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Before the
Federal Communications Commission
Washington D.C. 20554

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Federal Communications Commission
Office of Secretary

In the matter of:

Advanced Television Systems and their Impact
on Existing Television Broadcast Service

MM Docket No. 87-268

To: The Commission

Comments of Robert Primes, ASC

Robert Primes, ASC hereby comments on the Fifth Further Notice of Proposed Rule making in the above captioned proceeding

Purpose

It is well known to me that the American Society of Cinematographers and the Directors Guild of America are filing comments along with other interested parties. Nevertheless, I am compelled to make my own views known because I believe our nation's character is shaped by ideas and images presented on motion picture, television and computer screens. I further believe that the depth of emotions felt is directly related to the quality of images seen.

General Qualifications

I am a working director of photography and won the Emmy for cinematography in 1995 for the television movie *My Antonia*. I am a vice president of the American Society of Cinematographers, a delegate to the National Film Preservation Board and serve on the national executive board of the International Photographers Guild (which is the American union for workers in cinematography). I am on the faculty of the American Film Institute and

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frequently lecture at other colleges around the country. I have photographed major feature films (*Bird on a Wire, The Hard Way*) television series (*thirtysomething, Quantum Leap*) television movies and pilots, special effects, commercials, etc. I compose and light over 2,000 motion picture shots each year.

Specific Qualifications re Advanced Television Systems

I have read a fair percentage of what has been published on the subject of ATV in the past few years as well as the *Fifth Further Notice of Proposed Rule Making*, Mr. Baron's summary: The *ATV Standard: Understanding the Choices*, The informal reply comments of Professor William F. Schreiber of M.I.T., a recent draft of the comments from Demografx and, with the help of Dr. Robert Hopkins, have consulted the ATSC Digital Television Standard itself.

I attended the *Film format Seminar* presented by the Technology Council of the Motion Picture-Television Industry in 1993 and have seen the ACATS proposal and demonstration at the Society of Motion Picture and Television Engineers screening in Los Angeles in January 1996. In November 1995, I addressed the International Broadcast Electronics Exhibit in Tokyo where I was able to directly compare interlaced HDTV monitors and progressive scan computer monitors running the same programs. I am also familiar with the work done at the MCA/MEI HD Telecine Research Center at Universal City and the Sony Pictures' High Definition Center in Culver City.

I have spoken at various forums on formats and aspect ratios the past few years and represented the American Society of Cinematographers at the June 1996 ShowBizExpo in Los Angeles, hosting Branko Gerovac and his team of High Definition Television scientists from M.I.T. and representatives from Polaroid Corporation who were demonstrating the first progressive scan broadcast quality HDTV camera at the ASC booth. I shamelessly picked the M.I.T. scientists brains over a four day period, attended various ShowBizExpo forums on the subject of Advanced Television Systems and have had approximately seven hours of one-to-one discussion about the ACATS proposal with the gracious and knowledgeable former ACATS director, Dr. Robert Hopkins.

I feel fully qualified to comment on the ACATS DTV proposal.

Reason for Comments

I wish to congratulate the ACATS group for their prodigious effort and diligence in the daunting task of attempting to define a practicable and high quality ATV standard. I believe the alterations I will recommend will allow the standard greater compatibility with future advances in technology, more faithful reproduction of the motion picture literature, a greater likelihood of success in the marketplace and will benefit the public in a major way.

Motivation

While it is relatively easy to understand the effect of the spoken word in drama, what is far less obvious is the direct effect of the images themselves, which have much the same unanalyzable but powerful emotional effect as music. This is partially because cinematographers and film directors deliberately conceal their craft so as not to distract the viewer from the story. Consequently our work has a profound effect on an audience but is usually neither noticed nor recognized outside our trade. This is indeed as it should be.

The present state-of-the-art motion picture projected in a theatre has roughly 10 times the vertical resolution and 10 times the horizontal resolution of a VHS tape[1]. A darkened theatre has a brightness range approximately 10 times that of a typical home television viewing situation. Thus, it could be argued that the amount of visual data and consequently the visual impact of a movie projected in a theatre is about 1000 times greater than that same movie seen in the home on videotape.[2] Directors and cinematographers understand and lament the fact that the television audience never feels the full force of their work.

It is for this reason that the motion picture and television production industry is so concerned that the next system of American television technology not only improve on NTSC, but give the public images that approach the power of the projected print in a movie theatre. If we aspire to a higher standard than many engineers and broadcast executives it is because we believe the best of our work is profound and touching, that it is capable of inspiring beneficial changes in character and therefore it is in the public interest that it be shown as effectively as possible.

