ID No - 1531

16 February 2000

Professor Richard Snape
Deputy Chairman
Productivity Commission
LB2 Collins Street East
MELBOURNE VIC 8003
Facsimile (03) 9653 2199

Dear Professor Snape

Inquiry into Broadcasting

The Federation of Australian Commercial Television Stations wishes to make some further comments on issues raised during the last round of hearings, and in submissions by other parties. The comments relate to digital datacasting, some other aspects of digital television, and the commercial television industry's self-regulatory system. These comments are made on behalf of FACTS' members other than the Seven Network.

Digital datacasting

Much public comment on the proposed regulation of digital datacasting in the broadcasting band wrongly assumes that there will be less scope for datacasting than in other countries.

As far as we can ascertain, Australia is the only country to allocate broadcasting band spectrum specifically for datacasting. In the United States, for example, only existing licensed television broadcasters have been allocated spectrum for digital services. US broadcasters will be free to provide datacasting services, provided that they also provide at least a standard definition digital television service. Non-broadcasters can utilise the US broadcasting bands for datacasting only by reaching agreement with broadcasters. While some test services have been announced - see attached report - we understand that no broadcast datacasting services are currently available.

In the United Kingdom, 2 megabits of one licensed multiplex (or about 3% of the overall digital broadcasting capacity) has been reserved for the long-established Teletext service. The new digital teletext service is still a text- and graphics-based service, though it envisages eventual links with the Internet (see attached background information from the British Digital Teletext website).

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As far as we can ascertain, no other country currently introducing terrestrial digital television (or at an advanced stage of planning for it) proposes to allocate spectrum specifically for datacasting purposes.

So, by allowing direct access to the broadcasting spectrum by non-broadcasters, the Australian Government has gone significantly further than any other government in acknowledging the role that datacasting may play in the development of digital terrestrial television. In doing so, however, it has created the unique regulatory problem of how to draw a line between broadcasters and datacasters. This involves more legislative complexity than the internationally-favoured alternative of restricting broadcast spectrum to licensed broadcasters. (This is further complicated by the policy decision to prohibit multichannelling by commercial broadcasters, which requires datacasting to be defined in such a way that it cannot become "backdoor" multichannelling.) From a datacaster's point of view, direct access to broadcasting spectrum is presumably worth the regulatory "overhead".

The proposed definition of datacasting draws a line around traditional broadcasting, and permits datacasters to do anything else. It also allows the use of program elements from television genres, provided that they do not amount to programs in their own right. This will allow datacasters to develop a wide range of services without having to tailor them consciously to the definition. For example, a datacaster could transmit "linear" programming such as:

- Educational programs along the lines of the ABC's open learning programs. These are full motion video, which often contain drama, documentary or current affairs elements, though clearly subordinate to their educational purpose
- Live or recorded coverage of press conferences, Parliament, and Parliamentary or other committee hearings
- Full motion video news programs of up to ten minutes in length
- Information programs.

Where material is provided "interactively" (i.e. either as a selectable portion of the transmitted data stream, or by a viewer initiating transmission of material via a backchannel), a wider range of programming can be provided, as well as purely interactive services, such as home banking and email.

This means that, for most datacasters, the regulatory "overhead" will be minimal. None of the public claims to the contrary in recent weeks go beyond misleading assertion and empty rhetoric that ignores bi-partisan support for a limit on the number of commercial television services until 2007.

The datacasting definition may well need to be reviewed some years hence, along with other aspects of the digital broadcasting regime (as Government policy provides for by 2004). While it is undoubtedly the best available fit for the policy context of the next few years, it may arguably not serve Australia's interests indefinitely.

High definition formats

The Commission asked FACTS to comment on the single page chart provided by NTL of options for simulcasting HDTV formats and SDTV (Transcript, p.1338). We have the following comments:

- A minimum of two megabits per second (Mbs) of the bit-rate capacity of a 7 MHz television channel is required for audio, closed captioning and essential service information data

- In reference to NTL's first paragraph, 1080i transmission of programs that do not involve rapid screen transitions may require considerably less than 16-18 Mbs, and so allow (in the absence of a mandatory digital simulcast) extensive program enhancements and/or datacasting (though possibly not fixed bit-rate datacasting)

- In reference to NTL's second paragraph, we agree that 720p may be "almost indistinguishable from 1080i" when "native" 720p material is broadcast and can be displayed as 720p on the receiver screen. Our last submission noted that there is currently no 720p production interchange standard. We also noted in evidence (Transcript, p.1334-1336) that most HDTV sets on the market in the US were unable to display 720p, instead converting it to 1080i or standard definition. (We provide further details in the following section of this submission.) The normal way of converting 720p to 1080i is to reduce it to standard definition and then "line double" the image to 1080i. This necessarily involves significant loss of picture quality

- In relation to NTL's third paragraph, we note that 576p contains the same number of lines as standard definition digital. It is noticeably superior to standard definition digital only in motion portrayal.

Digital television formats

As noted above, most current digital television receivers are unable to display the 720p format as such, instead converting it to 1080i or to standard definition. We attach lists of integrated digital television receivers, set-top decoders and "HDTV-ready" monitors currently available, or planned for release in the US. (These lists are from the authoritative www.twice.com website, and are current to January 2000.) The first list sets out, in the sixth column, the DTV Native Scan Format. No sets can display 720p except by conversion to 1080i or 480i or 480p. The same is the case with most set-top decoders.

Some 70-80% of all "HDTV-ready" monitors in lower and medium price brackets lack the scanning frequency needed to display 720p. Only in monitors costing $10,000 or more is the ability to display 720p the norm.

