course the covered portion of the wing background need not have any useable content since it will never be seen on the screen.

#### - Truck Interface

Before the digital production trucks start pulling up to your door, digital to analog interface equipment will need to be installed for the analog control room to handle those digital signals.

Your existing analog plant can have aspect ratio accommodating equipment bandaged together on a piece by piece basis in order to "keep up with the Jones". That however should only be considered a short-term solution.

### BUILD NEW WITH ANALOG

So the "legacy" control room has gone as far as it can. The war horse has given its all. What happens next? Purchase new analog equipment for the control room or buy digital equipment? That is the dilemma. Plus, is the newly purchased analog equipment really analog?

### COMPATIBLE EQUIPMENT – DIGITAL ISLANDS

#### -FS, CG, SS, DVE, & File Server

As video production equipment evolves, it moves to digital. Right now, the inner workings of all new Frame Synchronizers, Character Generators, Still Stores, Digital Video Effects and most File Servers (VideoDisk Recorders) are digital. When you replace one of these devices today, the new units come standard with digital ins and outs. In many instances options have to be purchased to convert the machine to analog NTSC.

#### - Tape Recorders

The next generation of video tape recorders are digital, be it D1, D5,



Digital BetaCam, BetaCam SX, DVCPRO, or DVCAM. Yes you can buy analog recorders, but who wants to when the digital machines give so much more quality at the same or lower price. Plus, more and more TV stations and production houses are transferring programs on digital tape.

#### - Editors – Linear or Non-Linear?

Purchasing an editor system inevitably raises the issue of Linear vs. Non-Linear? The editor purchase decision should be based on the ease and efficiency of operation, not on the type of technology used. Either of the two editor choices can be used successfully in the wide screen environment.

#### Random Vs. Sequential Editing

Non-Linear editing is essentially random access, hard disk based, and digital.

Linear editing is essentially sequential; magnetic tape based, and can use either analog or digital recording equipment.

Random access editing offers very quick determination of the Edit Decision List, and compilation of the final product. What slows the whole process down is that most Non-Linear systems do not have removable media. There is a wait for the finished product to transfer to an archive media such as tape.

Sequential editing forces editors to wait the search times of linear tape during construction, but the storage media can be instantly removed when the editing process is complete. The edit controller is a digital (computer) device. The tape storage system can be analog or digital.

Here again technology is providing the best of both worlds. If videodisk recorders are added to an existing editing system, the edit preview and assembly speed of random access is gained. If source machines are disk based and the session is mastered to tape, both the speed of hard disk and

#### OLDER TECHNOLOGY

##### - Switchers, Routers, and Monitors

What's left? Analog video mix effects switchers (vision mixers), routing switchers and monitors are still available. This core analog video equipment and its analog interconnections: patch bays, distribution amplifiers, and cable, can currently be purchased at lower cost than their digital counterpart.

All those "digital islands" can be configured with analog interconnections. In fact a new "analog system" purchased today is really a group of "digital islands" connected together in an analog way.

#### 10. EQUIPMENT REQUIREMENTS – THREE YEARS AND BEYOND

When looking three years and beyond, those "digital islands" need to be interconnected in the digital domain. To do that, the switchers, routers, monitors, distribution amplifiers, and any other analog "orphans" have to become digital.

##### BUILD ALL DIGITAL

When building or rebuilding the Front-End plant, the least disruptive migration path for the long term is to plan and install a complete digital system with all equipment interconnected in the digital domain. While some existing "digital

islands” can be optioned with digital ins and outs and reused in the digital system, careful evaluation of the suitability of any legacy equipment is always prudent.

#### ADVANTAGE OF DIGITAL

So what is the advantage of digital equipment besides picture quality? Many digital products are switchable between 4X3 and 16X9 aspect ratios. Some units do it with a simple switch, some have software settings, and some equipment has replaceable parts. The resolution of the digital system is so great that sizing or cropping portions of the video frame will have no perceived effect.