Cropping

Every motion picture or television shot is carefully *composed*, generally with input from three artists: the director, the director of photography and the camera operator. Despite the typical production's $8,000 to $10,000 hourly operating cost, the process of blocking and composing the images of a show is rarely rushed because visual impact is considered by film makers to be equivalent to content.

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[1]Vertical and horizontal resolution are simply the number of single points or *pixels* of information in a vertical or horizontal line across the picture.

[2]According to Eastman Kodak's Cinesite, a motion picture frame scanned at 2000 by approximately 4000 lines, depending upon the aspect ratio will appear reasonably sharp when printed back to film and projected. The resolution of VHS tape is generally regarded as about 200 lines by 300 pixels. When the entire width of the film is shown in its original aspect ratio there is *even less* data on the television screen. The difference between the brightest white and darkest black on a movie screen is about eight lens stops (256:1). The brightness range of a home TV set is about 5 stops (32:1). Of course the ambient light in home viewing conditions can decrease the brightness range considerably by corrupting the darker tones.

There is virtually unanimous agreement among film makers that a powerful composition can not later be recomposed without significantly lessening its emotional impact. Cropping, truncating or 'panning and scanning' damages our work and considerably lessens its value to the public.

Aspect Ratio

The squarish 1.33 to 1 aspect ratio[3] NTSC screen was introduced before film makers adopted wide screen formats in the early fifties. Film makers preferred telling their stories in wider aspect ratios and almost every American theatrical film since the fifties has been shot at a 1.85 to 1 or wider aspect ratio . Wide images are closer to the way our eyes see the world and almost all American Films are shot at 1.85 or 2.4 *(scope)* ratios[4]

This, of course, has given us a nightmare of format incompatibility. The NTSC system was locked into a 1.33 ratio and film makers insisted on working in 1.85 or 2.4 to one *(scope)* ratios. Thus, for over forty years our work has been truncated, cropped and generally mangled while we could do little but gnash our teeth. On our *scope* pictures we could crop off 45% of our picture (*ouch*) or letterbox and lose half the pitifully small resolution the NTSC system offered (*groan*).

The current system of American television technology leaves no satisfactory way of presenting the wide screen movies made in the last four decades. The fact that the public hasn't protested loudly about this merely indicates they just don't understand how much they're missing.

At this time, it is quite legal and common practice for broadcasters to *pan and scan* or crop movies at their discretion. Yet this may not always be so. In 1995, a senate bill was introduced listing the (artistic) authors of a film or teleplay to be the writer, director and cinematographer. It is conceivable that in a few years cropping will not be allowed without the authors' permission. Today, digital technology allows the efficient and economical transmission of the entire motion picture by specifying its width and height in pixels in a header description. I therefore submit that this become the standard adopted so that **movies and other program material from the past, present and future, be transmitted to the viewer uncropped and in their original aspect ratio as their authors intended.**

The flaw in 16x9

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[3]Ratio of width to height. The number expresses the width in units if the height were to be 1 unit. The 1.33 to 1 aspect ratio (commonly shortened to 1.33) is also called *4 by 3* and the 1.77 aspect ratio is also called *16 by 9*.
[4]The ultra- wide 2.4 or 2.35 ratio was originally called *cinemascope* (now commonly shortened to *scope*) and is used for about a third of our movies. A shortage of anamorphic lenses prevents even more films from using this popular format.

There is an essential flaw in the reasoning for the 1.77 or 16x9 aspect ratio. The 1.77 ratio was chosen because it is almost exactly between the widest (2.4) ratio and the squarest (1.33) ratio commonly used. The vast majority of material shot in 1.33 is comparatively low resolution television. Because it is lower resolution, it is not designed by the directors and cinematographers who frame the shots to be seen greatly magnified. We generally make television close-ups larger, so that an audience sitting far enough away to avoid seeing the relatively coarse television raster lines can still see the emotions in an actor's face. This material is much less sharp than High Definition television and will not be hurt by remaining relatively small on an ATV screen. Therefore, if a 1.33 television image is shown in the center of a very wide screen monitor with copious black side *curtains*, no real harm is done to the image because the image was *designed* to be seen at a relatively small viewing angle.[5]