Co-regulation and the commercial television industry Code of Practice

The Commission drew FACTS' attention to several complaints made by submitters about station complaint handling. Where we have been able to identify the station involved, and

the details of the complaint, the station has provided a quite different account of the circumstances, and its response.

FACTS recognises that the co-regulatory system relies heavily on the industry's readiness to make viewers aware of complaint procedures, and to deal with complaints sensibly and speedily. We believe that the industry has a good overall record in each respect, and increasingly deals with complaints from a customer-relations perspective. We are committed to improving industry performance in this area.

Yours sincerely

TONY BRANIGAN
General Manager

Attachments

1. Report of test services
2. Background information from British Digital Teletext website
3. HDTV integrated receivers, set-top boxes and "HDTV-ready" monitors in the United States.

Ref:AB10.00

DTV programming panel that included Bob Seidel, CBS VP of engineering and technology, and John Greene, VP of Capitol Broadcasting, which owns HDTV stalwart WRAL-TV Raleigh, N.C. Both Seidel and Greene said they wouldn't back Sinclair's petition, citing extensive DTV reception tests they've conducted that prove 8-VSB works.

"We support the 8-VSB position," said Seidel. "This is not the time to change horses."

Instead, Seidel thinks the DTV standard is robust enough to simultaneously broadcast "opportunistic data," including Internet content and electronic coupons, and HDTV programming within the DTV data stream. He says CBS will be making "some major announcements" regarding DTV data applications in the near future. ■

Cita, BET's sassy cyberhost

Cable network uses virtual sets, characters to enliven its on-air look, while saving money

By Karen Anderson

She's not bad; she's just rendered that way. Cita, the new "cyberhost" of Black Entertainment Television's *Jams Zone* is drawing quite a following, and putting the cable network in the forefront of virtual production.

BET produces the music program using Orad's virtual set and Ascension Technology's virtual character technology, which converts actual human motions into 3-D graphic characters like Cita.

In addition to *Jams Zone*, BET is using Orad's Cyberset O to render sets for *Out the Box*, another music program, and *Madd Sports*.

"With the different shows we are doing we just wanted to make some changes to give us a little bit of ease in changing the sets," says BET Vice President of Technical Operations Joe Phillips. "And to help give our network a different look."

Cita, the 'Jams Zone' cyberhostess, is produced by Ascension Technology.

The equipment has proven relatively easy to use, Phillips says. "We were sort of thrown into it. We've managed to get on the air and get on the air cleanly, and we're growing each week."

Viewers seem particularly captivated by the Cita character. "They are really taken by the dialog and her movement on the set," Phillips says.

Phillips would not disclose how much BET spent on the set but said it was upward of a half-million dollars. "Where the systems pay for themselves is where you are building a set. An elaborate set can cost you anywhere from $25,000 to $100,000 depending on what you are building," he says. "Whereas if you have designers in-house that are rendering the [virtual] sets and putting them into the system you really are saving a lot of money." ■

TeraStreaming video to PCs

Software allows broadcasters to transmit high-quality, low-bandwidth programming

By Karen Anderson

TeraStream, a fledgling Reston, Va., company, is developing software that will allow broadcasters to transmit multiple streams of low-bandwidth video to home PCs over their digital stations.

TeraStream has been testing its system at Allbritton-owned WJLA-TV Washington in June. It's now broadcasting six video streams and two audio streams that can be received on PCs with Hauppauge's 8-VSB PC tuner card.

It's designed to help broadcasters make "higher and better use" of their digital bandwidth, says TeraStream President Sande Smith.

WJLA-TV has said that is wants to wait until set penetration increases and encoder prices decrease before it embarks on HDTV broadcasting. "We have every intention of providing HDTV," says Jerald Fritz, vice president of legal and strategic affairs for Allbritton. "It's just an economic decision at this point."

For its trials at WJLA-TV, TeraStream ran its software on the new Harris Dataplus "encapsulator." The system takes in IP material and converts it to an MPEG-2 data stream as small as 1 Mb/s, allowing broadcasters to develop new service plans with their digital bandwidth. "We are always looking for other things to help repay the extra investments we've made in digital television," Fritz says.

Smith adds, "You should see how good 1 Mb/s streaming video is. We think it's a wake-up call to the broadcast industry."

That's not to say Smith is advocating broadcasters' doing away with HDTV. "This is a way for stations to provide PC-based video and audio when they are not broadcasting prime time HDTV," he says.

NAB Executive Vice President for Television Chuck Sherman agrees that PC video streaming is a great supplement. It could be used for a number of services, including educational and community programming, he says.

"I love it," Sherman says. "I think it's terrific technology and gives the broadcasters further options to use their dig bit stream."

But, Smith says, "it ain't cheap." The Harris' Dataplus alone is $62,000. Smith says his company is still working on pricing and packaging.

The good news is that PC TV tuner cards, expected to be out later this fall, cost less than $600 and should drop significantly in the next year or so. ■

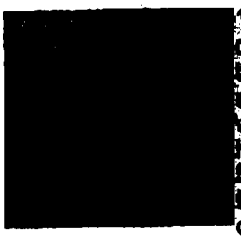
The Digital Teletext team and MHEG-5, Meet the team

From analogue to digital

The company that exists today has its origins in 1991 when a consortium of companies came together to bid for the analogue teletext licence on ITV and Channel 4. The bid was successful, and Teletext went on air on January 1, 1993.

Since then we have built the largest operation of its kind in the world (with 22m weekly viewers, nearly twice the audience we had in 1993). In 1996 we were granted capacity in digital terrestrial broadcasting. Under the terms of the 1996 Broadcasting Act we were assigned capacity on the same multiplex (or frequency block) as ITV and Channel 4, and equivalent to 3% of the total multiplex capacity.

