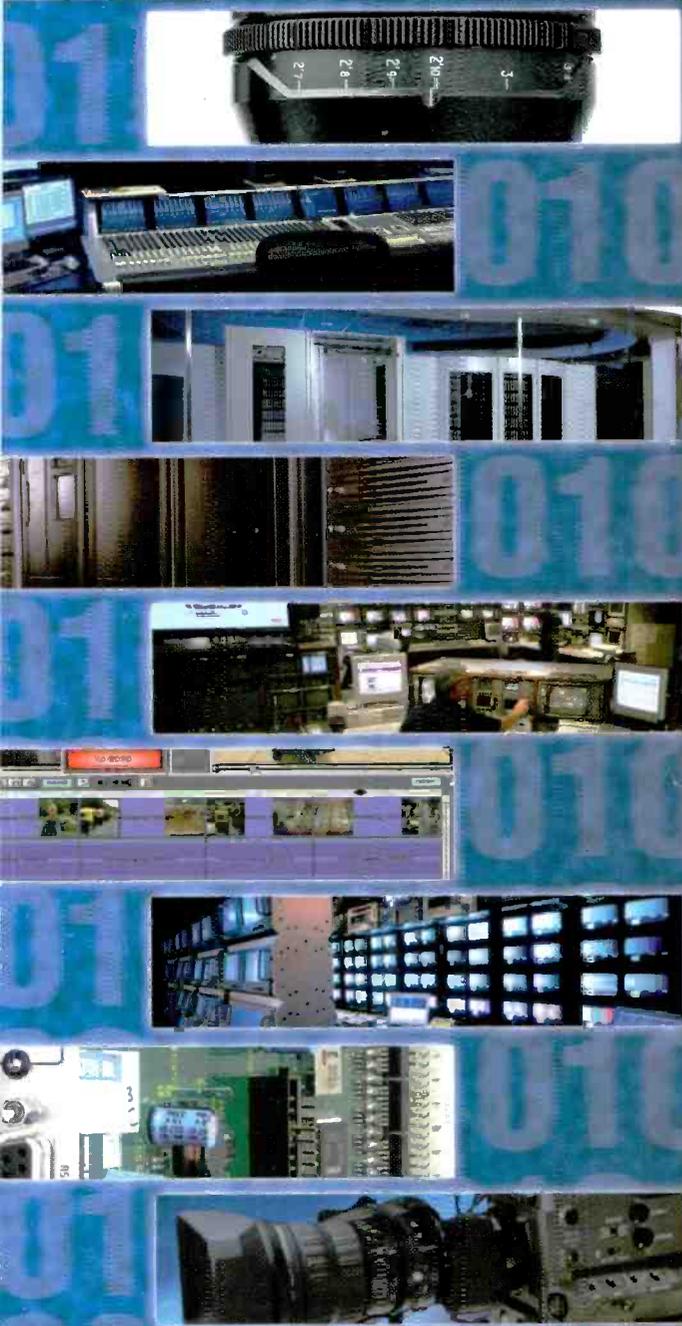


# Broadcast Engineering

THE JOURNAL OF DIGITAL TELEVISION

2004 2004 2004



## Digital Reference Guide

The #1 resource for all your broadcast needs



Digital Audio Network Router

# The Bridge

**The Bridge Router** can hold all the electronics you'll need for a small console: I/O cards, mix engines, and DSP processors. Naturally it can also have automatic fail-over DSP and CPU cards to keep you on-air. You can expand the system with a simple cage-to-cage interconnect.



## It's not just a Digital Console, IT'S AN ENTIRE AUDIO INFRASTRUCTURE

**YOU CAN START** with a simple AES router with analog and digital inputs and outputs. From there you can add logic I/O cards and scheduling software; you can link multiple master bridge cages together to achieve thousands and thousands of I/O ports; you can create a custom system that includes multiple smaller remote satellite cages— with everything interconnected via CAT5 or fiber optic links.

**BUT THAT'S JUST THE BEGINNING:** you can also add mix engine cards, interface to your automation system; you can choose from two different WHEATSTONE series control surfaces (D-5.1 or D-9), each specially configured for production room, on-air or remote truck applications. We also provide a full complement of Ethernet protocol remote router control panels, as well as a complete family of plug-in modules that interface the routing system to existing Wheatstone digital and analog standalone consoles.



**The D-9 is  
Compact yet Powerful:**

It can route, generate and monitor 5.1 surround signals and produce simultaneous 5.1 and stereo master signals for your dual broadcast chain. The console also provides extensive, rapid communication paths throughout your entire Bridge system. Motorized faders and control setting storage and recall make show-to-show transitions fast, easy and accurate.



**Wheatstone Knows Live Audio.** The D-5.1 is loaded with MXMs, foldbacks, and clear easy-to-read displays. You'll have all the power you need when the news breaks! Its intuitive layout helps your operators work error-free, and it can handle and generate all the 5.1 content and simultaneous stereo capability any large or medium market station could need.

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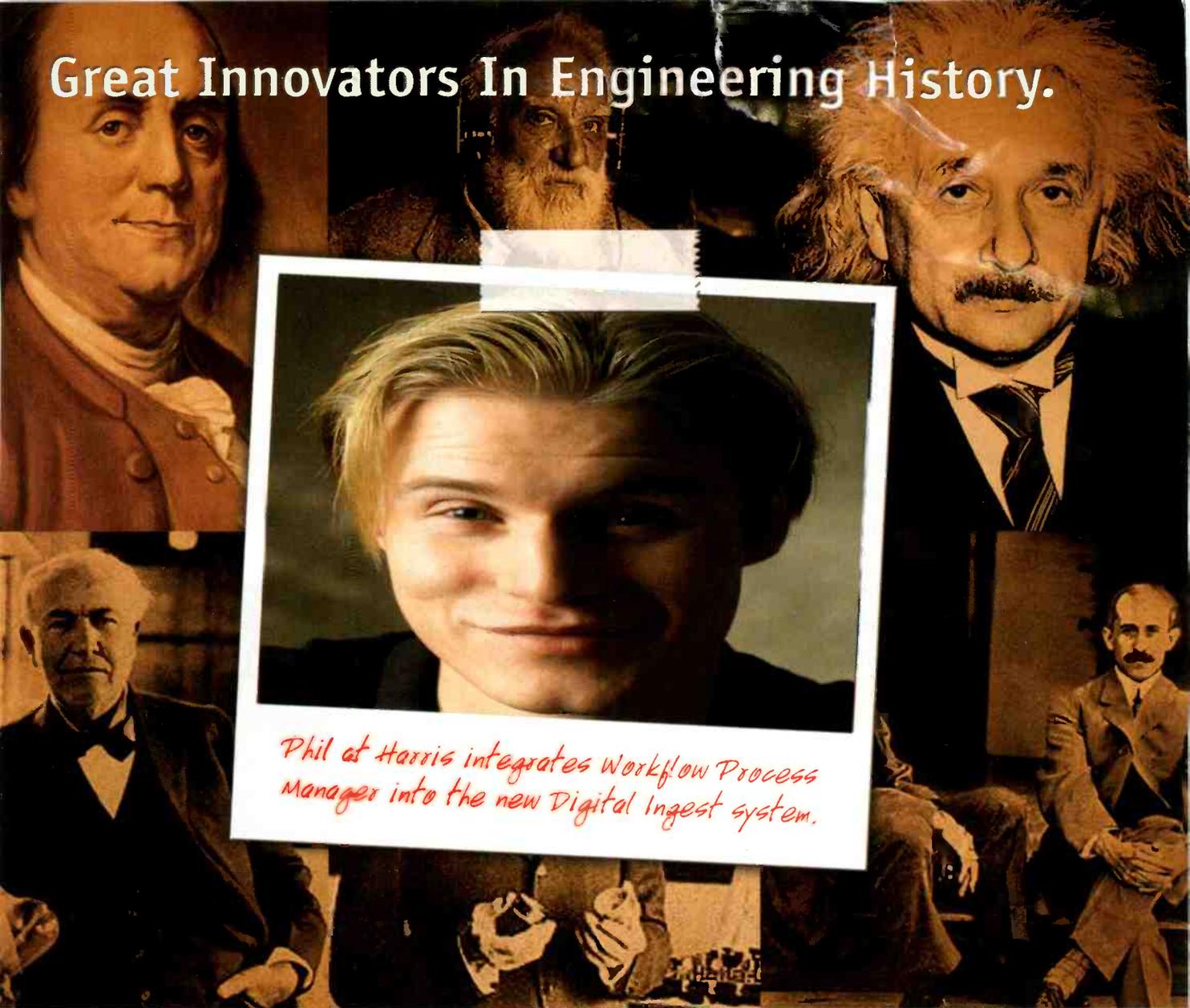


Made in USA

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# Great Innovators In Engineering History.



## Announcing a breakthrough in media ingest and transfer: New Digital Ingest from Harris.

Yes, our guy Phil was pretty excited about the whole Digital Ingest thing. But now it's your turn to discover the latest innovation from Harris, the leader in broadcast technology. **Digital Ingest completely automates your front-end media ingest and transfer process,**

**hrs** harris resource suite  
FOR INGEST-TO-BROADCAST WORKFLOW MANAGEMENT

whether you're talking about a single facility or a whole enterprise. Until now, when digital media was acquired from delivery services — such as Media DVX or DG Systems — distribution throughout the broadcast facility required manual transfer to tape and video file servers. All of that has changed. Now, with Digital Ingest — part of the Harris Resource Suite — you eliminate the error-prone busy work of manually entering metadata, give your operation virtual "real time" ingest-to-plaintext (great for those last-minute, gotta-get-this-on-the-air requests), and better allocate your engineering resources.

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For more information about Digital Ingest and the entire Harris Resource Suite of products, call **1-408-990-8200** or visit us online at [www.broadcast.harris.com/automation](http://www.broadcast.harris.com/automation).

[www.broadcast.harris.com/automation](http://www.broadcast.harris.com/automation)

**HARRIS**

## Read, vote, win.

**T**his year's Digital Reference Guide, formerly the Buyers Guide, holds a wealth of information. The directories department gathered information on hundreds of companies and products for presentation in this issue. The goal was to provide readers with a timely, accurate and up-to-date reference of solutions and vendors for broadcast and production television equipment.

In addition to the printed version you now hold, we have a complete electronic version online at [www.broadcastengineering.com](http://www.broadcastengineering.com). So, search either the printed page or the electronic one — both versions will help you locate the products and vendors you need.

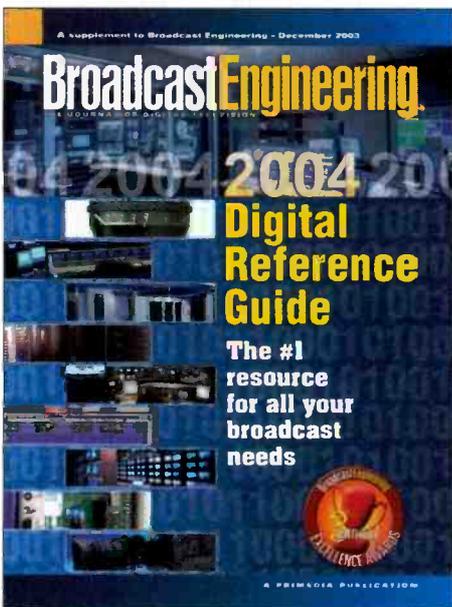
Don't forget to read the 3rd annual Excellence Awards, which begin on page 49. After you've read each story, vote for your favorite installations on *Broadcast Engineering's* Web site.

### Readers win too!

Readers will again help select this year's winners. So, vote online and we'll enter you into a drawing for the new *Broadcast Engineering* T-shirts. Read, vote, win!



Brad Dick  
editorial director



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Cover designs by art director Robin Morsbach