Consider the opposite situation however. Wide screen 2.4 aspect ratio scope movies are the widest, sharpest, biggest work we normally do. We use a larger portion of the negative to achieve a *sharper picture*. The reason this is necessary is that *we design these pictures to be seen greatly magnified on a huge, wide screen*. We compose the frame quite differently than for a squarer format. In wide screen films we often frame very small figures against giant backgrounds to overwhelm the audience by the scope and power of the environment.[6]

We use composition and screen size to convey imbalance, isolation, suspense, majesty, loneliness, danger, euphoria, stability, anxiety, neurosis, or a feeling of literally being *on the edge*. Obviously the emotions conveyed by film making on this level of visual expression can survive neither cropping nor significantly reducing the magnification of the image size. Every film maker knows that material shot for the big screen should be viewed as big and sharp as possible if the audience is to feel the full power of the medium.

Not a single engineer factored this into their calculations. I have seen dozens of diagrams, formulae, charts and pseudo-scientific studies justifying 16x9 yet not a single writer or engineer mentioned that there is a *qualitative* difference between wide screen movies and NTSC television. **The aspect ratio should be weighted toward the wider media because wide material *needs* to be magnified and fill the screen and squarer NTSC material simply does not.** The fact that this simple fact was missed after all the years and millions of dollars spent

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[5]NTSC television is designed to be seen from seven screen heights away (13'8" from a 20" high set). Advanced Television has much finer lines and is designed to be seen from three screen heights (5' from a 20" high set).
[6]Thirty five millimeter film is so sharp it is designed to be viewed from 1.5 to 2 screen heights (2'6" to 3'4" from a 20" high picture). In the case of a scope picture, you could be sitting 2'6" from a picture 4'2" wide and it would still look completely sharp!

demonstrates to me that the ACATS group was deficient in understanding the basic nature of the software their proposed system was designed to transmit.

Shooting Wide Screen Television

I will be surprised if the squarish 1.33 aspect ratio is used much for image origination if ATV becomes the national standard. On page five of Stanley Baron's *The ATV Standard: Understanding the Choices,* Mr. Baron states:

> *"Both cinematographers and videographers would agree that use of a 2:1 or greater aspect ratio is not the best approach to establishing the feeling of a close working relationship between the news journalists on a set or a journalist and a person being interviewed, seated in comfortable chairs and holding a dialogue separated by a small coffee table."*

Every time I showed Mr. Baron's comment to a film or television cinematographer, they laughed. We laughed because Mr. Baron chose a very *TV-ish* example and because people associate TV with squarish images. Those of us who have filmed everything imaginable in wide aspect ratios know that intimate scenes work beautifully in those formats. We knew people would adore watching the scene Mr. Baron described in a wide screen format. I believe cinematographers, videographers and directors will embrace shooting wide screen television just as we've embraced shooting wide screen movies.

2 to 1

The American Society of Cinematographers (ASC), the Directors Guild of America (DGA) and the 5,800 member International Photographers Guild (IPG) which represents cinematographers, videographers, news photojournalists, camera operators, still photographers, etc. have all gone on record favoring a 2:1 ratio screen for the next generation of television monitors. That would yield a 28% larger *scope* image than on a 1.77 set of the same height.[7] Cramming a 2.4 scope picture into a 1.77 set revisits the sins of the past and *encourages cropping to fill up more of the TV set.* **We have suffered through cropping for decades and the thought of continuing the practice in a new system infuriates virtually everyone responsible for creating motion pictures today!**

The proponents of 16x9 argue that it is easier (and therefore cheaper) to make a rounder (or squarish) glass television tube than a wide one. Representatives from Apple Computer, M.I.T., the MCA/MEI HD Telecine Research Center,

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[7]On a 2:1 set vs., a 1,77 set of the same diameter, the increase in size of a scope picture is negligible. Nonetheless, the considerably wider black bands on the top and bottom of the 1.77 set might tempt users to crop the image to fill the screen. They would then be deprived of viewing the entire image.

Spielberg's Dreamworks and others[8] agreed that rapid progress in flat screen and moving mirror projection technology could soon make bulky, heavy, glass cathode ray tube based sets obsolete. It would be a tragedy to lock ourselves into decades of a restrictive format because of manufacturing costs of a technology that might soon disappear.

Why Specify a Ratio?