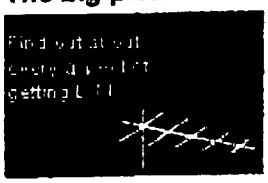
Since being granted digital capacity, Teletext has been instrumental in devising ways of broadcasting a service for digital terrestrial television. Our experience at providing news, features and information on the Web has been a good grounding for new media work and we have been busy recruiting editorial, design and technical personnel.

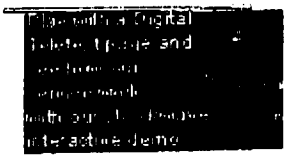


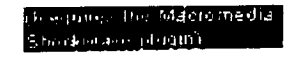
1998 saw the major focus of our digital activity since it was only in the Spring that the technical standards for digital broadcasting were formally agreed. A hypermedia language known as MHEG-5 has been designated as the language for coding services on the digital terrestrial platform. Long before then though, the Digital Teletext team had been working on how digital TV text services might look, feel and work.

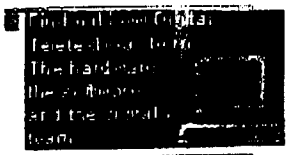
The Digital Teletext team and MHEG-5 ■

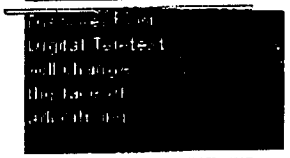
The big picture



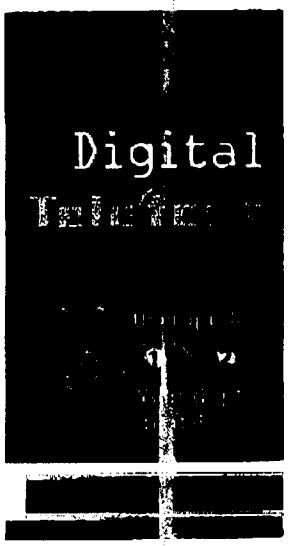








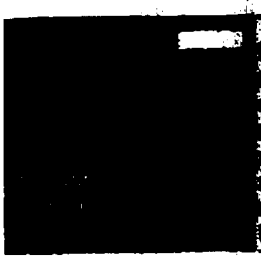
News, Sport, Finance, Weather, Holidays, TV Plus, Bigscreen, Digitiser



The Digital team and MHEG-5

The Digital Teletext team comprises members of the editorial, design, technical and commercial departments. It draws on the skills of editors and production experts, experienced in the analogue service, and the creative skills of designers who have worked on a vast number of Web and multimedia projects. Between them, the team has pioneered an innovative yet simple navigation system that will make the new service immensely flexible and yet easy to use.

Before sufficiently effective MHEG-5 authoring software was available, the design team had to model various sections and navigational systems in Macromedia Director, adhering rigidly to the UK specification for MHEG-5 for digital television. These were used for internal presentations and in market research. Design development has been on both Macintosh and PC platforms using a wide variety of software including Photoshop, Illustrator, Quark Xpress, Homesite and various types of HTML, MHEG-5 and bespoke packages.



The specification dictates what the MHEG code can do, as well as what buttons any remote controls must carry and how they may / may not be used. It was by assessing all this information and applying their Web, multimedia and creative skills to it that the team arrived at the Digital Teletext model of navigation.

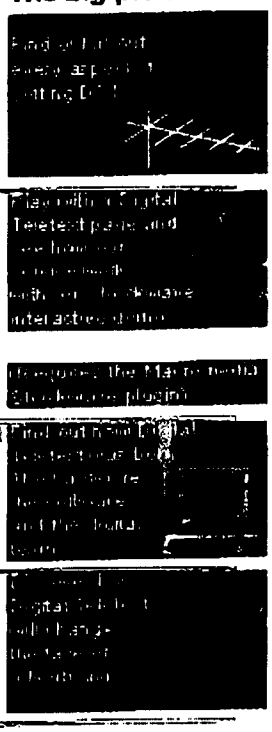
MHEG-5 has proved to be highly effective for writing the Teletext service, being a flexible object-oriented language that allows pixel-perfect positioning of text boxes and graphics, as well as the coding of all manner of links and hotspots. With MHEG we have been able to create scrollable menus that link through to stories, visually rich features and dynamic tables of information such as sports results and television listings.

The team has ensured that the design of Digital Teletext overcomes analogue's three key weaknesses:

Appearance - in digital we can broadcast pictures and smooth graphics; we can use a modern font and hundreds of different colours.

Control - viewers have more control over pages in digital. Key sections of the service - news, sport, TV, weather - contain pages that allow viewers to go forwards and backwards, or access a page by pressing a single page number.

The big picture



Pop-up menus allow viewers to "jump" within, or between, sections.

Speed - this increased control means an even faster service.

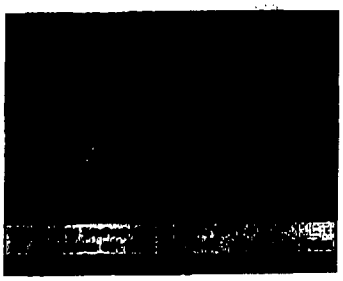
Meet the team

Advertising Inquiries

Commercial Digital Teletext

The future, Meet the commercial team

Digital Teletext and Advertising



Teletext is already a highly successful advertising medium, widely used by all sectors to generate direct response and encourage brand involvement. It provides an interactive and dynamic dimension to advertising and through the use of cross-referral from other media has become an integral part of many multimedia campaigns. Over the past six years, Teletext has developed its holiday advertising to become the UK's leading marketplace for holidays, with one in every 10 holidays being sold through the analogue service.