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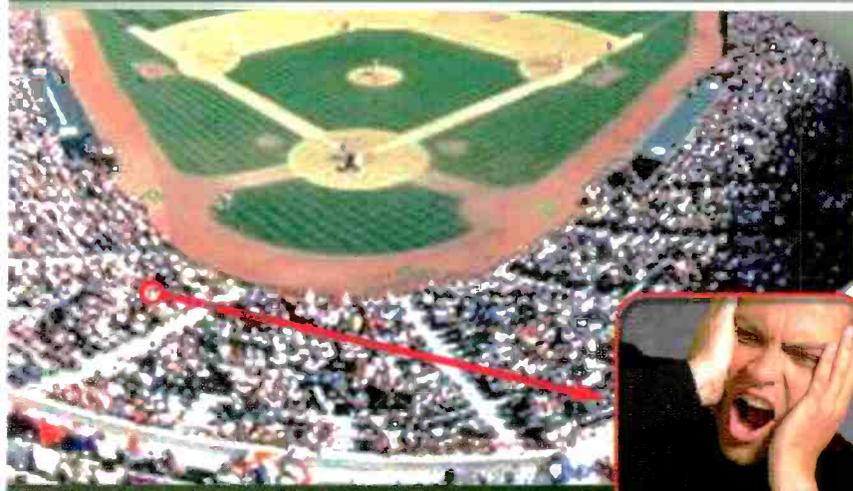
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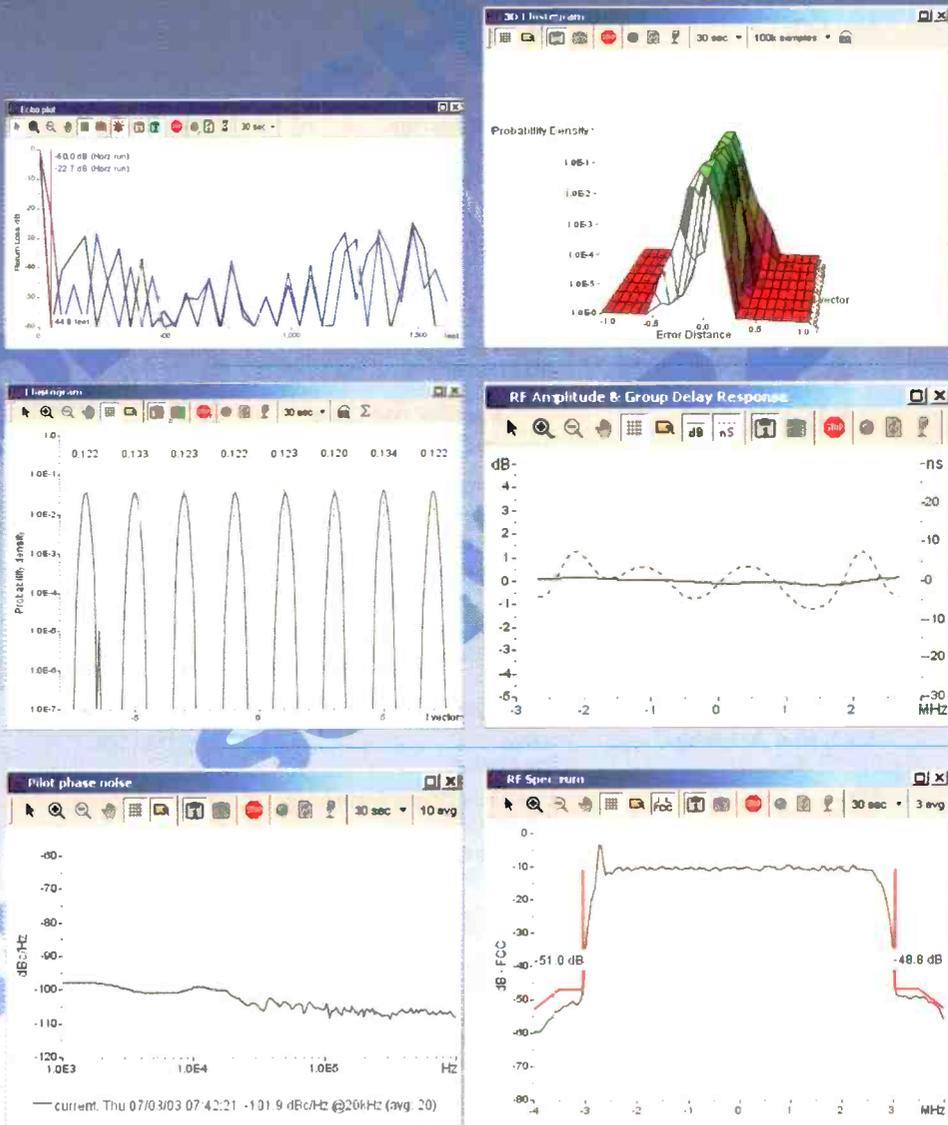
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### Audio accessories

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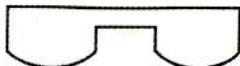
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### Audio meters

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**Logitek Electronic Systems**  
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**TerraSonde**  
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**Zandar Technologies Headquarters**  
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### Audio monitor amplifiers

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**Aviom**  
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**Burst Electronics**  
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**Wohler Technologies**  
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### Audio patch panels

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### Speakers

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**Harrison by GLW**  
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**Modulation Sciences**  
732-302-3090

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**Azden**  
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### Audio compressor/ expanders

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**360 Systems**  
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**Alcorn McBride**  
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**Burlington A/V Recording Media & Equipment**  
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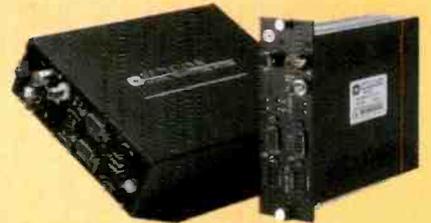
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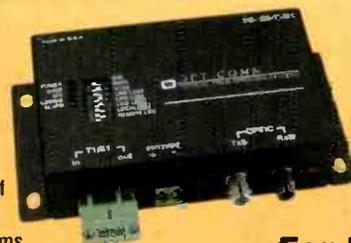
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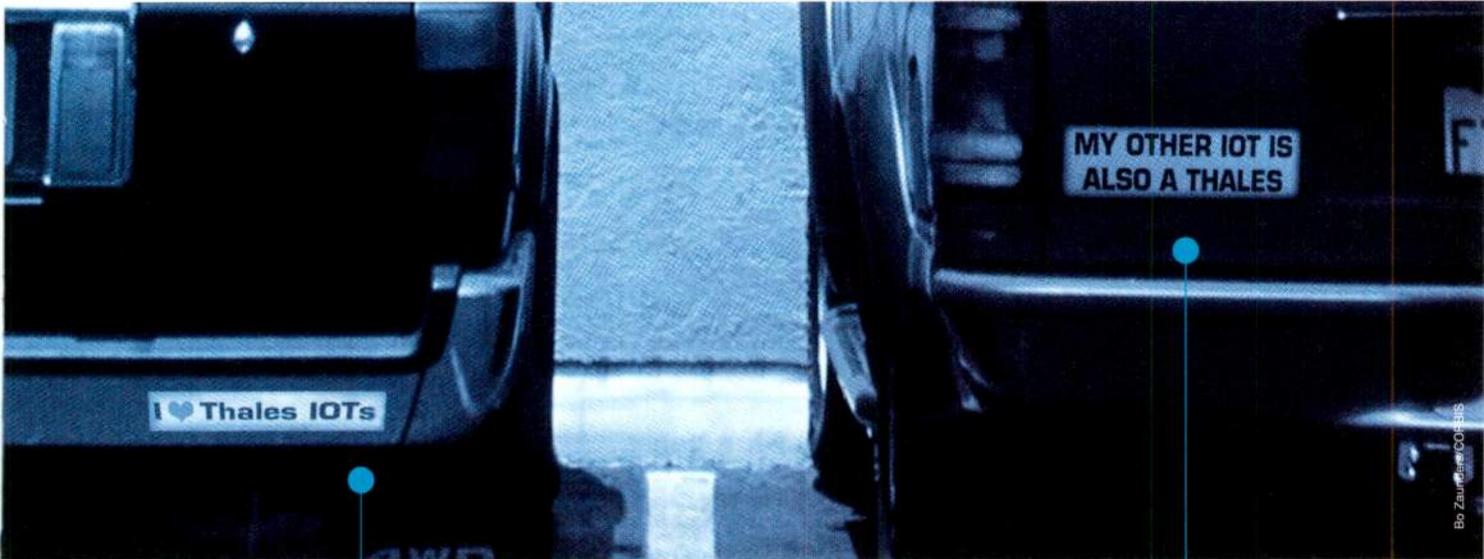
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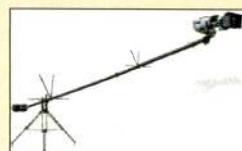
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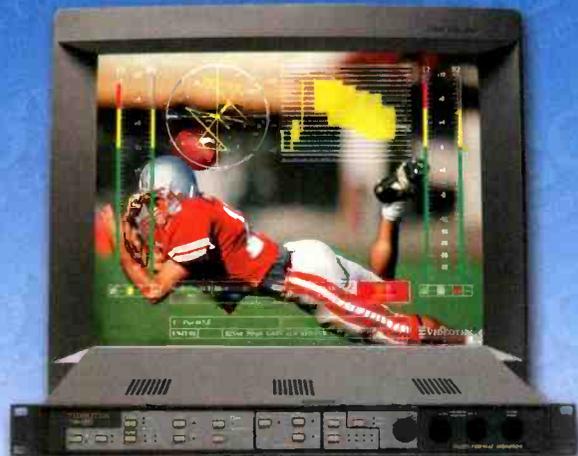


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#### Burlington A/V Recording Media & Equipment

516-678-4414

#### Hitachi Denshi America

516-682-4427

#### JVC Professional Products

973-317-5000

#### Media Concepts

918-252-3600

#### Panasonic Broadcast & Television Systems

201-348-5300; 800-528-8601

#### Sony Electronics / Recording Media

201-930-6342

#### Studio Exchange

818-840-1351

#### Thomson Broadcast & Media Solutions

530-478-3000; 800-547-8949

#### Video Rentals (VRI)

800-255-2874

### Camera accessories

#### 16x9

818-972-2839

#### Anton/Bauer

203-929-1100

#### Camplex

620-342-7743

#### Cartoni USA

818-760-8240; 800-845-6619

#### Cinekinetic

+61 8 9 459 3690

#### Cool-Lux

805-482-4820

#### D.W. Electrochemicals

905-508-7500

#### Electrophysics

973-882-0211

#### Evertz Microsystems

905-335-3700

#### Frezzi Energy Systems

973-427-1160

#### Glidecam Industries

508-830-1414



#### IDX System Technology

310-891-2800

#### Ikegami

201-368-9171

#### Lewis Communications

818-766-3715

#### Lightware

303-744-0202

#### Link Research

+01923 200 900

#### Media Concepts

918-252-3600

#### Obarrio y CIA

5411 4543 0643

#### Panasonic Broadcast & Television Systems

201-348-5300; 800-528-8601

#### Petrol

+972 3 6731891

#### Sony Electronics / Recording Media

201-930-6342

#### Studio Exchange

818-840-1351

#### Telemetrics

201-848-9818

#### Telescript

201-767-6733

#### Thomson Broadcast & Media Solutions

530-478-3000; 800-547-8949

#### Video Rentals (VRI)

800-255-2874

## Videomagnetics

719-390-1313

### Cameras

#### Band Pro Film/Video

818-841-9655

#### Electrophysics

973-882-0211

#### GE Interlogix

800-343-3358

#### Hitachi Denshi America

516-682-4427

#### Ikegami

201-368-9171

#### JAI America

978-957-8587

#### JVC Professional Products

973-317-5000

#### Media Concepts

918-252-3600

#### ParkerVision

904-737-1367

#### Panasonic Broadcast & Television Systems

201-348-5300; 800-528-8601

#### Sony Electronics / Recording Media

201-930-6342

#### Studio Exchange

818-840-1351

#### Thomson Broadcast & Media Solutions

530-478-3000; 800-547-8949

#### Vicon Motion Systems

949-472-9140

#### Videomagnetics

719-390-1313

#### Winemiller Communications

717-241-4400

#### WolfVision

650-802-0786

## CGs

### Character generators

#### Aston Broadcast Systems

+44 1252 836 221

#### AVS Graphics & Media

801-975-9799

#### Broadcast Software Solutions

770-978-9450

#### Burst Electronics

505-898-1455

#### CGS Infographics Automation

859-269-7512

#### Chyron

631-845-2152

#### Compix Media

310-320-8937

#### e-mediavision.com

+44(0)208 755 2014

## Evertz Microsystems

905-335-3700

#### Future Works

408-428-0895

#### Horita

949-489-0240

#### Incite Multimedia

+41 22 3085741

#### Inscriber Technology

519-570-9111; 800-363-3400

#### Keywest Technology

913-492-4666

#### Leitch

757-548-2300; 800-231-9673

#### Leitch Technology

818-525-2599; 888-843-7004

#### MagicBox

541-752-5654

#### Media Concepts

918-252-3600

#### Multidyne Video & Fiber Optic Systems

516-671-7278

#### Pinnacle Systems / Broadcast & Professional

650-526-1600

#### Pixel Power

954-943-2026

#### Studio Exchange

818-840-1351

#### Thomson Broadcast & Media Solutions

530-478-3000; 800-547-8949

#### Video Rentals (VRI)

800-255-2874

#### Vizrt

212-560-0708

### Teleprompters and prompting software

#### Associated Press ENPS

202-736-1100

#### Comprompter

608-785-7766

#### Computer Prompting & Captioning - CPC

301-738-8487

#### Evertz Microsystems

905-335-3700

#### Listec Video

561-683-3002

#### Studio Exchange

818-840-1351

#### Telescript

201-767-6733

## COMPUTERS

### Computer accessories

#### Adrienne Electronics

702-896-1858

#### Kae

801-238-2300



## Cool. Studio Cool.

Introducing Arri Studio Cool, the most complete, flexible, and easy to service fluorescent lighting solution ever developed.

The optically superior Arri Studio Cool is available in 2-tube, 4-tube, and 8-tube models. Each lamphead accommodates 55-watt tubes for higher light output. What's more, only Arri offers interchangeable reflectors that allow designers to select either the high output 90 degree reflector or the wide, soft 120 degree beam angle reflector.



Studio Cool's rugged aluminum extrusion and cast housing features a detachable electronics module for total ease of service and maintenance. And when it comes to control, three different choices of Arri Studio Cool provide dimming via DMX control, two-step switching, or phase control dimming.

Finally, a complete line of Studio Cool accessories is available to help you create the system solution that's right for you. Accessories include barndoors, intensifiers, egg crates, louvers, and filter frames.



Optically superior, flexible, rugged and reliable, Studio Cool offers everything you've come to expect from Arri. And that's the coolest part of all.

For more information about Arri Studio Cool, please call 845.353.1400 or email us at [studio-be@arri.com](mailto:studio-be@arri.com).