It is my understanding that within the current ACATS proposal, it is possible to transmit *any given aspect ratio* by merely employing a header descriptor specifying the number of lines and the number of pixels per line. If that is indeed true, then **there may be no longer any need to mandate an aspect ratio for transmission or for receivers.** We are aware that manufacturers will promote the 16x9 sets they are already developing, but at least those wishing to promote sets wider than 1.77 would not be disadvantaged. **It is crucial to not impede the manufacture of wider screen sets. Wide sets encourage both broadcasters to transmit and the public to watch the whole uncropped picture. It is in the public interest and should therefore be mandated that broadcasters transmit the entire picture in its original aspect ratio to the home receiver.**

Pan and Scan: Embedded in the System

It is my understanding that coded deep within the MPEG2 compression system utilized in the ACATS proposal is the mechanism for viewers to choose a panned and scanned (cropped) version instead of the whole uncropped version of the movie.[9] The broadcasters and engineers of the Grand Alliance evidently installed or approved that code because of the pervasive practice of panning and scanning in the old NTSC system. There are three compelling reasons to disable this code.

1.) Panning and scanning is neither needed nor desirable in the new ATV system because an unaltered, uncropped wide screen movie fills much more of the set with a much sharper image than with the old NTSC system.

2.) The public are neither expert nor knowledgeable about motion picture composition or visual story telling. They are not given the choice to eliminate part of the sound track and I see no reason they need to be allowed to eliminate part of the picture.

3.) The artists that create motion pictures care that the public receive the full benefits of their work. We consider inclusion of format altering code an arbitrary and capricious disregard for the high standard of dedication and craftsmanship of the American motion picture industry. It trivializes work we hold to be important.

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[8]at a June 30, 1996 ShowBizExpo panel on advanced TV

[9]Source: Conversations with Dr. Robert Hopkins, former ACATS executive director

This is a superb test of the flexibility of the proposed system. If a simple function like pan and scan enabling can not be easily and permanently removed from the system then the very architecture of the system must be questioned. It is my opinion that **the Pan and Scan enabling function should not be transmitted to ATV receivers.** This is likely to become an extremely important issue with the entertainment industry.

Interlace and Forward Compatibility

The proposed standard includes both interlaced and progressive scan formats.[10] I believe the inclusion of interlaced formats in the proposed standard compromises the flexibility of the system to adapt to improvements in technology; specifically the ability to integrate with the progressive scan world of computers. **It is only by *converging with basic computer standards* that we may be able to achieve the massive acceptance of ATV necessary to provide the public with a useful, affordable and high quality system.** At this point in our technological evolution, backwards compatibility, which could be easily provided with an inexpensive set-top box, should not limit forward progress.

Interline Distortion

In Japan, I was able to make direct comparisons between interlaced HDTV monitors and ordinary progressive scan computer monitors showing the same images. The difference in picture quality was shocking. Test patterns and lines as simple as ordinary Macintosh menu bars flashed and jiggled horribly on the interlaced televisions yet were rock solid stable on the progressive monitors. Fine detail and even gray sky textures seemed to 'crawl' or shake distractingly on the interlaced devices yet were stable and sharp on the progressive scan monitors.[11] Fine print was also much more clear and readable on the non-interlaced monitors. That is why progressive scan monitors are used almost exclusively in the computer industry. I believe progressive scan monitors are necessary to achieve the desirable goal of convergence of advanced television systems and computer systems. Interlaced monitors which are not computer compatible will probably flood the market unless an all progressive system is established.

Synchronization

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[10]Interlace is the process of scanning all the odd numbered lines of a picture and then all the even numbered lines. It was developed in the 1930s because of technology limitations and has remained with NTSC television ever since. Progressive scan scans each line of the picture in order from top to bottom. The computer industry has migrated completely to progressive scan systems and monitors.

[11]The reason is *interline distortion*, the inability for interlaced monitors to define adjacent contrasting lines. A normal interlaced signal is almost unwatchable without *interlace filtering*, a process of merging together adjacent line pairs and defocusing them. The result is a loss of approximately 40% of sharpness. Progressive scan has no such limitations.

According to Branko J. Gerovac, director of the M.I.T. High Definition Research Group, the precise timing and synchronization needed in an interlaced system causes complications and design limitations which could inhibit flexibility in the proposed system. This is not within my field of expertise but should be evaluated by an independent consultant not associated with a company with a vested interest in interlace technology.