Digital Teletext will open up a whole new range of possibilities for advertisers. The overall benefits that digital provides include:

Full-colour pictures and Web-style graphics

Faster and easier navigation around the service

More control over cycling pages

What will this mean to the advertiser?
The ability to broadcast in full colour with graphics means that advertisers are able to brand pages better through the use of logos and colours, which will enhance pages and strengthen the brand proposition.

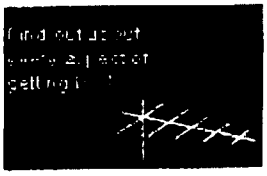
Through the use of enhanced graphics and text, more information can be provided on each page.

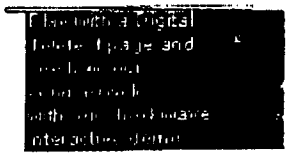
Cross-referral from mainstream television advertising will continue to be available on the new digital service, thereby extending and reinforcing the communication of an advertiser's brand proposition.

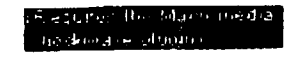
The enhancements of Digital Teletext will encourage viewers to not only look but also respond to an even greater number of advertisements.

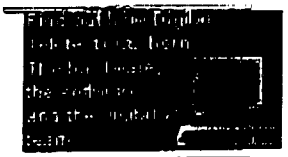
The future

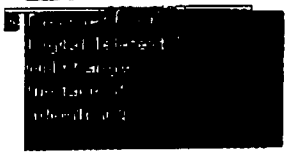
The big picture











News, Sport, Finance, Weather, Holidays, TV Plus, Bigscreen, Digitiser

Advertising inquiries

Commercial Digital Teletext

Digital Teletext and advertising, Meet the commercial team

The Future

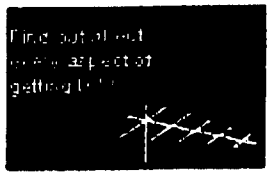
Digital will allow Teletext to develop new sectors in which advertisers can take full advantage of the enhanced branding opportunities.

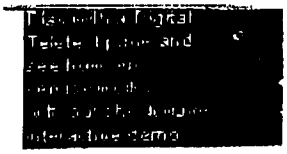
One of the most exciting developments is the eventual link-up between the Internet and Digital Teletext. Consumers will be able to buy goods from the screen, book a holiday or tickets to the cinema, or even take a look at their bank account.

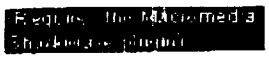
Digital Teletext will enable advertisers to communicate further information about their product or service, encourage and develop brand loyalty and eventually offer them access to rich databases, and personalised or customised information.

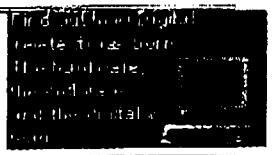
Meet the commercial team

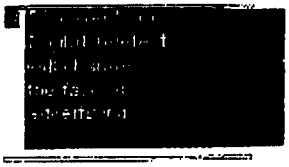
The big picture











News, Sport, Finance, Weather, Holidays, TV Plus, Bigscreen, Digitiser

Fully Integrated 1080i Sets
(Digital Decoder Included)

Back

Brand	Model	Display Type	Screen Size	Aspect Ratio	DTV Native Scan Format	Scan Conversion	Line Doubling For NTSC?	Built-In AC-3 Decoder?	Available	Suggested Retail Price
Daewoo	DSP-2060N	Direct View	30W"	16:9	1080i	All Formats>1080i	Yes	Yes	4Q-1999	$5,000
Hitachi	61HD[illegible]98B*	7" CRT Rear Projection	61W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes	Yes	Now	$7,999 includes satellite dish
Konka	HD30[illegible]U	Direct View	30W"	16:9	1080i	All Formats>1080i	Yes	Yes	May	$3,499.00
Konka	HD34[illegible]U	Direct View	34W"	16:9	1080i	All Formats>1080i	Yes	Yes	Q4-00	TBA
Philips	64PH[illegible]905	9" CRT Rear Projection	64W"	16:9	1080i	NTSC>525p 480i>1080i 480p>1080i 720p>1080i 1080i>1080i	Yes	Yes	Now	$9,990
Philips	34PH9915	Direct View	34W"	16:9	1080i	NTSC>525p 480i>1080i 480p>1080i 720p>1080i 1080i>1080i	Yes	Yes	2Q, 2000	$5,000
ProScan	PS61000*	7" CRT Rear Projection	61W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes	Yes	Now	$7,999
ProScan	PS34000* Performax	Direct View	34W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes	Yes	4Q, 2000	$3,499
ProScan	PS38000* Performax	Direct View	38W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes	Yes	Spring	$3,999
RCA	F38310* Perfo max	Direct View	38W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes	Yes	Spring	$3,999
RCA	P6130[illegible]*	7" CRT Rear Projection	61W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes	Yes	Now	$7,999
Samsung (Tantus Digital)	HCJ5[illegible]5W	7" CRT Rear Projection	55W"	16:9	1080i	All Formats>1080i	Yes, Includes HD Component	Yes	Now	$7,999
Samsung (Tantus Digital)	HCJ655W	9" CRT Rear Projection	65W"	16:9	1080i	All Formats>1080i	Yes, Includes HD Component	Yes	Now	$11,000
Sharp Vision	64LHP5000	7" CRT Rear Projection	64W"	16:9	1080i	NTSC>480p 480i>480p 720p>1080i 1080i>1080i	Yes	Yes	Now	$8,995
Sanyo	TBA	Direct View	30W"	16:9	1080i	NTSC>480i/p 480i>480i/p 480p>480p 720p>1080i 1080i>1080i	Yes	Yes	4Q-1999	$3,499
Sony	KWP-65HD1	CRT Rear Projection	65W"	16:9	1080i	NTSC>960i 480i>960i 480p>480p 720p>1080i 1080i>1080i	Yes (DRC)	No, on-board ProLogic	Now	$10,999
Sony	KW-34HD1	Direct View	34W"	16:9	1080i	NTSC>960i 480i>960i 480p>480p 720p>1080i 1080i>1080i	Yes	Yes	Now	$8,499
Toshiba	DW65X91*	7" CRT Rear Projection	65W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes, Includes HD Component inputs	Yes	1Q-00	$8,499 includes dish
Toshiba	DW5[illegible]X91*	7" CRT Rear Projection	56W"	16:9	1080i	NTSC>540p 480i>540p 480p>540p 720p>1080i 1080i>1080i	Yes, Includes HD Component inputs	Yes	TBA	$6,999 Includes dish
Zenith/ Inteq	IQB56W10	7" CRT Rear Projection	56W"	16:9	1080i	All Formats>1080i	Yes, Includes: HD Component Video, RGB via VGA inputs	Yes	Now	$8,495
Zenith/ Inteq	IQA64W10	9" CRT Rear Projection	64W"	16:9	1080i	All Formats>1080i	Yes, Includes: HD Component Video, RGB via VGA	Yes	Now	$9,999