**Laird Telemedia**  
800-898-0759

**Lightware**  
303-744-0202

**UniqueTracks Royalty Free Music**  
888-400-2149

**Network Technologies**  
330-562-7070

**Petrol**  
+972 3 6731891

**Rack Release Systems**  
480-325-3893

**Trenton Technology**  
770-287-3100

**ViewCast**  
972-488-7200

**Weircliffe Int'l**  
+44 1392 272 132

## Computer networking products

**ATTO Technology**  
716-691-1999

**Ciprico**  
763-551-4000

**Digigram**  
703-875-3100

**DVC Digitalvideo Computing GmbH**  
+49 8152-93010

**Gloriole Electroptic Technology**  
416-225-8051

**IPV**  
+44 1223 477 000

**Laird Telemedia**  
800-898-0759

**Masterclock**  
636-724-3666

**Multidyne Video & Fiber Optic Systems**  
516-671-7278

**Trenton Technology**  
770-287-3100

## Computer systems

**Arista**  
510-226-1800

**Associated Press ENPS**  
202-736-1100

**BOXX Technologies**  
512-835-0400

**Laird Telemedia**  
800-898-0759

**RCS**  
914-428-4600

**Trenton Technology**  
770-287-3100

## Data Multiplexers

**DVC Digitalvideo Computing GmbH**  
+49 8152-93010

**Multidyne Video & Fiber Optic Systems**  
516-671-7278

**Opticomm**  
858-450-0143; 800-867-8426



Data multiplexer

**Zandar Technologies PLC Headquarters**  
+353 1280 8945

## Data storage systems

**Associated Press ENPS**  
202-736-1100

**ATTO Technology**  
716-691-1999

**BOXX Technologies**  
512-835-0400

**Ciprico**  
763-551-4000

**DVC Digitalvideo Computing GmbH**  
+49 8152-93010

**Imation**  
651-704-4000

**Silicon Graphics (SGI)**  
650-960-1980

**Sony Electronics / Recording Media**  
201-930-6342

**Spectra Logic**  
303-449-6400

## Data transmission systems

**ATTO Technology**  
716-691-1999

**DMDsecure**  
+31 20 330 3372

**DVC Digitalvideo Computing**  
+49 8152-93010

**Opticomm**  
858-450-0143; 800-867-8426

## Video cards

**Computer Modules (DVEO)**  
858-613-1818

**da Vinci Systems**  
954-688-5601

**Digital Voodoo Pty**  
**DVC Digitalvideo Computing**  
+49 8152-93010

**e-mediavision.com**  
+44(0)208 755 2014

**Matrox Electronic Systems - Video Products Group**  
514-685-2630

**Matrox Graphics**  
514-822-6000

**Opticomm**  
858-450-0143; 800-867-8426  
DVX-6000 video SDI/HDTV fiber card transmission

**ViewCast**  
972-488-7200

**Zandar Technologies PLC Headquarters**  
+353 1280 8945

## DEALERS, DISTRIBUTORS

### Supplier type

**Broadcast Richardson**  
630-208-2200

**Broadcast Supply Worldwide**  
253-565-2304

**Communications Engineering**  
703-550-5800

**Cool-Lux**  
805-482-4820

**DVC Digitalvideo Computing**  
+49 8152-93010

**GMPCS Personal Comm**  
954-973-3100

**MCSI / Broadcast Solutions Group**  
770-447-1001

**Netcom**  
201-968-0684

**Packaged Lighting Systems**  
845-778-3515

**Presentation Systems Design**  
636-225-3637

**Professional Communications Systems**  
813-888-5353

**Roscor**  
847-299-8080

**Roscor Interlink**  
800-524-9982

**Roscor Michigan**  
248-489-0090

**Roscor Ohio**  
513-772-3393

**Roscor Wisconsin**  
414-223-2600

**SignaSys**  
408-998-8037

**Studio Exchange**  
818-840-1351

**Teklogic**  
818-610-3527

**TecNec**  
845-246-0428

## DESKTOP VIDEO

### Desktop Video

**Artbeats**  
541-863-4429

**Broadcast Richardson**  
630-208-2200

**Discreet Software**  
415-547-2000

**DVC Digitalvideo Computing GmbH**  
+49 8152-93010

**e-mediavision.com**  
+44(0)208 755 2014

**Floral Systems**  
352-372-8326

**Incite Multimedia**  
+41 22 3085741

**IPV**  
+44 1223 477 000

**Laird Telemedia**  
800-898-0759

**UniqueTracks Royalty Free Music**  
888-400-2149

**Matrox Electronic Systems - Video Products Group**  
514-685-2630

**Matrox Graphics**  
514-822-6000

**Minerva Networks**  
408-567-9400

**Miranda Technologies**  
514-333-1772

**Pinnacle Systems / Broadcast & Professional**  
650-526-1600

**Seachange Int'l**  
978-897-0100

**United Media**  
714-777-4510 x110

**ViewCast**  
972-488-7200

**Wohler Technologies**  
650-589-5676

**Zandar Technologies PLC Headquarters**  
+353 1280 8945

## DIGITAL AUDIO WORKSTATIONS

### Digital Audio Workstations

**Avid Technology**  
978-640-6789; 800-949-AVID

**Harrison by GLW**  
615-641-7200

**Incite Multimedia**  
+41 22 3085741

**Laird Telemedia**  
800-898-0759

**Mackie Designs**  
425-487-4333

**TeraTek Software**  
+33 1 42 62 06 20

## DUPLICATION

### Duplication

**CustomFlix**  
978-626-0061

**Panasonic Broadcast & Television Systems**  
201-348-5300; 800-528-8601

**SF Video**  
415-288-9400

**Sony Electronics / Recording Media**  
201-930-6342

## FILM EQUIPMENT

### Film Equipment

**ARRI**  
845-353-1400

**Astro Systems**  
818-848-7722

**Avica Technology**  
310-450-9090

**Cartoni USA**  
818-760-8240; 800-845-6619

**Cinekinetic**  
+61 8 9 459 3690

**Digital Vision (US)**  
818-769-8111

**Panther**  
+89 613 90001

**RTI**  
847-677-3000

**Thomson Broadcast & Media Solutions**  
530-478-3000; 800-547-8949

## GRAPHICS

### Animation/Graphics software

**2d3**  
949-472-9140

**auto.des.sys**  
614-488-8838

**Bauhaus Software**  
210-212-7530

**CGS Infographics Automation**  
859-269-7512

**Chyron**  
631-845-2152

**Discreet - Desktop Video Combustion**  
415-356-0700

**Discreet 3D Animation**  
415-356-0700

**Discreet Software**  
415-547-2000

**e-mediavision.com**  
+44(0)208 755 2014

**Kaydara**  
514-842-8446

**Leitch**  
757-548-2300; 800-231-9673

**Leitch Technology**  
818-525-2599; 888-843-7004

**Linker Systems**  
949-552-1904

**Omneon Video Networks**  
408-585-5105; 866-861-5690

**Pinnacle Systems / Broadcast & Professional**  
650-526-1600

**Quantel**  
203-972-3199

**REALVIZ**  
415-615-9800

**sci-worx**  
+49 511 277 0

**Side Effects Software**  
310-319-9876

**ULTIMATTE**  
818-993-8007

**Video Design Software**  
631-249-4399

**Vizrt**  
212-560-0708

### Animation/Graphics systems

**AccuWeather**  
814-235-8600

**Bauhaus Software**  
210-212-7530

**BOXX Technologies**  
512-835-0400

**Burst Electronics**  
505-898-1455

**CGS Infographics Automation**  
859-269-7512

**Chyron**  
631-845-2152

**Discreet Systems (Inferno, Flame, Flint, Smoke)**  
415-356-0700

**e-mediavision.com**  
+44(0)208 755 2014

**Kaydara**  
514-842-8446

**Leitch**  
757-548-2300; 800-231-9673

**Leitch Technology**  
818-525-2599; 888-843-7004

**Linker Systems**  
949-552-1904

**Meteorlogix**  
952-882-4576

**Pixel Power**  
954-943-2026

**Quantel**  
203-972-3199

**Silicon Graphics (SGI)**  
650-960-1980

**Spencer Technologies**  
818-771-1850

**Vicon Motion Systems**  
949-472-9140

**Vizrt**  
212-560-0708

## INTERCOM

### Intercom

**Clear-Com Intercom Systems**  
510-496-6666

Matrix Plus: digital intercom systems with three frame sizes, a variety of display/non-display stations, and interfacing modules.

PL Pro: party-line intercom systems, including multi-channel main stations, beltpacks, headsets, and interfaces.

Q700 Wireless Intercom: two-channel wireless intercom system, programmable, frequency-agile, multiple operating modes.

**Drake Electronics**  
+44 1727 871200

**Encoda Systems - Automation Solutions**  
303-390-8904

**Klotz Digital America**  
678-966-9900

**Media Concepts**  
918-252-3600

**Premier Lighting & Production**  
818-762-0884

**Video Products Group**  
805-383-5500

**Wiltronix**  
301-258-7676

## LENSES

### Lens Converter/Accessories

**16x9**  
818-972-2839

**Century Optics**  
818-766-3715

**Fujinon**  
973-633-5600

**LEE Filters**  
818-238-1220

**Lewis Communications**  
818-766-3715

**Schneider Optics**  
818-766-3715

**Studio Exchange**  
818-840-1351

### Lens Systems

**16x9**  
818-972-2839

**ARRI**  
845-353-1400

**Band Pro Film/Video**  
818-841-9655

**Canon Broadcast**  
201-816-2900



DIGISUPER 100xs

**Electrophysics**  
973-882-0211

**Fujinon**  
973-633-5600

**Lewis Communications**  
818-766-3715

**Schneider Optics**  
818-766-3715

**Studio Exchange**  
818-840-1351

**Video Rentals (VRI)**  
800-255-2874

## LIGHTING

### Lighting

**Acme Effects**  
+886 3 3215983

**Alcorn McBride**  
407-296-5800

**ARRI**  
845-353-1400



Studio Cool

**Aspen Electronics**  
860-489-1193

**Bescor Video**  
516-420-1717

**Buhl Industries**  
201-296-0600

**Cinemills**  
818-843-4560

**Cool-Lux**  
805-482-4820

**Dedotec USA (Dedolight)**  
973-857-8118

**Devlin Design Group**  
858-535-9800

**Dialight**  
732-919-3119

**Frezzi Energy Systems**  
973-427-1160

**K5600**  
818-762-5756

**KW/2 Lighting Products**  
972-556-2376

**LEE Filters**  
818-238-1220

**Obarrio y CIA**  
5411 4543 0643

**Packaged Lighting Systems**  
845-778-3515

**Panther Broadcast**  
+49 89 613 900-01

**Premier Lighting & Production**  
818-762-0884

**ProSource**  
203-335-2000

**Sabre Communications**  
712-258-6690

**Theatre Service & Supply Corp**  
410-467-1225

**Video Rentals (VRI)**  
800-255-2874

## MICROPHONES

### Microphone accessories

**Ac-cetera**  
412-344-8609

**Bogen Photo**  
201-818-9500

**Broadcast Richardson**  
630-208-2200

**Electro-Voice**  
952-884-4051

**MXL Microphones**  
310-333-0606

**Sennheiser Electronic**  
860-434-9190

**Sony Electronics / Recording Media**  
201-930-6342

**Sound Devices**  
608-524-0625

**Systems Wireless**  
703-471-7887; 800-542-3332

**Telex Communications**  
952-736-4027; 877-863-4166

**Video Rentals (VRI)**  
800-255-2874

**Ward-Beck Systems**  
416-335-5999

### Microphones

**AKG USA**  
615-620-3800

**API Audio**  
301-776-7879

**Audio-Technica US**  
330-686-2600

**Azden**  
516-328-7500

**Bescor Video**  
516-420-1717

**Brauner USA**  
702-365-5155

**Broadcast Richardson**  
630-208-2200

**DPA**  
+45 48 142828

**Electro-Voice**  
952-884-4051

**Lectrosonics**  
505-892-4501

**Sennheiser Electronic**  
860-434-9190

**Shure**  
847-600-2000

**Sony Electronics / Recording Media**  
201-930-6342

**Studio Exchange**  
818-840-1351

**Systems Wireless**  
703-471-7887; 800-542-3332

**Telex Communications**  
952-736-4027; 877-863-4166

**DPA**  
+45 48 142828

**Electro-Voice**  
952-884-4051

**Lectrosonics**  
505-892-4501

**Micron Audio Products**  
973-857-8150

**MXL Microphones**  
310-333-0606

**Neumann USA**  
860-434-9190

**Sennheiser Electronic**  
860-434-9190

**Shure**  
847-600-2000

**Sony Electronics / Recording Media**  
201-930-6342

**Soundelux**  
702-365-5155

**Soundfield USA**  
702-365-5155

**Systems Wireless**  
703-471-7887; 800-542-3332

**Telex Communications**  
952-736-4027; 877-863-4166

**Video Products Group**  
805-383-5500

### Wireless mics

**AKG USA**  
615-620-3800

**API Audio**  
301-776-7879

**Audio-Technica US**  
330-686-2600

**Azden**  
516-328-7500

**Broadcast Richardson**  
630-208-2200

**Clear-Com Intercom Systems**  
510-496-6666

**COMTEK**  
801-466-3463

**DPA**  
+45 48 142828

**Electro-Voice**  
952-884-4051

**Lectrosonics**  
505-892-4501

**Sennheiser Electronic**  
860-434-9190

**Shure**  
847-600-2000

**Sony Electronics / Recording Media**  
201-930-6342

**Studio Exchange**  
818-840-1351

**Systems Wireless**  
703-471-7887; 800-542-3332

**Telex Communications**  
952-736-4027; 877-863-4166

**Video Rentals (VRI)**  
800-255-2874

## MICROWAVE & FIBER

### Audio codecs (telco)

**Scientific-Atlanta**  
770-236-5000

**sci-worx**  
+49 511 277 0

**Telecast Fiber Systems**  
508-754-4858

**Video Products Group**  
805-383-5500

### ENG microwave links

**Alcatel**  
972-519-2641

**Broadcast Microwave Services**  
858-391-3050; 800-669-9667

**Broadcast Richardson**  
630-208-2200

**Coherent Communications**  
661-295-0300

**Continental Microwave**  
+44 1582 424 233

**Link Research**  
+01923 200 900

### Microwave Radio Communications (MRC)



**REPORTER:** Wire ess camera-mounted broadcast quality radio with MPEG-2/COFDM; QuickVue Hand-held COFDM/MPEG-2 receiver with high-res LCD color monitor; STRATA Modular portable systems with MPEG-2/COFDM; CodeRunner Digital/analog portable microwave systems for ENG and central receive.