Motion

Because an interlaced format scans only half the picture each interval, any horizontal camera or subject motion will smear the image over twice the area, thus cutting the resolution or sharpness of the moving image in half.[12]

Flicker

Virtually all large computer monitors refresh (or redraw) their screens 70 or more times a second because at the brightness level of monitors, the eye can detect flicker at 60 Hz[13]. Flicker is undetectable at rates over 70 Hz[14]. Progressive scan formats can be easily converted to frequencies over 70 Hz at the receiver. Material shot at 24 or 25 frames per second could easily be converted to 72 Hz or 75 Hz. Interlaced material, however, can not be easily converted.[15]

Compression[16]

A compression scheme is judged by how much it can reduce the amount of data and by the quality of the compressed image. *MPEG2* is the specified compression method of the ACATS proposal. It reduces the amount of data by a factor of 25 and may introduce degradation or *compression artifacts* into the image[17].

No progressive scan 60 Hz high resolution[18] format was included in the 18 approved ACATS formats because it was claimed that that size progressive format couldn't be compressed into the approved 19 megabit bandwidth. Stan Baron of the ACATS committee asserted that a compression scheme that could compress that progressive scan format into the allotted bandwidth didn't exist and was 7 to 10 years away.[19]

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[12]Source: the M.I.T. High Definition Research Group. Branko J. Gerovac, director

[13]Source: Gary Demos of Apple Computers and Demografx

[14]ibid.

[15]Ibid. Witness the expensive and problematic PAL-NTSC conversions

[16]Compression is the process of scanning frames of picture and, via complex mathematical operations, reducing the amount of data needed to transmit those frames.

[17]My own eyewitness observations as described herein

[18]1920 pixels by 1080 lines

[19]June 30, 1996 ShowBizExpo seminar. I was in attendance.

The Future is Here Today

Gary Demos, a three time technical academy award winner and Hi-Def consultant for Apple Computers has developed and demonstrated a compression scheme based on MPEG2 but 6 to 8 times more efficient, something Mr. Baron claims is still 7 to 10 years away. Furthermore, Mr. Demos' scheme works without observable compression artifacts or image degradation.[20]

Rapid advances in compression schemes seem inevitable, and with them the opportunity to yield better and better images using less and less of our precious and limited bandwidth. Unfortunately, the ACATS proposal lacks the flexibility to incorporate advances in compression schemes.[21] There is controversy over whether it is possible for a transmission system to accommodate advances in compression schemes. Dr. Robert Hopkins, a staunch defender of the ACATS proposal who recently joined Sony, asserts it would be necessary to redo the system at great expense of time and money, but M.I.T.'s Dr. Branko Gerovac, an equally persuasive critic of the proposal indicates that if the interlaced formats are eliminated, growth in compression schemes could be provided for within the system.

Independent counsel

With 600 to 800% gains in compression efficiency already demonstrable today, if it came to a choice between the inclusion of interlace formats in the system or of accommodating present and future gains in compression efficiency, one would be foolish not to opt for compression efficiency. I believe it is imperative for the commission to seek expert independent advice and counsel on this matter. I believe the commission must seek truly independent advice because many companies, notably Sony, have made huge investments in high definition interlaced systems.[22] The desire to recoup their investment is understandable and would naturally cause them to defend the inclusion of interlace in the system. Hence, it is necessary to guarantee the commission has totally unbiased counsel in its investigation because the results could have a tremendous impact on both the quantity and quality of programs delivered to the American people.

American Ingenuity

A few years ago, Sony declared interlace formats should continue because a broadcast quality progressive scan HDTV camera was *"decades away"*. Yet the

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[20]Allen Daviau, ASC (ET, The Color Purple, Empire of the Sun, Avalon, Bugsy, etc.) and I spent hours looking at split screen side by side comparisons of the original material, the MPEG2 compression (which showed noticeable compression artifacts) and the Demos compressed images that showed no compression artifacts and were indistinguishable from the original.

[21]Source: conversations with Robert Hopkins and Branko Gerovac

[22]I recently visited the Sony high definition center and was quite impressed by their interlaced projection though I was less impressed by their high definition interlaced camera.

American made, M.I.T. designed, Polaroid built, broadcast quality progressive scan HDTV camera was demonstrated this year and made images so impressive it drew perpetual crowds at the recent NAB and ShowBizExpo events.[23]

Shaky Interlace Arguments

There seem to be only two arguments left for the inclusion of interlaced formats in the ACATS proposal:

1.) Under the proposed MPEG2 compression scheme a higher resolution interlaced image can be transmitted than a progressive one. Yet interlaced images lose 40% of their sharpness because of interline filtering, making the advantage almost negligible.[24]

2.) Sony and other manufacturers have already invested in interlaced technology. Considering that the inclusion of interlacing may jeopardize the potential convergence with computers, this argument seems comparatively trivial.