*Also receives DirecTv standard and HD satellite programming

Digital TV Set-Top Decoders

Back

Brand	Model	DTV Formats Received	Scan Conversion (Input>Output)	HD Interface for DTV Monitor	Includes NTSC Receiver?	Includes NTSC Line Doubler/ Scaler?	Built-In Dolby Digital Decoder	Available	Suggested Retail Price
Konka	HI-0001	All 18 Table 3 Formats	All Formats>1080i	RGB (High Density 15-pin D-sub)	No	No	Yes	January	$999.95
Loewe	TE	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats>480p All Formats>1080i	RGB via VGA, HD Component Video	Yes	No	Yes (2-channel)	TBA	TBA
Mitsubishi	HI-1080	All 18 Table 3 Formats	480i>960i 480p>960i 720p>1080i 1080i>1080i	Proprietary RGB H&V-Sync	No	Yes	Yes (2-channel)	Now	$3,499.00
Mitsubishi	SR-HD500*	All 18 Table 3 Formats	All Formats>480i All Formats>1080i	HD Component Video Proprietary RGB H&V-Sync	Yes	No	Yes (2-channel)	1Q-00	$999.00
Panasonic	TU-HD520*	All 18 Table 3 Formats	All Formats>Any Output Selected	Switchable: HD Component or RGB (RCA jacks)	Yes	Yes	No	May	$1,099.95
Panasonic	TU-DST50	All 18 Table 3 Formats	Switchable: All Formats>NTSC, All Formats In Native Form, 720p>480p, 1080i>480p, 480i>480p	HD Component Video	Yes	No	No	Now	$1,699.00
Pioneer	SH-D500	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats>480p All Formats>1080i	HD Component Video, RGB H&V-Sync	No	No	Yes	Now	$2,500.00
Pioneer	SH-D07	All 18 Table 3 Formats	Switchable: All Formats>480i, All Formats>1080i, All Formats>480p	Expansion Slot Connection for Pro-700HD	No	No	Yes	Now	$2,500.00
ProScan	PSHD105*	All 18 Table 3 Formats	Switchable: All Formats>480i, All Formats>540p, 720p>1080i, 1080i>1080i	RGB via VGA	Yes	Yes	Yes	TBA	$649.00
Proton	TBA	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats In Native Form, 720p>480p, 1080i>480p, 480i>480p	RGB via VGA, Component (YUV)	No	No	Yes	TBA	TBA
RCA	DTC100*	All 18 Table 3 Formats	Switchable: All Formats>480i, All Formats>540p, 720p>1080i, 1080i>1080i	RGB via VGA	Yes	Yes	Yes	Now	$649.00
Samsung	SIR-T100	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>1080i	HD Component Video RGB VGA and RCA	No	Yes	Yes	Now	$1,999.00
Samsung	SIR-T200	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>720p All Formats>1080i All Formats>NTSC Line double NTSC	HD Component Video RBG via RCA	Yes	Yes	No	August	$899.00
Samsung	SIR-TS200*	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>720p All Formats>1080i All Formats>NTSC Line double NTSC	HD Component Video RBG via RCA	Yes	Yes	No	August	$999 (dish optional
SharpVision	TU-DTV1000	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats>480p All Formats>1080i	HD Component Video RGB H&V-Sync	No	No	Yes	Now	$1,995.00
Toshiba	DST-3000*	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats>1080i	HD Component Video	Yes	No	Yes	1Q-00	$1,100.00
Zenith	DQADTV1W	All 18 Table 3 Formats	All Formats>1080i	RGB H&V-Sync	No	No	Yes (2-channel)	Now	$3,995.00

*Also received DirecTV standard and HD satellite services.