**MITEQ**  
631-436-7400

**N Systems Incorporated (NSI)**  
410-964-8400

**NEC America Broadcast Equipment Department**  
214-262-3642

**Nemal Electronics Int'l**  
305-899-0900

**NSI (N Systems)**  
410-964-8400

**Nucomm**  
908-852-3700



**Newscaster VT1 ENG COFDM Transmitter:** A Digital/Analog COFDM ENG Truck transmitter, the Newscaster switches between digital and analog, has a built-in analog modulator, and offers single or dual band (2/7) operation from a single RF head. Single connecting coax cable reduces cost, weight and complexity. MPEG-2 encode/COFDM modulator available. Optional integrated test Generator with programmable ID.

**Radyne ComStream**  
602-437-9620

**Shook Mobile Technology**  
210-651-5700

**Studio Systems Electronics**  
+44 118 932 4600

**Winemiller Communications**  
717-241-4400

### Fiber optic transmitter/receiver systems

**Alcatel**  
972-519-2641

**Artel Video Systems**  
508-303-8200

**Broaddata Communications**  
310-530-1416

**Broadcast Richardson**  
630-208-2200

**Communications Specialties**  
631-273-0404

**Drake Electronics**  
+44 1727 871200

**Evertz Microsystems**  
905-335-3700

**GE Interlogix**  
800-343-3358

**Gloriole Electropic Technology**  
416-225-8051

**IFS**  
203-426-1180

**International Fiber Systems Div of GE**  
203-426-1180

**IPITEK**  
760-438-1010

**Leitch**  
757-548-2300; 800-231-9673

**Leitch Technology**  
818-525-2599; 888-843-7004

**Narda Microwave**  
516-231-1700

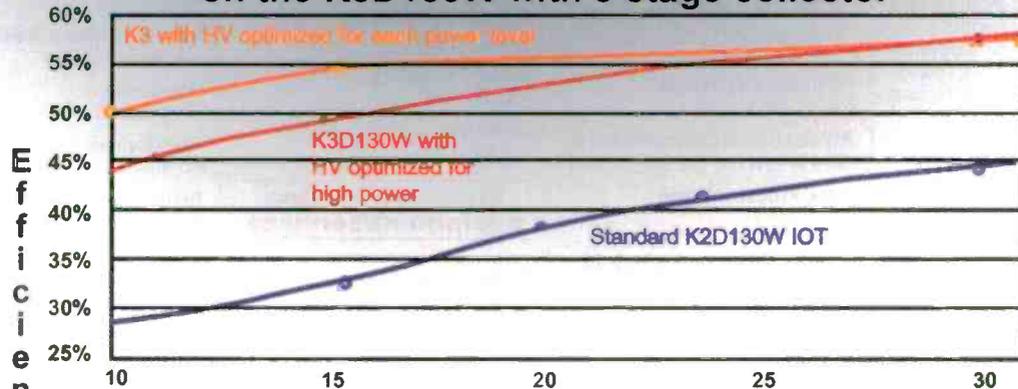
**Network Electronics**  
818 701 6201



# Elegant Efficiency

## The Real Facts about EIMAC's K3 MSDC IOT

### ACTUAL EFFICIENCY MEASUREMENTS on the K3D130W with 3 stage collector \*



### Published Data for 5 Stage Collector MSDC IOT



Average power 8VSB (kW)



Communications & Power Industries

Eimac Division

301 Industrial Road

San Carlos, CA 94070

tel 650.592.1221

fax 650.592.9988

email.iot@eimac.cpii.com

www.eimac.com

\* Test results with uncorrected standard 8VSE input. High voltages between 30 kV and 34 kV.

ISO 90C1 Certified . Made in USA

## Opticomm

858-450-0143; 800-867-8426  
DVX-5000 & DVX-6000 fiber optic SDI/  
HDTV video transmission receiver

## Scientific-Atlanta

770-236-5000

## Stratos Lightwave

708-867-9600

## TecNec

845-246-0428

## Telecast Fiber Systems

508-754-4858

CopperHead camera-mounted fiber  
optic communication/control trans-  
ceiver; Adder fiber optic audio/inter-  
com/data multiplexer family; Cobra fi-  
ber interfaces for triax and HD cameras

## Video Products Group

805-383-5500

### STL/TSL links

## Alcatel

972-519-2641

## Andrew

708-349-3300

## Broadcast Richardson

630-208-2200

## Canon USA Broadcast and Communications Div

201-816-2900

## Kathrein Scala Div

541-779-6500

## Microwave Radio Communications (MRC)

978-671-5700; 800-490-5700

DAR Plus Digital/analog systems capa-  
bility with Qm2 ATSC (19.39 Mbps + T1)

## Nucomm 908-852-3700



FT6/FR6-MM200 High Data Rate  
Microwave System: Innovative and  
highly flexible, the High Data Rate  
Microwave System is configurable  
between 1 and 200 Mbps, in bands  
1.0 to 15.4 GHz. Complete control  
over modulation density and chan-  
nel bandwidth up to 6 bits per sec-  
ond per Hz. Provides for large im-  
provements to fading and multi-  
path via multiple digital equalizers.

## Radio Frequency Systems

203-630-3311

## Radyne ComStream

602-437-9620

## Screen Service Italia

+39 030 3582225

## Telecast Fiber Systems

508-754-4858

Viper II Modular video/audio HD/SDI  
transport system

## Winemiller Communications

717-241-4400

### Telco interface equipment

## Alcatel

972-519-2641

## Drake Electronics

+44 1727 871200

## Scientific-Atlanta

770-236-5000

# TANDBERG

## Television

## TANDBERG Television

407-380-7055

## TriPoint Global Communications

828-464-4141

## Video Products Group

805-383-5500

### Telephone hybrids

## Drake Electronics

+44 1727 871200

## MULTIMEDIA/ INTERNET

### DVD systems

## Laird Telemedia

800-898-0759

## Panasonic Broadcast & Television Systems

201-348-5300; 800-528-8601

## Presentation Systems Design

636-225-3637

## sci-worx

+49 511 277 0

## Spencer Technologies

818-771-1850

## Studio Exchange

818-840-1351

## Teklogic

818-610-3527

### Interactive systems

## Alticast

512-225-6665

## IPV

+44 1223 477 000

## Irdeto Access

+31 23 556 2270

## Linker Systems

949-552-1904

## Softel USA

310-309-5281

## Triveni Digital

609-716-3500

## Video Design Software

631-249-4399

## Vizrt

212-560-0708

## Zandar Technologies PLC

Headquarters  
+353 1280 8945

### Internet production systems

## Associated Press ENPS

202-736-1100

## BBC Technology

818-840-9770

## DMDsecure

+31 20 330 3372

## Incite Multimedia

+41 22 3085741

## Media Computing

480-575-7281

## TV Magic

858-650-3155

### Media streaming equipment/services

## BT Broadcast Services - North America

202-721-8599

## Computer Prompting & Captioning - CPC

301-738-8487

## Controlware

732-919-0400

## Digigram

703-875-3100

## Discreet Desktop Video - Cleaner

415-556-0700

## Discreet Software

415-547-2000

## DMDsecure

+31 20 330 3372

## DVC Digitalvideo Computing

+49 8152-93010

## EVS Broadcast Equipment

+32 4 361 7000

## Floral Systems

352-372-8326

## GMPCS Personal Comm

954-973-3100

## Incite Multimedia

+41 22 3085741

## IPV

+44 1223 477 000

## Irdeto Access

+31 23 556 2270

## LEL Computer Systems

561-347-2242

## Minerva Networks

408-567-9400

## Music 2 Hues

888-821-7515

## Nextamp SA

+33 299 6162

## ParkerVision

904-737-1367

## Pinnacle Systems / Broadcast & Professional

650-526-1600

## RCS

914-428-4600

## Seachange Int'l

978-897-0100

## sci-worx

+49 511 277 0

## SkyStream Networks

408-616-3300

## T-Systems Media & Broadcast

+49 761 880 62320

## Telestream

530-470-1300

## TeleVersions

847-836-3320

## Thales Broadcast & Multimedia

413-998-1100; 800-288-8364

## Triveni Digital

609-716-3500

## ViewCast

972-488-7200

## POWER PRODUCTS

**antonbauer**

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Anton/Bauer innovations have  
been the overwhelming choice of  
broadcasters and video profession-  
als around the globe for nearly 35  
years. Matching the latest technol-  
ogy in lithium ion, nickel metal hy-  
dride, and nickel cadmium chemis-  
tries with exclusive features like the  
RealTime fuel gauge display and  
InterActive charging, Anton/Bauer  
continues to lead the way with the  
widest range of batteries ever to  
take the field. For more informa-  
tion please contact Anton/Bauer at  
phone 203-929-1100, fax 203-929-  
9935 email  
websales@antonbauer.com or visit  
our website www.antonbauer.com

### Batteries

## Alcatel

972-519-2641

## Anton/Bauer

203-929-1100

## Aspen Electronics

860-489-1193

## Bescor Video

516-420-1717

## Energex Batteries

516-249-2873

## Frezzi Energy Systems

973-427-1160

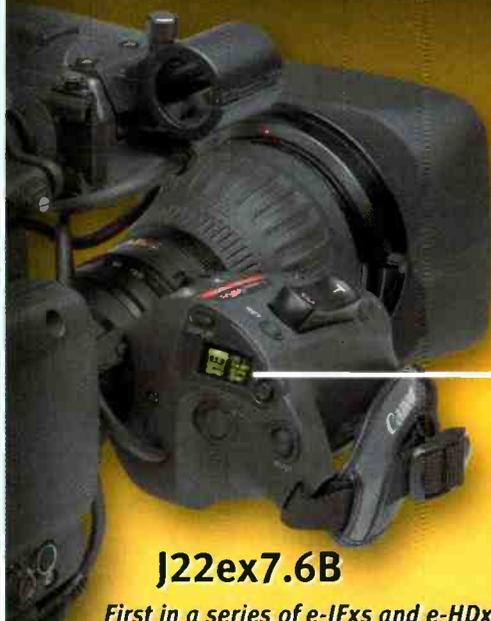
# Canon's new 'e' lens brings 'e'nhancement to a new level.

From its enhanced features to its environmental design, Canon's new J22ex7.6B IRSD/IASD lens is engineered to impress. The widest angle portable telephoto lens ever produced, the J22ex7.6B is the first in a series of Canon e-IFxs and e-HDxs broadcast lenses. These lenses feature enhanced digital technology, which improves on the performance of the highly useful Digital Drive tools and are manufactured with non-polluting components including lead-free glass, minimizing environmental impact.

# e

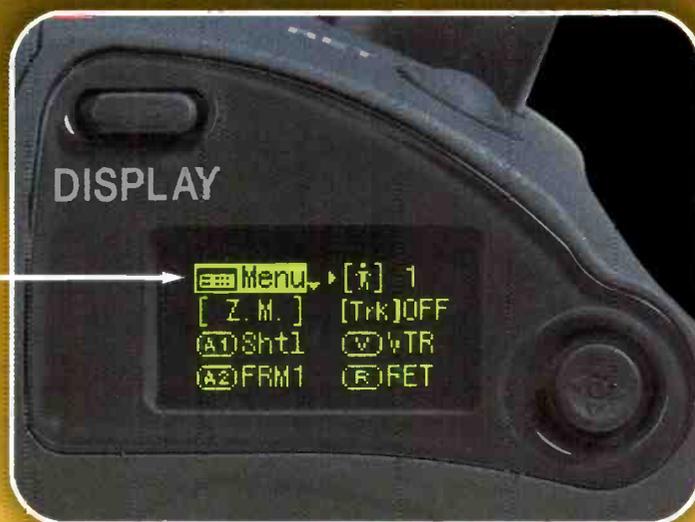
Enhanced Features

Environmental Design



**J22ex7.6B**

*First in a series of e-IFxs and e-HDxs lenses*



## eIFxs

## FEATURES AT A GLANCE

Equipped with an informational LCD display and digital feature navigator, e-IFxs series users can customize the enhanced digital functions with ease and precision. New features of e-IFxs lenses include:

- Digital Drive's new Focus Preset (IASD version) can be combined with Shuttle Shot, Speed Preset and 2 Framing Presets, and Zoom Track for powerful user settings.
- New Aux 1 and Aux 2 switches provide quick access to user-assignable functions.
- Users can set precise zoom and focus curves according to their needs.
- A Precise Movement Sensitivity Mode can be memorized for zoom seesaw, zoom demand and preset controls.
- The drive unit can memorize 9 camera operator patterns of user-customized settings, as well as a default position, and transmit the data from unit to unit.
- Maximum Zoom Speed now 0.5 seconds.
- Follow reference signal display for virtual reality, robotic control and other uses.

Find out more at  
[canonbroadcast.com](http://canonbroadcast.com)

1-800-321-HDTV (Canada: 905-795-2012)

Maximize Your Camera's Performance.