#### - Wide Screen Ready

For the longer term, wide screen compatibility is paramount when selecting digital equipment for front-end control rooms. Digital equipment, while not necessarily 16X9 in format should be capable of passing the wide screen aspect ratio.

#### - Interchange & Compatibility

The broadcast and production worlds are moving inevitably to digital, and the expectation of the video community is that program content is acquired and manipulated in the digital domain. Interchange of production elements either live or stored will become exclusively a digital one.

#### STANDARDS SET

The regulatory and industry standards for digital and high definition (wide screen) have been set. The timetable for broadcast conversion has been fixed. We either follow or we lead.

#### DO LSVD FACILITIES NEED HIGH DEFINITION?

Considering the current state of the large screen display technology, high

definition digital equipment gives resolutions that are 25 to 100 times that of the displays. Standard definition digital television yields resolutions 3 to 14 times the capability of current display products. For now it seems that the additional cost associated with going high definition don't make sense.

If your budget allows it and if you're planning a new facility? – DO IT ALL NOW – Go standard definition digital and go wide screen. Digital equipment has come down in price and in some instances is more cost effective and higher in quality than equivalent analog equipment.

#### 11. CONCLUSION

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Upgrading from standard to wide screen television is inevitable for the broadcast industry and in turn, Large Screen Video Display facilities. LSVD professionals need to be proactive in their efforts to upgrade their facilities so that they remain current and marketable.

We have discussed the historical, regulatory, program, and equipment facets of wide screen operation. Several production / artistic solutions have been presented to manage wide screen aspect ratios irrespective of the technology available.

Equipment options, ranging from adding the minimum amount of analog equipment to an existing plant, to building from scratch a complete digital, wide screen, production facility have also been discussed.

These solutions provide immediate answers and prudent migration for the long term. The fundamental issues in



upgrading from standard television to wide screen technology are ones of production not hardware. Wide screen presentation can be done with existing analog equipment. Of course, better overall production results will be possible with digital, wide screen capable, equipment as the core of the front-end production room.

Presentation of archive 4X3 material on 16X9 screens presents us the opportunity to use the "polyscreen" technique to provide more compelling simultaneous images, and revenue enhancements.

Upgrading to wide screen provides the viewer / fan with an experience unmatched at home and meets the fan's expectation as home viewing moves to digital and high definition.

When the time comes to actually implement wide screen technology, it's best to carefully study the individual equipment needs of each organization. A detailed migration plan should include a thorough needs assessment and key design documents including: Comprehensive Signal Census, Individually tailored Equipment Lists, Equipment power & air conditioning Loads, Equipment location & Space Planning, Rack & Console Elevation Drawings, and equipment Interconnect Drawings.

It is hoped that the information presented here will help clarify wide screen technology for the LSVD professional.

Verdier Ventures, Inc. (VvInc.) is a full service video systems design / project management house. VvInc. is familiar with all phases of sports / billboard large screen replay video systems

design and construction. VvInc. can provide consulting services from

feasibility studies, through proposal / RFP generation and engineering design, to final completion walkthrough.

Please feel free to call the author, Jacques Verdier at Verdier Ventures, Inc. if you have additional questions or if you desire assistance in your transition to wide screen operation.

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#### HISTORICAL PERSPECTIVES

Aspect ratio concerns have permeated the entire history of the moving image business as the following historical perspective shows.

#### MOTION PICTURES

While the motion picture industry had no aspect ratio standard for its first 40 years, a 35mm frame with approximately a 4X3 width to height ratio has been the preference from the Edison Kinetoscope (1889) to "the talkies" (1930's). In 1932 the Society of Motion Picture Engineers (SMPE) set the Academy aperture standard of (11 x 8 or 1.375:1), very close to a 4X3 ratio.

#### TELEVISION

As early as 1940 the National Television Systems Committee (NTSC) studied the issue of aspect ratio for television and settled upon our familiar 4X3 standard. The NTSC cited compatibility with the motion picture practice and the ability to scan movies "without waste" as driving forces in selecting their standard.