1080i/720p-Capable Monitors

(33.75kHz or better scanning frequency)

External DTV-Decoder Required

Back

Brand	Model	Display Type	Screen Size	HDTV Scan Rate Display Capability	On-Board Line Doubling/ Scaling?	Number of NTSC Tuners	Interface for DTV Tuner/Decoder	Available	Price
Cinevision	105[illegible]	7" CRT Front PTV	Variable	720p, 1080i	No	0	VGA 15-pin D-sub	Now	$20,000
Faroudja	RP-[illegible]600	CRT Rear PTV	58W" 16:9	720p, 1080i	Yes	0	RGBS-H&V via VGA 15-pin D-sub	Now	$35,000
Fujitsu	PDS-4221	Plasma Panel	42W" 16:9	720p, 1080i (1024x1024)	No	0	RGB-H&V BNC, Component BNC, RGB 15-pin D SUB	Now	$15,995
Fujitsu	PDS-4222 Brushed Silver	Plasma Panel	42W" 16:9	720p, 1080i (1024x1024)	No	0	RGB-H&V BNC, Component BNC, RGB 15-pin D SUB	Now	$15,995
Hitachi	60SDX88B	7" CRT Rear PTV	60" 4:3	1080i	Yes	2	HD Component	Now	$4,299
Hitachi	36SDX88B	Direct View	36" 4:3	1080i	Yes	1	HD Component, 15-pin D-sub	Now	$2,799
Hitachi	53SDX89B	7" CRT Rear PTV	53" 4:3	1080i	Yes	2	HD Component	Now	$3,499
JVC	AV-61S901	D-ILA Rear PTV	61W" 16:9	1080i (3.32 mil. pixels)	Yes line doubles NTSC	0	(2) HD Component	April	$5,999
Konka	HR3093U	Direct View	30W" 16:9	1080i	Yes	1	RGB High Density 15-way D-type socket	April	$2,499
Konka	HR3289U	Direct View	32" 4:3	1080i	Yes	1	RGB High Density 15-way D-type socket	Q3-00	TBA
Konka	HD[illegible]98U	Rear Projection	50" 16:9	1080i	Yes	1	RGB High Density 15-way D-type socket	Q4-00	TBA
Madrigal	MP-9	9" CRT Front PTV	Variable	1080i 720p	No	0	RGB H&V sync,	January	$60,000
Madrigal	MP-8	8" CRT Front PTV	Variable	1080i 720p	No	0	RGB H&V sync,	January	$45,000
Mitsubishi Platinum Series	WT-46805	7" CRT Rear PTV	46W" 16:9	1080i	Yes	2	HD Component, Proprietary RGB	Now	$3,799
Mitsubishi Platinum Series	VS-50805	7" CRT Rear PTV	50" 4:3	1080i	Yes	2	HD Component, Proprietary RGB	Now	$3,999
Mitsubishi Platinum Series	WS-55805	7" CRT Rear PTV	55W" 16:9	1080i	Yes	2	HD Component, Proprietary RGB	Now	$4,499
Mitsubishi Platinum Series	VS-60805	7" CRT Rear PTV	60" 4:3	1080i	Yes	2	HD Component, Proprietary RGB	Now	$4,499
Mitsubishi Platinum Series	VS-80803	9" CRT Rear PTV	80" 4:3	1080i	Yes	2	Proprietary RGB	Now	$9,999
Mitsubishi Diamond Series	WS-[illegible]5905	7" CRT Rear PTV	55W" 16:9	1080i	Yes	2	HD Component, Proprietary RGB	Now	$5,499
Mitsubishi Diamond Series	WS-[illegible]5905	7" CRT Rear PTV	65W" 16:9	1080i	Yes	2	HD Component, Proprietary RGB	Now	$6,999
Mitsubishi Diamond Series	WS-73905	9" CRT Rear PTV	73W" 16:9	1080i	Yes	2	HD Component, Proprietary RGB	Now	$9,999
NetTV	DTV29X	Direct View	27" 4:3	1080i, 720p	No	0	VGA 15-pin D-sub	Now	$899
NetTV	DTV29XT	Direct View	27" 4:3	1080i, 720p	No	1	VGA 15-pin D-sub	Now	$999
NetTV	DTV34X	Flat Faced Direct View	32" 4:3	1080i, 720p	Yes	0	VGA 15-pin D-sub HD Component	April	$1,299
NetTV	DTV34XTF	Flat Faced Direct View	32" 4:3	1080i, 720p	Yes	1	VGA 15-pin D-sub HD Component	April	$1,399
NetTV	DTV36WTF	Flat Faced Direct View	36W"	1080i, 720p	Yes	1	VGA 15-pin D-sub HD Component	April	TBA
Panasonic	CT-34WDM60 Tau	Flat-Faced Direct View	34W" 16:9	1080i	Yes	0	HD Component	Now	$5,999
Panasonic	CT-34WX50	Flat-Faced Direct View	34W" 16:9	1080i	Yes	1	HD Component	May	$5,999
Panasonic	CT-36DV60	Direct View	36" 4:3	1080i	No	1	HD Component	Now	$3,199
Panasonic	PT-56WPX95	7" CRT Rear PTV	56W" 16:9	1080i, 720p	Yes	2	HD Component	Now	$5,999
Panasonic	PT-65WPX95	7" CRT Rear PTV	65W" 16:9	1080i, 720p	Yes	2	HD Component	3Q-00	TBA
Philips	60PF9701	7" CRT Rear PTV	60W"	1080i, 480p	Yes	2	HD Componet	Summer	$5,500
Philips	55PF9701	7" CRT Rear PTV	55W" 16:9	1080i, 480p	Yes	2	HD Component, VGA 15-pin D-sub	Summer	$5,000
Philips	60PF9601	7" CRT Rear PTV	60" 4:3	1080i, 480p	Yes	2	HD Component	Summer	$4,200
Philips	30PW9815	Direct View	30W" 16:9	1080i	Yes	2	HD Component	2Q-00	$3,000
Philips	34PW9815	Direct View	34W" 16:9	1080i	Yes	2	HD Component	2Q-00	$4,000