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## *IDX System Technology*

310-891-2800

**Media Concepts**  
918-252-3600

**Obarrio y CIA**  
430643

**Pag USA a Div of Ste-Man**  
818-760-8265

**Plainview Batteries**  
516-249-2873

**Sony Electronics / Recording Media**  
201-930-6342

**Studio Exchange**  
818-840-1351

## Battery analyzers

**Advanced Test Equipment (ATEC)**  
858-558-6500

**Alcatel**  
972-519-2641

**Christie Div MarathonNorco Aerospace**  
254-776-0650

**Frezzi Energy Systems**  
973-427-1160

## Battery chargers

**Alcatel**  
972-519-2641

**Anton/Bauer**  
203-929-1100

**Aspen Electronics**  
860-489-1193

**Bescor Video**  
516-420-1717

**Christie Div MarathonNorco Aerospace**  
254-776-0650

**Energex Batteries**  
516-249-2873

**Exeltech**  
817-595-4969

**Frezzi Energy Systems**  
973-427-1160

*IDX System Technology*  
310-891-2800

**Kay Industries**  
574-236-6220

**Pag USA a Div of Ste-Man**  
818-760-8265

**Plainview Batteries**  
516-249-2873

**Studio Exchange**  
818-840-1351

## Lightning protection products

**ADC**  
952-938-8080; 800-366-3891

**Kay Industries**  
574-236-6220

**Nemal Electronics Int'l**  
305-899-0900

**Superior Electric**  
860-585-4500

## Power (AC) products

**Anton/Bauer**  
203-929-1100

**Bescor Video**  
516-420-1717

**Electrack Enclosure Products**  
714-776-5420

**Exeltech**  
817-595-4969

**Kay Industries**  
574-236-6220

**MGE UPS SYSTEMS**  
714-557-1636

**Staco Energy Products**  
937-253-1191

**Studio Exchange**  
818-840-1351

**TAIYO YUDEN (USA) (POWER)**  
760-510-3200

## Power supplies

**Advanced Test Equipment (ATEC)**  
858-558-6500

**Anton/Bauer**  
203-929-1100

**Aspen Electronics**  
860-489-1193

**Bescor Video**  
516-420-1717

**Burle Industries**  
717-295-6888

**Christie Div MarathonNorco Aerospace**  
254-776-0650

**Frezzi Energy Systems**  
973-427-1160

*IDX System Technology*  
310-891-2800

**Kay Industries**  
574-236-6220

**Media Concepts**  
918-252-3600

**Nemal Electronics Int'l**  
305-899-0900

**Studio Exchange**  
818-840-1351

**TAIYO YUDEN (USA) (POWER)**  
760-510-3200

**TriPoint Global Communications**  
828-464-4141

**Video Products Group**  
805-383-5500

## UPS systems

**Arista**  
510-226-1800

**Exeltech**  
817-595-4969

**Hewlett-Packard - Rack & Power Infrastructure Group**  
281-370-0670

**MGE UPS SYSTEMS**  
714-557-1636

**Staco Energy Products**  
937-253-1191

**Studio Exchange**  
818-840-1351

**Superior Electric**  
860-585-4500

**TAIYO YUDEN (USA) (POWER)**  
760-510-3200

**Thales Broadcast & Multimedia**  
413-998-1100; 800-288-8364

## PRODUCTION SWITCHERS

## Compositing systems

**Discreet Systems**  
514-393-1616

**Media 100**  
508-460-1600

**Quantel**  
203-972-3199

**Studio Exchange**  
818-840-1351

**ULTIMATE**  
818-993-8007

## DVEs

**Accom**  
650-328-3818

*Leitch*  
757-548-2300; 800-231-9673

*Leitch Technology*  
818-525-2599; 888-843-7004

**Media Concepts**  
918-252-3600

**Pinnacle Systems / Broadcast & Professional**  
650-526-1600

**Ross Video**  
613-652-4886

**Snell & Wilcox**  
408-260-1000; 800-827-4544

**Sony Electronics / Recording Media**  
201-930-6342

**Spencer Technologies**  
818-771-1850

**Studio Exchange**  
818-840-1351

**Thomson Broadcast & Media Solutions**  
530-478-3000; 800-547-8949

**Video Rentals (VRI)**  
800-255-2874

## Keyers

**Broadcast Video Systems**  
905-764-1584

**Crystal Vision**  
+44 1223 497049

*Evertz Microsystems*  
905-335-3700

**Leitch AgileVision**  
416-445-9929 ext3482

*Leitch*  
757-548-2300; 800-231-9673

*Leitch Technology*  
818-525-2599; 888-843-7004

**Ross Video**  
613-652-4886

**Snell & Wilcox**  
408-260-1000; 800-827-4544

**Sony Electronics / Recording Media**  
201-930-6342

**Spencer Technologies**  
818-771-1850

**Studio Exchange**  
818-840-1351

**Thomson Broadcast & Media Solutions**  
530-478-3000; 800-547-8949

**ULTIMATE**  
818-993-8007

*Videotek*  
610-327-2292; 800-800-5719

## Production switchers

**Brick House Video**  
+44 (0) 23 8067 6026

**FOR-A**  
714-894-3311

**Future Works**  
408-428-0895

**Ikegami**  
201-368-9171

**Ikegami Electronics**  
201-368-9171

**Media Concepts**  
918-252-3600

**Pinnacle Systems / Broadcast & Professional**  
650-526-1600

**Ross Video**  
613-652-4886

**Snell & Wilcox**  
408-260-1000; 800-827-4544

**Sony Electronics / Recording Media**  
201-930-6342

**Studio Exchange**  
818-840-1351

It's not the first time we changed the way you look at pro-video test equipment. And some people noticed...



- First to introduce and deliver Serial Digital HD test solutions
- First to implement 720P capabilities in our products
- First test equipment provider to include both analog and digital input capabilities in one package
- First to provide built in 10 bit analog decoding for picture display monitoring
- First to introduce an HD Rasterizer with built in XGA display capabilities

And now Leader is the first to bring pro-video test and measurement information to the palm of your hand! No more endless trips from the set to the camera to view the action.

Our easy to use software connects the award winning LV5700 Multi-SDI monitor to a wireless capable PDA, allowing the user to monitor key signal functions such as waveform, vectorscope, audio, status, as well as view the picture the camera is producing... away from the camera.

When it comes to industry innovations... Leader is first.

**LEADER**

FOR PROFESSIONALS WHO KNOW THE DIFFERENCE

Leader Instruments Corporation  
6484 Commerce Drive  
Cypress, CA 90630

TF 800.645.5104  
T 714.527.9300  
F 714.527.7490

sales@LeaderUSA.com  
www.LeaderUSA.com

**Thomson Broadcast & Media Solutions**  
530-478-3000; 800-547-8949

**Videotek**  
610-327-2292; 800-800-5719  
Digital Prodigy 16 input serial digital production switcher

## RECORDING MEDIA

**Bulk erasers**

**RTI**  
847-677-3000  
**Weircliffe Int'l**  
+44 1392 272 132

## Recordable media (tape and disc)

**Burlington A/V Recording Media & Equipment**  
516-678-4414

**Fuji Photo Film USA**  
914-789-8100

**HHB Communications**  
805-579-6490

**Imation**  
651-704-4000

**Maxell Corporation of America**  
201-794-5900; 800-533-2836

**Panasonic Broadcast & Television Systems**  
201-348-5300; 800-528-8601

**Quantegy**  
800-752-0732

**Sony Electronics / Recording Media**  
201-930-6342

**Spectra Logic**  
303-449-6400

## RF COMPONENTS

### THALES ELECTRON DEVICES

**Thales Electron Devices**  
Thales Electron Devices is a worldwide manufacturer of UHF TV electron tubes and devices for digital and analog broadcasting, with: IOTs delivering up to 35 kW 8VSB / 84 kW NTSC including new depressed-collector IOTs, standard IOTs and associated RF circuits, tetrodes, solid-state power amplifiers: 375 W digital / 750 W analog modules to be used as stand-alone or rack-mounted units, worldwide on site technical assistance and training.

## Dummy loads

**Broadcast Richardson**  
630-208-2200

**Jampro Antennas/RF Systems**  
916-383-1177

**MYAT**  
201-767-5380

**Narda Microwave**  
516-231-1700

**Radian**  
905-212-8200

**Teracom Components**  
207-627-7474

**Thales Electron Devices**  
+33 13070 3645

## RF combiners

**Andrew**  
708-349-3300

**Broadcast Richardson**  
630-208-2200

**DDB Unlimited**  
800-753-8459

**Dielectric Communications**  
207-655-4555; 866-DIE-LECTRIC

**Jampro Antennas/RF Systems**  
916-383-1177

**Narda Microwave**  
516-231-1700

**Radian**  
905-212-8200

**Teracom Components**  
207-627-7474

**Thales Broadcast & Multimedia**  
413-998-1100; 800-288-8364

**Thales Electron Devices**  
+33 13070 3645

## RF transmitting tubes

**Broadcast Richardson**  
630-208-2200

**Burle Industries**  
717-295-6888

**CPI - Eimac Div**  
650-592-1221

**CPI - Eimac Div**  
650-592-1221; 800-414-8823



K3D130M

**Daily Electronics**  
360-896-8856

**E2V Technologies.com**  
914-592-6050

**sZone**  
509-891-7362

**Thales Broadcast & Multimedia**  
413-998-1100; 800-288-8364

**Thales Components**  
973-812-9000

**Thales Electron Devices**  
+33 13070 3645

**TriPoint Global Communications**  
828-464-4141

## Tower accessories/lighting

**Antenna ID Products**  
610-458-8418

**Broadcast Richardson**  
630-208-2200

**Central Tower**  
812-853-0595

**DDB Unlimited**  
800-753-8459

**Dialight**  
732-919-3119

**Dielectric Communications**  
207-655-4555; 866-DIE-LECTRIC

**Flash Technology**  
615-503-2000

**Kline Towers**  
803-251-6207; 877-KLI-NETW

**Radian**  
905-212-8200

**Sabre Communications**  
712-258-6690

**Structures Div Valmont Industries**  
574-936-4221

**Swager Communications**  
800-968-5601

**Teracom Components**  
207-627-7474

**Thales Electron Devices**  
+33 13070 3645

**Wohler Technologies**  
650-589-5676

## Tower management services

**Antenna ID Products**  
610-458-8418

**Radian**  
905-212-8200

**Richland Towers**  
813-286-4140

**Sabre Communications**  
712-258-6690

**SpectraSite Broadcast Group**  
972-550-9500

**Swager Communications**  
800-968-5601

**T.Z. Sawyer Technical Consultants**  
301-913-9287

**Thales Electron Devices**  
+33 13070 3645

## Towers

**Antenna ID Products**  
610-458-8418

**Central Tower**  
812-853-0595

**DDB Unlimited**  
800-753-8459

**Dielectric Communications**  
207-655-4555; 866-DIE-LECTRIC

**Jampro Antennas/RF Systems**  
916-383-1177

**Kline Towers**  
803-251-6207; 877-KLI-NETW

**Radian**  
905-212-8200

**Richland Towers**  
813-286-4140

**Rohn Industries**  
309-697-4400

**Sabre Communications**  
712-258-6690

**SpectraSite Broadcast Group**  
972-550-9500

**Structures Div Valmont Industries**  
574-936-4221

**Swager Communications**  
800-968-5601

**Thales Electron Devices**  
+33 13070 3645

**TriPoint Global Communications**  
828-464-4141

## Transmission line/accessories

**Andrew**  
708-349-3300

**DDB Unlimited**  
800-753-8459

**Dielectric Communications**  
207-655-4555; 866-DIE-LECTRIC

**Jampro Antennas/RF Systems**  
916-383-1177

**Narda Microwave**  
516-231-1700

**Opticomm**  
858-450-0143; 800-867-8426

**Radian**  
905-212-8200

**Radio Frequency Systems**  
203-630-3311

**Rohn Industries**  
309-697-4400

**Sabre Communications**  
712-258-6690

**Teracom Components**  
207-627-7474

**Thales Electron Devices**  
+33 13070 3645

**Trompeter Electronics**  
800-982-2629

**Wohler Technologies**  
650-589-5676

## SATELLITE EQUIPMENT

**T-Systems**

### T-Systems Media & Broadcast

Media & Broadcast, a division of T-Systems, is your reliable partner for media services. We offer audio, video, and data-delivery, and management solutions. Our service portfolio includes: a worldwide network for radio and TV distribution, global satellite connections, SNG and earth station facilities, terrestrial digital radio and TV networks, streaming media services and BusinessTV services corporate communication services.