Historical Perspective Continued...**CINERAMA, CINEMASCOPE,  
TODD-AO, ET AL**

The advent of television and its market penetration made itself felt by the early 1950's. By 1953, motion picture attendance had fallen, from the 1929 high of 95 million, to 46 million despite a growing US population. The movie industry decided to fight the audience loss by offering experiences that could not be gotten through viewing television at home.

While not new concepts, 3-D and wide screen pictures exploded on the motion picture scene. Even though motion picture attendance continued to fall to its low of 16 million in 1971, wide aspect ratio productions thrived, some with screen ratios as wide as 2.75:1 (24X9).

Out of the plethora of wide screen formats, and as recently as 1993, the film industry was again discussing aspect ratio standards. While no standards have been set, the compromise ratio of 1.85:1 (16.6 X9) is the projection aspect ration most commonly recommended for 35mm widescreen (nonanamorphic) movies.

**HIGH DEFINITION, WIDE SCREEN  
TELEVISION**

The development of High Definition (digital) television has brought us the 1995 SMPTE 267M standard aspect ratio of 16 X 9 (1.77:1), which is within 5% of the motion picture wide screen practice of 1.85:1. Again compatibility with theatrical wide screen presentations was a factor in developing the TV standard.

- **ASPECT RATIO**

The relationship of an image's width to its height.

- **WIDE SCREEN**

Any aspect ratio wider than 4 X 3 (1.333:1), width to height. Typically 16X9.

- **STANDARD SCREEN  
TELEVISION**

A television presentation whose aspect ratio matches the current 4 X 3 standard.

- **WIDE SCREEN TELEVISION**

A television presentation whose aspect ratio is 16 X 9 irrespective of the method of acquisition, recording, and transmission method. (The technology can be analog or digital.)

- **PICTURE RESOLUTION**

The amount of image detail allowed for in any visual presentation. Each visual technology defines, or limits, the maximum amount of picture information possible.

Television resolution is measured by the number of horizontal scanning lines, and spacing of the picture elements (pixels) within each horizontal line, that constitutes a complete television frame. As the number of scanning lines & picture elements increases, the detail, clarity & crispness of the picture improves.

- **INTERLACE SCAN**

Method of moving the electron beam in a camera or TV receiver that sends every other line to create a television field. The odd lines are sent as the first field, then the even lines are sent to create the second field. Odd and even fields are combined together in the human visual system to make up the

**DEFINITIONS**

complete television frame. Interlace scanning requires less information to be transmitted.

- PROGRESSIVE SCAN

Method of moving the electron beam in a camera or TV receiver that sends every scanning line in sequence to create the complete television frame. Progressive scanning has twice the information of interlace method, but has fewer motion artifacts and is better for capturing fast action situations like sporting events.

- NTSC – (ANALOG) TELEVISION

The representation of television image and sound as an electrical signal that directly corresponds to, is analogous to, the original visual image and aural stimulus. The black & white, color and synchronizing signal elements of the captured image are combined into a single information stream according to standards set in the 1940's and early 1950's by the National Television Systems Committee (NTSC).

Specs: Resolution of 525 scanning lines (483 active) with about 60 interlaced frames per second

- DTV - DIGITAL TELEVISION

The representation of television image and sound as a series of numerical values capable of being generated & manipulated by computer and computer like devices.

- SDTV - STANDARD DEFINITION (Digital) TELEVISION

A digital television system that provides picture resolution (number of active scanning lines) that is equivalent to current NTSC (analog) television standard. The aspect ratio is intended to be 16X9 but can also be 4X3. Single

channel or multiple channel operation is allowed.

Specs: Resolution of 480 active scanning lines with 720 picture elements per line, either interlaced or progressive, are included in the standard.

- HDTV - HIGH DEFINITION (Digital) TELEVISION

A television system that provides picture detail, color purity, and aspect ratio greater than the standard NTSC television system. HDTV is always presented in a single channel widescreen 16X9 aspect ratio.

Specs: Resolution of 1080 interlaced active scanning lines with 1920 picture elements per line is defined by the standard.

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