Pioneer	PDP-505HD	Plasma Panel	50W" 16:9	720p, 1080i (1280x768)	Yes	0	RGB, HD Component	Now	$20,000
Pioneer	SD-641HD5	7" CRT Rear PTV	64W" 16:9	1080i	Yes	2	HD Component	Now	$6,999
Pioneer	SD-532HD5	7" CRT Rear PTV	53W" 16:9	1080i	Yes	2	(2) HD Component, VGA 15-pin D-sub	Now	$4,499
Pioneer	SD-582HD5	7" CRT Rear PTV	58W" 16:9	1080i	Yes	2	(2) HD Component, VGA 15-pin D-sub	Now	$5,499
Pioneer Elite	PRO-510HD	7" CRT Rear PTV	53W" 16:9	1080i	Yes	2	(2) HD Component, VGA 15-pin D-sub	Now	$6,300
Pioneer Elite	PRO-610HD	7" CRT Rear PTV	58W" 16:9	1080i	Yes	2	(2) HD Component 15-pin D-sub	Now	$7,300
Pioneer Elite	PRO-700HD	7" CRT Rear PTV	64W" 16:9	1080i	Yes	2	(2) HD Component, Expansion Slot Connection For SH-D07	Now	$8,300
Princeton	AF3.0HD	Multi-scan Direct View	30W" 16:9	1080i, 720p,	Yes	0	RGBHV with BNC or VGA, (2) HD Component	Now	$4,100
Princeton	AF3.4HDF	Flat-Faced, Multi-scan Direct View	34W" 16:9	1080i, 720p	Yes	1	RGBHV with BNC or VGA, HD Component	Jan-00	TBA
Princeton	AF3.6HDF	Direct View	36" 4:3	1080i, 720p	Yes	1	RGBHV with BNC or VGA, HD Component	May-00	TBA
ProScan	PS61800HR	7" CRT Rear PTV	61" 4:3	1080i	Yes	2	15-pin D-sub, HD Component	1Q-00	$3,799
ProScan	PS32800HR	Multi-scan Direct View	32" 4:3	1080i	Yes	2	15-pin D-Sub HD Component	1Q-00	$2,199
ProScan	PS36800HR	Multi-scan Direct View	36" 4:3	1080i	Yes	2	15-pin D-Sub, HD Component	Yes	$2,699
ProScan	PS50100W	Plasma Panel	50W" 16:9	720p 1080i	TBA	TBA	RGB via VGA (15-pin D-sub)	TBA	TBA
Proton	MM3601VT	Direct View	36" 4:3	1080i	No	0	HD Component VGA 15-pin D-sub	Now	$3,200
Proton	MM2701VT	Direct View	27" 4:3	1080i	No	0	HD Component VGA 15-pin D-sub	Now	$1,700
RCA	MM27100HR	Direct View	27" 4:3	1080i	Yes	2	15-Pin D-Sub, HD Component	TBA	$1,399
RCA	MM36100HR	Direct View	36" 4:3	1080i	Yes	2	15-Pin D-Sub, HD Component	Now	$2,499
RCA	MM52100HR	7" CRT Rear PTV	52" 4:3	1080i	Yes	2	15-Pin D-Sub, HD Component	1Q-00	$3,299
RCA	MM61100HR	7" CRT Rear PTV	61" 4:3	1080i	Yes	2	15-Pin D-Sub, HD Component	TBA	$3,699
Runco	PL-42	Plasma Panel	20.5"x36.5"	720p 1080i (852x480)	Yes	0	HD Component via RCA	Now	$13,995
Runco	Reflection Series VX1	1-chip DLP Front PTV	Variable	1080i (1024x768)	Yes	0	RGBS via VGA 15-pin D-sub	Now	$14,995
Runco	VX3	3-chip DLP Front PTV	Variable	720p 1080i (1024x768)	Yes	0	HD Componen t via BNC	Now	$64,995
Runco	VX7	DLP 1024x768	Variable	720p 1080i (1024x768)	Yes	0	HD Component via BNC	Now	$110,000
Runco	Reflection Series VX108	1-chip DLP Front PTV	Variable	720p 1080i (800x600)	Yes	0	RGB H&V sync,	1Q-00	$11,995
Runco	DTV-940	7" CRT Front PTV	Variable	720p 1080i	No	0	HD Component via BNC	Now	$13,995
Runco	DTV-943	7" CRT Front PTV with on-board scaler	Variable	720p 1080i	Yes scaling 38.8kHz	0	HD Component via BNC	Now	$17,995
Runco	DTV-991RP	7" CRT Rear PTV	58W" 16:9	720p 1080i 1080p	No	0	RGB via BNC	Now	$24,995
Runco	DTV-992Ultra	8" CRT Front PTV	Variable	720p 1080i 1080p	No	0	HD Component via BNC	1Q-00	$32,995
Runco	DTV-1100	9" CRT Front PTV	Variable	720p 1080i 1080p	No	0	RGB H&V-sync via BNC	Now	$39,995
Runco	DTV-5801	7" CRT Rear PTV	58W" 16:9	1080i	Yes	2	HD Component via BNC	Now	$9,995
Samsung Tantus	HCJ552W	7" CRT Rear PTV	55W" 16:9	1080i	Yes	2	HD Componet	Now	$4,999
Samsung Tantus	HCJ652W	7" CRT Rear PTV	65W" 16:9	1080i	Yes	2	HD Component	Now	$6,999
Samsung Tantus	PCJ534RF	7" CRT Rear PTV	53" 4:3	1080i	Yes	2	HD Component	Now	$3,499
Samsung Tantus	PCJ614RF	7" CRT Rear PTV	61" 4:3	1080i	Yes	2	HD Component	Now	$3,999
Samsung Tantus	HLK-436W	Ferro LCD	43W" 16:9	All Formats>720p	Yes	2	HD Component, VGA 15-pin D-sub	Apr-00	$6,000
Samsung Tantus	HLK-506W	Ferro LCD	50W" 16:9	All Formats>720p	Yes	2	HD Component, VGA 15-pin D-sub	May-00	$7,000
Seleco (OWI, Video)	SVL-500HT	7" CRT Front PTV	Variable	1080i	No	0	RGBS via BNC, 15-pin D-sub	Now	$9,995
Seleco (OWI, Video)	SDC-700L6	7" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC, 15-pin D-sub	Now	$11,595