### Satellite receivers and antennas

- Andrew**  
708-349-3300
- BarcoNet**  
770-236-5000
- Broadcast Richardson**  
630-208-2200
- EaglePro Industries**  
517-796-8800
- EASI-Efficient Antenna Systems**  
641-424-5079
- GMPCS Personal Comm**  
954-973-3100
- Link Research**  
+01923 200 900
- Microwave Radio Communications (MRC)**  
978-671-5700; 800-490-5700
- MITEQ**  
631-436-7400
- Newtec America**  
203-323-0042
- Patriot Antenna Systems**  
517-629-5990
- Radyne ComStream**  
602-437-9620
- Scientific-Atlanta**  
770-236-5000
- SkyStream Networks**  
408-616-3300
- T-Systems Media & Broadcast**  
+49 761 880 62320
- Thrane & Thrane A/S**  
+45 395 58800
- TriPoint Global Communications**  
828-464-4141
- Vislink**  
+ 44 1494 774400

### Satellite uplinks

**Andrew**  
708-349-3300

- Broadcast Richardson**  
630-208-2200
- BT Broadcast Services - North America**  
202-721-8599
- CPI Satcom Div**  
650-846-3700
- DVC Digitalvideo Computing GmbH**  
+49 8152-93010
- E2V Technologies.com**  
914-592-6050
- EASI-Efficient Antenna Systems**  
641-424-5079
- Link Research**  
+01923 200 900
- Microwave Radio Communications (MRC)**  
978-671-5700; 800-490-5700
- MITEQ**  
631-436-7400
- Multipoint Communications**  
+44 1376 510 881
- Newtec America**  
203-323-0042
- Radyne ComStream**  
602-437-9620
- Richardson Electronics**  
630-208-2200
- Scientific-Atlanta**  
770-236-5000
- Shook Mobile Technology**  
210-651-5700
- T-Systems Media & Broadcast**  
+49 761 880 62320
- Thrane & Thrane A/S**  
+45 395 58800
- TriPoint Global Communications**  
828-464-4141
- Vislink**  
+ 44 1494 774400

## STUDIO ACCESSORIES

### Cable management systems

- ADC**  
952-938-8080; 800-366-3891
- Bittree**  
818-500-8142
- Electrack Enclosure Products**  
714-776-5420
- Nemal Electronics Int'l**  
305-899-0900
- Panduit**  
800-777-3300
- Signal Transport**  
949-859-9615
- TV Magic**  
858-650-3155

### Cleaning equipment/products

- D.W. Electrochemicals**  
905-508-7500
- Maxell Corporation of America**  
201-794-5900; 800-533-2836

### Engineering software

- LS Telcom**  
+49 7227 9535 600
- Zandar Technologies PLC Headquarters**  
+353 1280 8945

### Master clock systems

- ESE**  
310-322-2136  
Master Clocks, Digital Displays, Analog Displays, Interface
- Evertz Microsystems**  
905-335-3700
- HHB Communications**  
805-579-6490
- Horita**  
949-489-0240
- Image Video**  
416-750-8872
- Leitch**  
757-548-2300; 800-231-9673
- Leitch Technology**  
818-525-2599; 888-843-7004
- Masterclock**  
636-724-3666

### Outdoor display equipment

- ESE**  
310-322-2136
- Kwik Stand Displays**  
218-828-8177

### Racks/furniture

- AMCO Engineering**  
847-671-6670
- Broadcast Richardson**  
630-208-2200
- Electrack Enclosure Products**  
714-776-5420
- Forecast Consoles**  
631-253-9000; 800-735-2070
- Kae**  
801-238-2300
- Kwik Stand Displays**  
218-828-8177
- Panduit**  
800-777-3300
- Rack Release Systems**  
480-325-3893
- Storeal**  
770-458-3280

- TBC Consoles**  
631-293-4068
- Wheatstone**  
252-638-7000

- Winsted**  
952-944-9050

### Studio accessories

- Ac-cetera**  
412-344-8609
- Bogen Photo**  
201-818-9500
- Broadcast Richardson**  
630-208-2200
- D.W. Electrochemicals**  
905-508-7500
- Devlin Design Group**  
858-535-9800
- DSC Labs**  
905-673-3211
- Eddcor Electronics**  
505-887-6790
- ESE**  
310-322-2136
- Faraday Technology**  
+44 1782 661 501
- Image Video**  
416-750-8872
- Kae**  
801-238-2300
- Rack Release Systems**  
480-325-3893
- Sony Electronics / Recording Media**  
201-930-6342
- Telescript**  
201-767-6733
- Theatre Service & Supply Corp**  
410-467-1225
- Wohler Technologies**  
650-589-5676

### Tools

- Nemal Electronics Int'l**  
305-899-0900
- Rack Release Systems**  
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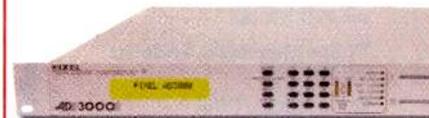
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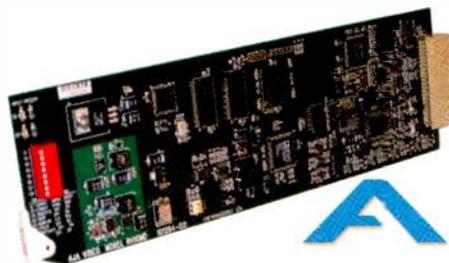
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818-840-1351

**SynthaSys Research**  
650-364-1853

**Tektronix**  
503-627-5129

**Teletronix**  
800-426-2200

**Videotek**  
610-327-2292; 800-800-5719

## TV TRANSMITTERS, TRANSLATORS, EXCITERS & ANTENNAS



### ROHDE & SCHWARZ

**Rohde & Schwarz**

Pace setting technology helps you save space, energy and hassle. Digital: liquid-cooled transmitters 1...20kW, air-cooled medium and low-power series, UHF translators/gap fillers. Analog ease: liquid-cooled transmitters 5...100kW, air-cooled medium power. Easiest transition from analogue to digital. All solid state, various standby configurations and remote control solutions available.

### Frequency conversion equipment

**EMCEE Broadcast Products**  
800-233-6193

**Ktech Telecom**  
818-773-0333

**Multipoint Communications**  
+44 1376 510 881

**Rohde & Schwarz**  
+49 180 5124242

### MMSD products

**Andrew**  
708-349-3300

**Axcera**  
724-873-8100; 800-215-2614

**EMCEE Broadcast Products**  
800-233-6193

**Rohde & Schwarz**  
+49 180 5124242

**Screen Service Italia**  
+39 030 3582225

**Thales Broadcast & Multimedia**  
413-998-1100; 800-288-8364

### Remote control systems (transmitter)

**EMCEE Broadcast Products**  
800-233-6193

**ITELCO USA**  
856-423-0010

**Opticomm**  
858-450-0143; 800-867-8426

DVX-6000 HDTV remote transmission

## MORE

## MODELS | APPLICATIONS | SOLUTIONS

### Editing & Graphics



**V-R82P-SDI**  
\$3999



**V-R53P-SDI**  
\$3399

### Remote & ENG



**V-R25P**  
\$3299



**V-R44P**  
\$1699



**V-R563P**  
\$1799



**V-R62P**  
\$2249



**V-R82P**  
\$1799



**V-R151P-4**  
\$2699

### EFP & Video Assist

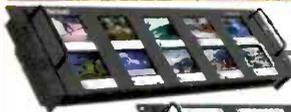
**V-LCD4-PRO-L**  
\$399



**V-R70P**  
\$799



### Studio/OB-VAN/DTV



**V-R25P-SDI**  
\$4995

**V-R44P-SDI**  
\$2299



**V-R63P-SDI**  
\$4799

**V-R72P-2SDI**  
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**V-R171P-SDI**  
Wide Screen,  
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S-Video, WXGA  
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**Marshall Electronics** Tel.: 800-800-6608 \ Fax: 310-333-0688

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**Scientific-Atlanta**  
770-236-5000

**Thales Broadcast & Multimedia**  
413-998-1100; 800-288-8364

## TV exciters

**Axcera**  
724-873-8100; 800-215-2614

**Continental Microwave**  
+44 1582 424 233

**EMCEE Broadcast Products**  
800-233-6193

**ITELCO USA**  
856-423-0010

**Ktech Telecom**  
818-773-0333

**Rohde & Schwarz**  
410-910-7800; 888-TES-TRSA

**Rohde & Schwarz**  
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**Teko Telecom**  
+39 051 6256148

## TV transmitters

**Ai (Acrodyne)**  
410-568-2105



Quantum Depressed Collector Series (QDC) High power IOT equipped UHF transmitter line for analog and digital applications, with maximum efficiency, water-cooled, depressed collector IOT technology; developed to solve the problems broadcasters face with old klystron equipment - reliability and utility costs; glycol-free cabinet environment; proven dependability and performance of incorporated Rohde & Schwarz technology.

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**EMCEE Broadcast Products**  
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**Harris Broadcast**  
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Diamond, Sigma, Platinum transmitters

**ITELCO USA**  
856-423-0010

**Ktech Telecom**  
818-773-0333

**L-3 Communications Electron Devices**  
570-326-3561; 800-861-1848

**LARCAN**  
905-564-9222

**LARCAN**  
303-665-8000

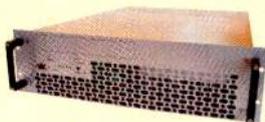
**Microwave Radio Communications (MRC)**  
978-671-5700; 800-490-5700

**MYAT**  
201-767-5380

**Northrop Grumman Electronic Systems**  
800-861-1843

**Radian**  
905-212-8200

**Richardson Electronics**  
630-208-2200



Ready for digital? With the AU series UHF amplifiers from Richardson Electronics you can be. Designed for both digital (50W, 100W and 200W) and analog (250W, 500W and 1000W) applications, these LDMOS amplifiers produce 56 dB gain, are easily configurable to a higher power level and are compliant to all major international standards.

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**Rohde & Schwarz**  
410-910-7800; 888-TES-TRSA

**Rohde & Schwarz**  
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**s2one**  
509-891-7362

**Screen Service Italia**  
+39 030 3582225

**T-Systems Media & Broadcast**  
+49 761 880 62320

**Teko Telecom SPA**  
+39 051 6256148

**Thales Broadcast & Multimedia**  
413-998-1100; 800-288-8364

**Thales Components**  
973-812-9000

## TV transmitting antennas

**Andrew**  
708-349-3300

**Dielectric Communications**  
207-655-4555; 866-DIE-LECTRIC

**Jampro Antennas/RF Systems**  
916-383-1177

**Kathrein Scala Div**  
541-779-6500

**Kline Towers**  
803-251-6207; 877-KLI-NETW

**Microwave Radic Communications (MRC)**  
978-671-5700; 800-490-5700

**MYAT**  
201-767-5380

**Radian**  
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**Radio Frequency Systems**  
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**Rohde & Schwarz**  
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**Rohn Industries**  
309-697-4400

**Sabre Communications**  
712-258-6690

**SpectraSite Broadcast Group**  
972-550-9500

**T.Z. Sawyer Technical Consultants**  
301-913-9287

**Teracom Components**  
207-627-7474

## VEHICLES

### ENG trucks

**Advent Communications**  
+44 1494 774400

**Alpha Video & Electronics**  
412-429-2000

**AVEC**  
412-429-2000

**Continental Microwave**  
+44 1582 424 233

**E-N-G Mobile Systems**  
925-798-4060

**Frontline Communications**  
727-573-0400

**Gerling and Associates**  
740-965-2888

**Link Research**  
+01923 200 900

**Media Concepts**  
918-252-3600

**NSI (N Systems)**  
410-964-8400

**Shook Mobile Technology**  
210-651-5700

**Sony Electronics / Recording Media**  
201-930-6342

**TriPoint Global Communications**  
828-464-4141

**Winemiller Communications**  
717-241-4400

## Satellite flyaway systems

**Advent Communications**  
+44 1494 774400

**Broadcast Richardson**  
630-208-2200

**Continental Microwave**  
+44 1582 424 233

**Gerling and Associates**  
740-965-2888

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+01923 200 900

**Microwave Radio Communications (MRC)**  
978-671-5700; 800-490-5700

Mantis Flyaway C, X, Ku, Ka-band and multi-band versions available

**TriPoint Global Communications**  
828-464-4141

**Vislink**  
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## Satellite uplink trucks

**Advent Communications**  
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**Alpha Video & Electronics**  
412-429-2000

**AVEC**  
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**Broadcast Richardson**  
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925-798-4060

**Frontline Communications**  
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**Thrane & Thrane A/S**  
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**Vislink**  
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**Winemiller Communications**  
717-241-4400

## VIDEO ACCESSORIES

**EAS products VBI data software systems**

**Broadcast Software Solutions**  
770-978-9450

**Evertz Microsystems**  
905-335-3700

**Vela**  
727-507-5300

## GPS equipment

**ESE**  
310-322-2136

Master Clocks, Frequency Standards, NTP & Interfaces

**Evertz Microsystems**  
905-335-3700

**Horita**  
949-489-0240

**Masterclock**  
636-724-3666

## Time code equipment

**Adrienne Electronics**  
702-896-1858

**Brick House Video**  
+44 (0) 23 8067 6026

**Burst Electronics**  
505-898-1455

**ESE**  
310-322-2136

Generators, Readers, Video Inserters, Comparators, Computer Interface

**Evertz Microsystems**  
905-335-3700

**Fast Forward Video**  
949-852-8404

**Horita**  
949-489-0240

**Imagine Products**  
317-843-0706

**Leitch**  
757-548-2300; 800-231-9673

**Leitch Technology**  
818-525-2599; 888-843-7004

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**Masterclock**  
636-724-3666

**Miranda Technologies**  
514-333-1772

**Studio Exchange**  
818-840-1351

**Video Rentals (VRI)**  
800-255-2874

## Video accessories

**AJA Video**  
800-251-4224

**Band Pro Film/Video**  
818-841-9655

**Bescor Video**  
516-420-1717

**Broadcast Microwave Services**  
858-391-3050; 800-669-9667

**Burst Electronics**  
505-898-1455

**Cinekinetic**  
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**D.W. Electrochemicals**  
905-508-7500

**Da-Lite Screen Company**  
574-267-8101

**Digital Vision (US)**  
818-769-8111

**Drastic Technologies**  
416-255-5636

**DSC Labs**  
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**ESE**  
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**Glidecam Industries**  
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**Kramer Electronics**  
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**UniqueTracks Royalty Free Music**  
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**Nemal Electronics Int'l**  
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**Quantegy**  
800-752-0732

**Rack Release Systems**  
480-325-3893

**RTI**  
847-677-3000

**SmartSound Software**  
818-920-9122

**Steadystick**  
+49 8986 3888

**Studio Exchange**  
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**TV One Multimedia Solutions**  
859-282-7303

**Video Rentals (VRI)**  
800-255-2874

**Videoframe**  
530-477-2000

**Ward-Beck Systems**  
416-335-5999

**Weircliffe Int'l**  
+44 1392 272 132

**Wohler Technologies**  
650-589-5676

## Video captioning equipment

**Adrienne Electronics**  
702-896-1858

**Broadcast Video Systems**  
905-764-1584

**CaptionMax**  
800-822-3566

**Enco Systems**  
248-827-4440

**Norpak**  
613-592-4164

**Softel USA**  
310-309-5281

**Telescript**  
201-767-6733

**TV Magic**  
858-650-3155

## Video patch panels

**ADC**  
952-938-8080; 800-366-3891

**Bittree**  
818-500-8142

**Nemal Electronics Int'l**  
305-899-0900

**PatchAmp**  
201-457-1504

**Studio Exchange**  
818-840-1351

**Telecast Fiber Systems**  
508-754-4858

**Trompeter Electronics**  
800-982-2629

## VIDEO COMPRESSION EQUIPMENT



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More than 20 million U.S. households get it because Harmonic enables broadcasts to deliver better digital video everywhere. We provide truly practical standards-based solutions for multicasting, centralcasting and distribution. Call Harmonic or visit us at [harmonicinc.com/broadcast](http://harmonicinc.com/broadcast) to learn how we can help you succeed in the digital (and real) world.