We are urged by ACAT's advocates to accept the proposal *as is* because it *is* a finished proposal that would take time to alter, that it has been recommended by important companies and engineers and because its supporters wish to move on with the implementation of the system.[25] After taking eleven years to draft a plan, ACATS now urges us to rush to judgment before the major industries of entertainment and computing can properly weigh the long term consequences of this plan. That gives me pause for thought. Under the present proposal, what is to guard us from the following scenario?

1. *The ACATS DTV proposal is approved.*

2. *Manufacturers immediately introduce <u>interlaced</u> DTV sets into the market, because they are closest to ready.*

3. *Broadcasters invest in interlaced technology and favor the interlaced formats because consumers are buying interlaced sets.*

4. *Manufacturers of television sets and equipment make greater short term profits.*

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[23]Although I was unable to see a side by side comparison, images from the progressive scan camera looked superior to images from Sony interlaced cameras I viewed at the screening room at the Sony High Definition Center.

[24]The identical argument could be made for a higher frame rate substituted for a higher resolution, but the result is substantially the same.

[25]Tone of the ShowBizExpo forum hosted by Stan Baron. Also from conversations with Robert Hopkins and from recent newspaper ads by ACATS proponents.

5. *Compatibility between computers and television fails.*

6. *The public is stuck with a refinement of 1930s technology for the foreseeable future. They are also denied the benefits of interactive, high definition access to the information infrastructure, movies on demand, etc.*

Despite the committee's rhetoric to the contrary, the current ACATS proposal is still tied much too much to the past. Technological breakthroughs are coming too fast for a system not yet liberated from interlacing, fixed aspect ratios and Pan and Scan. **The ACATS committee lacked boldness and vision extending far enough to imagine the enormous potential of an integrated computer and advanced television system.** All digital image manipulation of movies is done by progressive scan computers. **When that technology can be integrated into movies and television programs in real time, people may be able to insert themselves and friends into interactive, high resolution dramas. The sky is no longer the limit!** How utterly absurd to sacrifice *that,* for interlacing!

The Market and the Dream

I heartily agree with the commissioners that we need to put in place a high quality, affordable and adaptable advanced television system as soon as possible. However, I believe the best way to accomplish that is to hasten the inevitable convergence of digital television with computer systems. The forward-thinking computer industry has already completely migrated to progressive scan. There are already 40 million progressive scan multisync computer monitors in place in the US. **An all-progressive-scan television system would run on virtually any computer monitor. The proposed interlaced/progressive system would not.**[26]

The Japanese public did not accept the NHK High Definition Muse system. It would be tragic if the ATV system failed because it was only of use to the wealthy and the few. But converged with computer technology, families could enjoy high definition, wide screen movies, television, the internet, computing, movies-on-demand, educational materials, homework, health care, the information highway, etc. all on a single system. Affordability would come from the mass market because the system would be versatile, practical and useful. This should be the dream we aspire to and this, in the eyes of both the computer and entertainment industries, is the advanced system we need.

Conclusion

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[26]Source: The M.I.T. team.

From all that I have read and seen and heard, three simplifications and one more serious modification to the ACATS proposal could preserve the integrity of film literature and provide the flexibility necessary for further growth.
They are:

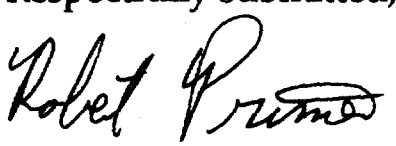
1.) The elimination of a specified aspect ratio.
2.) The elimination of Pan and Scan ability.
3.) The elimination of interlaced formats.
4.) The provision for incorporating technical advancements into the system as they occur, especially in the difficult area of image compression.

The other hope, of course, is that the FCC will do everything within its power to encourage the broadcast of materials in their original aspect ratios. I am not certain of the best way to implement this. I am certain the public deserves to see the whole picture.

I do not expect the commission to change the advisory committee's proposal based solely on my recommendation. I do hope the commission will delay acceptance of the ACATS proposal until they can gain independent verification of these potential problems from parties without vested interests in the results.

Many of us have gladly invested tremendous amounts of our time and energy to this cause. We believe there is no mission more important than improving the hearts and minds of our people.

Respectfully submitted,



Robert Primes, ASC