Seleco (OWL Video)	SDG-800HD	7" CRT Front PTV	Variable	720p 1080i	Yes (DVDO i-scan)	0	RGBS via BNC, HD Component, 15-pin D-sub	Now	$14,995
Seleco (OWL Video)	SDG-900	8" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC, 15-pin D-sub	Now	$19,895
Seleco (OWL Video)	SDZ-1300	3-chip DLP Front PTV	Variable	720p 1080i	No	0	RGB/YUV BNC, DB 15	Now	$27,750 w/zoom lens
Sharp Vision	64LHP4000	7" CRT Rear PTV	64W" (16:9)	1080i	Yes	2	HD Component Video	Now	$6,995
Sharp Vision	XVDW100U	LCD Front PTV	Variable	1080i, 720p (1,024x768)	Yes	0	HD Component, RGBHV VGA	TBA	TBA
Sharp Vision	LC 60HDU	CG-Silicon LCD Rear PTV	60W" (16:9)	1080i,	Yes	0	HD Component RGB H&V sync	1Q-00	$49,995
Sharp Vision	LC D50U	Plasma Panel	50W" (16:9)	720p (1280x768)	Yes	0	HD Component RGB H&V	January	TBA
Sharp Vision	34 WF5H	Direct View	34W" (16:9)	1080i	Yes	2	HD Component, RGBHV via VGA	March	$3,995
Sony	KP 53XBR300	7" CRT Rear PTV	53" (4:3)	1080i	Yes (DRC)	2	HD Component	Now	$4,500
Sony	KP 61XBR300	7" CRT Rear PTV	61" (4:3)	1080i	Yes (DRC)	2	HD Component	Now	$5,500
Sony	VPH-G90U	9" CRT Front PTV	Variable	720p, 1080i	Yes (DRC)	0	RGBS-BNC, HD Component	Now	$35,000
Sony	VPH-D50HTU	CRT Front PTV	Variable	720p 1080i	Yes (DRC)	0	RGB H&V-sync, HD Component	Now	$13,990
Sony	VPL-VW10HT	LCD Front PTV	Variable	720p (1366x768)	Yes (DRC)	0	RGB H&V-sync HD Component	Now	$6,990
Sony	PFM-510A1WU	Plasma Panel	42W" 16:9	720p, 1080i (1024x1024)	Yes (Scales	0	RGBHV, HD Component Video	Now	$15,999
Toshiba	CW 34X92	Direct View	34W" 16:9	1080i	Yes (IDSC, horizontal & vertical)	2	2 HD Component Video Inputs	1Q-00	$4,499
Toshiba	CN 36X81	Direct View	36" 4:3	1080i	Yes (IDSC, horizontal & vertical)	2	2 sets of HD Component Video	Now	$2,199
Toshiba	TN 50X81	7" CRT Rear PTV	50" 4:3	1080i	Yes (IDSC, horizontal & vertical)	2	2 sets of HD Component Video	Now	$2,999
Toshiba	TN55X81	7" CRT Rear PTV	55" 4:3	1080i	Yes (IDSC, horizontal & vertical)	2	2 sets of HD Component Video	Now	$3,199
Toshiba	TN61X81	7" CRT Rear PTV	61" 4:3	1080i	Yes (IDSC, horizontal & vertical)	2	2 sets of HD Component Video	Now	$3,599
Toshiba	TW-56X81	7" CRT Rear PTV	56W" 16:9	1080i	Yes (IDSC, horizontal & vertical)	2	2 sets of HD Component Video	Now	$4,999
Toshiba	TW-65X81	7" CRT Rear PTV	65W" 16:9	1080i	Yes (IDSC, horizontal & vertical)	2	2 sets of HD Component Video	Now	$6,499
Toshiba	TW-40X81	7" CRT Rear PTV	40W" 16:9	1080i	Yes (IDSC, horizontal & vertical)	2	2 sets of HD Component Video	Now	$2,999
Vidikron	Vision One	CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	$49,995
Vidikron	Vision Two	CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	$31,995
Vidikron	Vision Three	CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNS	Now	$24,995
Vidikron	VPF50HDX	CRT Front PTV	Variable	720p 1080i	No	0	RGBS BNC	Now	$19,995
Vidikron	Image 2-A	7" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	$10,995
Vidikron	Epoch D-600	LCD Front PTV	Variable	720p 1080i (1024x768)	Internal Scaler	0	RGB via VGA 15-pin D-Sub	Now	$9,495
Vidikron	Epoch HD-2200	LCD Front PTV	Variable	720p 1080i	No	0	(2) RGB via VGA 15-pin D-Sub	Q1-00	$12,995
Vidikron	Kronos One	7" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	$10,995
Zenith	Pro 900X	CRT Front PTV	Variable	720p 1080i	No	0	RGB H&V-sync	Now	$12,600
Zenith	Pro 1200X	8" CRT Front PTV	Variable	720p 1080i	Optional add-in line-quadrupler	0	RGB H&V-sync	1Q-00	$24,995

Chart updated 1.6.2000. Compiled by TWICE Executive Editor Greg Tarr.