## Compression encoder/decoders

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615-256-6619

**BarcoNet**  
770-236-5000

**Broadcast Microwave Services**  
858-391-3050; 800-669-9667

**Digital Vision (US)**  
818-769-8111

**Discreet Software**  
415-547-2000

**Enseo**  
972-234-2513

**EVS Broadcast Equipment**  
+32 4 361 7000

**Floral Systems**  
352-372-8326

**Harmonic**  
408-542-2500

**Harris Broadcast**  
513-459-3400

**FlexiCoder**

**IPV**  
+44 1223 477 000

**Leitch AgileVision**  
416-445-9929 ext.3482

**Leitch**  
757-548-2300; 800-231-9673

**Leitch Technology**  
818-525-2599; 888-843-7004

**Link Research**  
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**Minerva Networks**  
408-567-9400

**Motorola Satellite & Broadcast Network Systems**  
858-404-2933

**Nucomm**  
908-852-3700



MPEG-2 M2-Encoder/Decoders: M2-Encoder/Decoder is a light-weight MPEG-2 video encoder/decoder with Analog, SDI and ASI interfaces. Encodes 4:2:0 and 4:2:2 with rates to 50 Mbps, housed in a 1RU or a 1/2RU portable case, operating from 100/260 VAC (AC/DC for portable). Three preset quick keys are standard with optional integrated digital color bar generator.

**Radyne ComStream**  
602-437-9620

**Scientific-Atlanta**  
770-236-5000

**Scopus Network Technologies**  
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**Seachange Int'l**  
978-897-0100

**sci-worx**  
+49 511 277 0

**SkyStream Networks**  
408-616-3300

**Snell & Wilcox**  
408-260-1000; 800-827-4544

**Stradis**  
404-320-0110

**Studio Exchange**  
818-840-1351

## TANDBERG Television

**TANDBERG Television**  
407-380-7055

**Telestream**  
530-470-1300

**Thales Broadcast & Multimedia**  
413-998-1100; 800-288-8364

**TV One Multimedia Solutions**  
859-282-7303

**Vela**  
727-507-5300

**ViewCast**  
972-488-7200

### Compression pre-processors

**Digital Vision (US)**  
818-769-8111

**Ensemble Designs**  
530-478-1830

**Harmonic**  
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**Leitch AgileVision**  
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770-236-5000

**Snell & Wilcox**  
408-260-1000; 800-827-4544

**Studio Exchange**  
818-840-1351

**TeraNex**  
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### Statistical multiplexers

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**Harmonic**  
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### Video compression systems

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**Doremi Labs**  
818-562-1101

**DVC Digitalvideo Computing**  
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**Floral Systems**  
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**Harmonic**  
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**Laird Telemedia**  
800-898-0759

**Leitch AgileVision**  
416-445-9929 ext3482

**Leitch**  
757-548-2300; 800-231-9673

**Leitch Technology**  
818-525-2599; 888-843-7004

**LEL Computer Systems**  
561-347-2242

**Link Research**  
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**Motorola**  
858-455-1500

**Motorola Satellite & Broadcast Network Systems**  
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**Scientific-Atlanta**  
770-236-5000

**Scopus Network Technologies**  
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**SkyStream Networks**  
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**Vela**  
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**ViewCast**  
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### Video noise reduction systems

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**Leitch Technology**  
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**Link Research**  
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**Scientific-Atlanta**  
770-236-5000

**Snell & Wilcox**  
408-260-1000; 800-827-4544

**Studio Exchange**  
818-840-1351

**TeraNex**  
407-868-6051

## VIDEO EDITING SYSTEMS

### Editing systems and components

**Accom**  
650-328-3818

**Addenda Electronics**  
831-372-6205

**AJA Video**  
800-251-4224

**Broadcast Richardson**  
630-208-2200

**Burst Electronics**  
505-898-1455

**da Vinci Systems**  
954-688-5601

**Discreet - Desktop Video Combustion**  
415-356-0700

**Discreet Systems (Inferno, Flame, Flint, Smoke)**  
415-356-0700

**DNF Controls**  
818-898-3380

**Editware**  
530-477-4300

**Gennum**  
905-632-2996

**Hi Tech Systems**  
+44 125 6780880

**Incite Multimedia**  
+41 22 3085741

**Laird Telemedia**  
800-898-0759

**Leitch**  
757-548-2300; 800-231-9673

**Leitch Technology**  
818-525-2599; 888-843-7004

**Mathematical Technologies**  
401-831-1315

**Matrox Graphics**  
514-822-6000

**Media 100**  
508-460-1600

**Motorola Satellite & Broadcast Network Systems**  
858-404-2933

**Panasonic Broadcast & Television Systems**  
201-348-5300; 800-528-8601

**Pinnacle Systems / Broadcast & Professional**  
650-526-1600

**Quantel**  
203-972-3199

**SmartSound Software**  
818-920-9122

**Sony Electronics / Recording Media**  
201-930-6342

**Spencer Technologies**  
818-771-1850

**Studio Exchange**  
818-840-1351

**Swiderski Electronics**  
630-787-0800

**TBC Consoles**  
631-293-4068

**Thomson Broadcast & Media Solutions**  
530-478-3000; 800-547-8949

**United Media**  
714-777-4510 x110

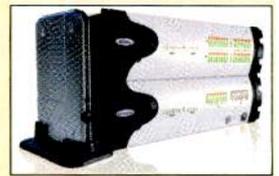
**Video Rentals (VRI)**  
800-255-2874

### Nonlinear editors

**Accom**  
650-328-3818

**Applied Magic**  
760-931-6417

**Avid Technology**  
978-640-6789; 800-949-AVID



DNA Family

**BOXX Technologies**  
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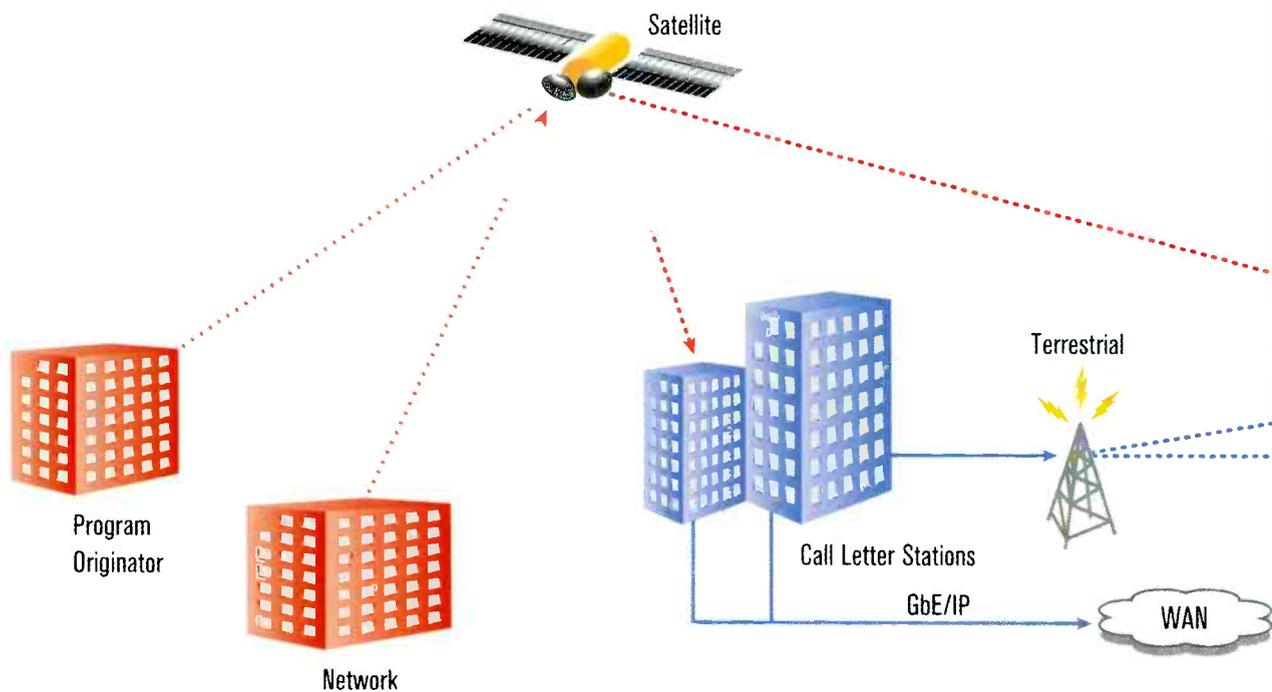
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More than  
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U.S. households  
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- Closed-loop Statistical Multiplexing of VBR HD, SD and Data in a Single Pool
- Digital Program Insertion (DPI)
- Multiple Video Transport Options
- Digital Service Management

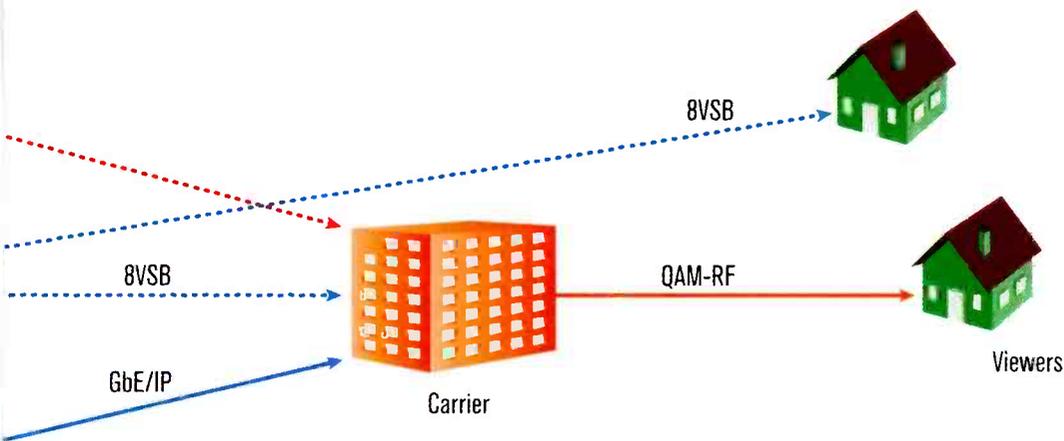
## TELEVISION STATION OPERATIONS

- Industry Leading HD and SD Encoding
- Closed-loop Statistical Multiplexing of VBR HD, SD and Data in a Single Pool
- Digital Program Insertion (DPI)
- System Mode Changing
- Multiple Video Transport Options
- Digital Service Management

# Practical Solutions for Delivering Better Digital Video. EVERYWHERE.

**HARMONIC'S PRACTICAL SOLUTIONS** maximize revenue, reduce costs and increase flexibility. They're proven and reliable. So, whether you already offer digital TV or are just starting out, we can provide a significant advantage for you.

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## CARRIER HEADEND

- HD and SD Digital Turnaround
- Industry Leading HD and SD Encoding
- Advanced HD, SD and Data Multiplexing
- Digital Program Insertion (DPI)
- Smart Edge Devices
- Multiple Video Transport Options
- Network Management

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- Provides Superior Viewing and Listening Experience
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Now, use that newfound bandwidth to increase service to your existing audience and attract new viewers. Harmonic's DiviTrackXE™—a third-generation, closed-loop statistical multiplexing system—can multicast an array of standard and high definition channels within your broadcast bandwidth. DiviTrackXE also lets you mix data services and variable bit-rate HD and SD streams in the same pool.

Monitor and manage your digital video infrastructure as a series of services rather than discrete pieces of hardware. NMX Digital Service Manager™—Harmonic's breakthrough new system—enables you to add, modify and manage your

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Maximize your reach by delivering your entire schedule directly to a cable, satellite, telco or other carrier headend. Harmonic's video transport systems get your content there quickly and reliably while protecting your video quality the entire way.

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solutions for **multicasting,**  
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514-393-1616

**DVC Digitalvideo Computing**  
+49 8152-93010

**DVS Digital Video Systems**  
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**Editware**  
530-477-4300

**EVS Broadcast Equipment**  
+32 4 361 7000

**Gennum**  
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**Imagine Products**  
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**Incite Multimedia**  
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**Laird Telemedia**  
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**Leitch Technology**  
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**Matrox Electronic Systems -  
Video Products Group**  
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**Media 100**  
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**Media Concepts**  
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**Panasonic Broadcast &  
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**Pinnacle Systems / Broadcast &  
Professional**  
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**Sony Electronics / Recording  
Media**  
201-930-6342

**Studio Exchange**  
818-840-1351

**Thomson Broadcast & Media  
Solutions**  
530-478-3000; 800-547-8949

**United Media**  
714-777-4510 x110

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### Line doublers/ quadruplers

**ANALOG WAY**  
212-269-1902

**Communications Specialties**  
631-273-0404

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## Plasma displays

**Clarity Visual Systems**  
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**DVC Digitalvideo Computing**  
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**e-mediavision.com**  
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973-317-5000

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## Projectors

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**Teklogic**  
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## Video monitors

**Band Pro Film/Video**  
818-841-9655

**BarcoNet**  
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**Glidecam Industries**  
508-830-1414

**Ikegami**  
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**Ikegami Electronics**  
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**Marshall Electronics**  
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**Panorama DTV**  
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201-767-6733

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## Video presentation equipment

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**TBC Consoles**  
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**Ensemble Designs**  
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**Kramer Electronics**  
908-735-0018

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**PatchAmp**  
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**Pro-Bel**  
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**Telford Technical Research**  
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**TV One Multimedia Solutions**  
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**Videotek**  
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**Ward-Beck Systems**  
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**Videotek**  
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## Video routing switchers

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8 input-dual outputting analog HD routing switches

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**Quartz Electronics**  
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**Sierra Video System**  
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**Sigma Electronics**  
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Video and Audio <  
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## Blueline Technology

972-353-2583

## Imation

651-704-4000

## Leitch AgileVision

416-445-9929 ext3482

## Leitch Technology

818-525-2599; 888-843-7004

## Masstech Americas

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## Maxell Corporation of America

201-794-5900; 800-533-2836

## Odetics Broadcast

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### Commercial insertion equipment/software

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615-256-6619

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## Storeel

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## BOXX Technologies

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**TV Magic**  
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**ViewCast**  
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## VTRs (video tape recorders)

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**Telecast Fiber Systems**  
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**Zander Technologies PLC USA Office**  
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# The 2003 **Broadcast**Engineering **EXCELLENCE AWARDS**

- 23 top broadcast and production facilities
- Photos of leading-edge solutions in use

**Vote and win  
a free T-shirt**  
(see page 50)

# 3<sup>rd</sup> EXCELLENCE AWARDS Annual

**W**e're proud to present entries for the 3<sup>rd</sup> annual *Broadcast Engineering* Excellence Awards. These awards recognize innovation and quality in the design and construction of broadcast and production facilities. This year's entries cover a wide range of systems integrators, manufacturers and facilities.

And, as before, *Broadcast Engineering* readers will help select the winners. Here's how you can vote, and win too!

Readers should read each of the entries that appear on the following pages. Select your three favorite entries. Then, visit the *Broadcast Engineering* Web site, [www.broadcastengineering.com](http://www.broadcastengineering.com), and click on the Excellence Awards logo on the home page. You'll be taken to a ballot page, where you can register your three votes for your favorite facilities.

When evaluating the facilities, please consider several issues:

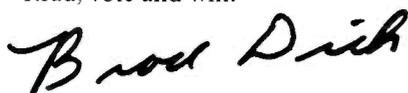
- Originality and innovation of new or existing techniques
- Complexity of project
- Presentation, visual attractiveness
- Unique application of technology
- Meeting owner/client goals

You can win too!

Readers who vote and then enter their e-mail address will be eligible to win a NEW *Broadcast Engineering* T-shirt. Only one entry per reader please. To be eligible to win one of the T-shirts, you must provide an e-mail address. E-mail addresses will be used only to notify the T-shirt winners. A drawing for the T-shirts will be held on Feb. 3. Hurry, you must register your vote by Feb. 1, 2004.

Excellence Awards winners will be announced in the March 2004 issue, and the awards will be presented to the winners at the NAB convention. T-shirts will be mailed to winning readers in March.

Read, vote and win!



Brad Dick  
Editorial director

## 2003 Entries

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SWR .....	64
Ohio News Network .....	65
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# Starz Encore

## productivity and air operation

The major system design goals for Starz Encore included full-program stream redundancy with dual "hot standby" feeds and media redundancy within the server systems. The technical team also decided that a move to a server-based infrastructure, using automation, was required. Beck Associates supplied both technical systems design and space planning expertise.

The Starz Encore technical plant can be conceptualized as two separate but interacting facilities: production operations and air operations. Production operations includes 18 digital edit suites, 10 graphic suites and three audio post suites. Beck Associates moved much of the production equipment directly from the existing plant at NDC. Thorough, careful pre-wiring, cabling and harnessing of the new

suites prior to the move allowed the majority of suites to be functional within a few days of the move.

Air operations is responsible for the continuous real-time origination of 30 separate program streams



among channels, OmniBus automation moves the material from the encode servers to a Sony Petasite archive system using an Avalon archive system. There the material is stored before it is moved to the multiple play servers on a just-in-time basis. OmniBus is responsible for maintaining a database that includes all media that exists in the system. OmniBus must automatically delete material on a timely basis to maintain server capacity and overhead. Masters supplied with Dolby E material are decoded and then encoded to AC-3 for final airplay. To allow these operations, the signal routing systems are designed to handle discrete 6-channel audio as well as encoded AC-3.

All of the routing systems are controlled by automation. The routing systems include a 192 x 192 Nvision transmission router, an Nvision "encoding" routing system (AES and SDI) and a Pro-Bel transmissions or "return" routing system. Evertz supplied the primary "glue", which includes, but is not limited to, audio-to-video MUX and DEMUX units, audio delay units, and V-Chip encoders. Both Tektronix and Videotek supplied the pervasive test and measurement equipment. Pinnacle supplied the DekoCast units that are used for channel branding.

(15 "channels," each with independent East and West Coast branding and timing). These feeds are continuously monitored in a large, 2-tiered master control room. The OmniBus automation system efficiency is such that only two operators and one supervisor are typically necessary. The system is designed to monitor and alarm on failure of video, audio (multi-language, Dolby E and AC-3), closed captioning and transmission path failure. Error messages are displayed immediately and dynamically on the nine Barco multi-channel multiplexed display screens.

Program material is brought into the facility on Digi-Beta masters. After quality evaluation and promotions editing, the movies and interstitial material are moved to the video server. Pinnacle supplied the 14 core servers that comprise the broadcast chain. Two of the servers are used for encoding operations, while 12 (six primary and six redundant backup) servers are used for play to air. Because a large amount of program material is shared

### Design Team

John FitzRandolph, proj. chf./sr. eng.  
 Fred Beck, sr. eng.  
 Jeff Morris, design cons./sr. eng.  
 Terry Breay, system eng.  
 Brad Martins, system eng.  
 David Basil, lead tech.  
 Oscar Ramirez, inv. mgr./ACAD  
 Misty Proulx, inv. mgr./ACAD

### Equipment List

OmniBus Colossus automation system  
 Archive interface w/ Avalon preview  
 Nvision SDI transmission router  
 Pro-Bel return router  
 Pinnacle playback primary and backup  
 Ingest servers  
 Deko Cast  
 Evertz delay and cc  
 Leitch  
 Sync generator  
 Reference distribution amplifiers  
 Dolby E decoder and AC3  
 Tektronix monitors  
 Wohler 5.1 audio monitors  
 Sony picture monitors and ingest VTRs  
 Barco Monitor cubes  
 Videotek test and measurements



# PBS Ingest Suite

**F**ocused on establishing discrepancy-free program feeds, PBS teamed with systems integrator CEI of Newington, VA, to develop a comprehensive solution based on a new workflow concept. Together, they designed an ingest suite that did more than reduce errors. The server-based system inspired further enhancements, which provide reliable and money-saving program-delivery solutions.

In traditional master control environments, discrepancies happen. Automation can fail to key a logo, V-Chip data may not be inserted, or the instruction to insert a parental rating message could be left off the program log. Whether hardware, software or human error, the result is the same: Once a discrepancy hits the air, it is too late to fix it.

PBS and CEI decided to examine the benefits of moving the packaging of programs upstream. According to

Jay Brown, CEI's director of engineering, a prepackaging approach that is combined with sophisticated quality control measures eliminates many potential discrepancies. Integrating program elements



(such as program video and audio, branding information, data, or special inserts) *in advance* ensures that programs are 100 percent accurate *before* the program is sent to air. Catastrophic failure or a corrupted file could still impact air; however, the inclusion of redundant systems makes the chances of this occurring relatively small. At weekly meetings, PBS and CEI engineers discussed current projects and future plans. To achieve their goal of discrepancy-free program feeds, the team decided to build a prototype ingest suite. To this end, the design process began in earnest on an SD/HD capable solution.

At the heart of the new ingest suite are mirrored 4.5TB Omneon servers for air and protect. This 58-channel system is the largest installed in North America. Program masters are ingested into the Omneon servers as 50Mb I-frame-only files under the control of Harris Automation. Front Porch Digital (FPD) products address two requirements. DIVArchive manages file transfers between the servers



and the 430TB ADIC Scalar 10K tape archive. FPD BitScream transcoders generate 1.5Mb Windows Media 9 files for PBS internal network browsing. Program elements are integrated with the 50Mb program-masters, which are then *re-ingested* as 12Mb long-GOP air masters. Evertz, Miranda and Videotek products meet demanding QC requirements of monitoring, error detection, alarming and logging. The ingest suite has proven to be reliable and effective since going online in January of 2003.

The success of the server-based workflow inspired the launch of an edge-server prototype program in the spring of 2003 involving nine PBS member stations. The transfer of ingest suite program files to edge-servers in *non-real-time* brings money saving delivery options to stations, including both terrestrial transmission and the opportunistic use of transponder space. Developments currently underway also will bring browse and request interactivity to PBS and member stations.

The new ingest suite at PBS headquarters began as a concept-based discussion and was built as a prototype discrepancy-free delivery solution. Now in operation, it promises to be much more. ●

## Design Team

### PBS

Marilyn Pierce, sr. eng.  
James Seaman, sr. eng.  
James Kutzner, sr. dir./chf. eng.  
Andy Butler, sr. dir./eng.  
Stephan Scheel, sr. dir./tech.

### CEI

Jay Brown, dir. eng./proj. mgr.  
Ruber Huertas, sr. systems eng.  
Tom Hackett, sr. design eng.

## Equipment List

Mirrored Omneon Video Servers  
totaling 9TB storage  
ADIC Scalar 10K LTO-1 Tape Archive  
Front Porch Digital DIVArchive  
with 860TB Managed Storage  
Harris Automation  
Dolby-E hardware  
Clarity 67" Lion LCD Display  
Miranda Imagestore  
K-2 Display Processor



# DIRECTV's

## single-operator control requirements

**D**IRECTV, a United States digital satellite television service, needed to expand its local broadcast television station programming to further compete with cable offerings. DIRECTV accomplished its goal by engineering a state-of-the-art network of facilities, which included multiple local collection facilities that capture local TV broadcast programming at the source and transport it back to one of two (soon to be four) central broadcast facilities over terrestrial fibre.

DIRECTV wanted the new system to consist of an extremely complex group of inter-related subsystems. The most complicated architectures would be located in the studios, control rooms and central technical areas. The system would need to communicate with all the controlled elements via whatever physical connection is offered and present timely and relevant information to the users regarding status, progress and available options. The system would arbitrate between concurrent users sharing resources, assist cooperative working and deliver fully automatic, semi-automatic and manual control in exactly the way different users require at different times.

The solution would run on standard PC hardware. User-friendly, touch-screen technology would provide the interface to the system and allow single operator control and monitoring of many pieces of equipment at multiple locations — including remote and unstaffed areas. This reduces the amount of equipment — and therefore space — required to support multiple channels and broadcast streams.

The solution would be able to control multiple systems/devices from a single workstation, including cameras,

codecs, integrated receiver/decoders, ISDN terminal adapters, routers, satellite receivers, upconverters, video disks, video mixers, and VTRs. The system would integrate otherwise incompatible devices into a



single, coherent control system, using a simple WAN or Intranet connection to control multiple systems at different sites. The system could provide a status display of every device at every remote facility, providing useful information such as system status of a video feed or Web page. Status display screens

also would provide system-wide fault logging and alarms management from one single, intuitive display.

DIRECTV also required a trial program in which the vendor installed simulator systems at DIRECTV's broadcasting centers in Castle Rock, CO, and Los Angeles.

In order for this system to be cost-effectively deployed, the facilities needed to be unmanned while maintaining the utmost standards of serviceability and reliability.

BBC Technology's software-based Colledia Control was selected because it allows greater customization and configuration than other control platforms. Its software runs on standard PC hardware and operating systems and is both cost-effective and simple to install. It is scalable and currently rolling out in DIRECTV's two new satellite uplink facilities in Oakdale, MN, and Winchester, VA.

DIRECTV implemented a distributed broadcast monitoring and control solution, which allowed it to carry out checks at its unmanned distant sites to ensure that the local channels maintained the same picture quality, broadcast availability and general reliability as their existing programming.

### Design Team

#### DIRECTV

Dave Baylor, exec. vp  
Gary Loo, sr. mgr., eng.  
Rick Purpura, sr. dir.  
Frank Hironaka, sr. dir.

#### BBC Technology

Mitchell Linden, sr. vp-ops.  
Julian Williams, pre-sales and product mktng.  
Shannon Kim, vp-sales  
Peter Watson, lead architect

### Equipment List

Boeing 601 HP spot beam satellite  
Barco screen display wall  
BBC Technology Colledia Control



# (IMC)

## International Media Centre

**T**he new BT International Media Centre (IMC), based at the BT Tower in London, officially opened in April 2003 with equipment specification and technical integration by Cambridge-based Megahertz Broadcast Systems.

This center, an enlarged and enhanced version of the old TV control room, routes and monitors broadcast TV signals on a global scale and acts as a hub for virtually every television company broadcasting in the UK.

At any one time, up to 3000 services can be passing through the new center, of which several hundred will need either signal or picture monitored for quality. If a transmission fault occurs, it is reported to the IMC, where BT staff identify the cause and

immediately allocate engineers to solve the problem.

The design and technical requirements of the facility posed several difficulties for the Megahertz team, not



maintenance engineers. Analog four-wire interfaces, Videotek VTM-300 test equipment, an eight-cube Synelec display video wall, and Zandar DX4 quad SDI multiviewers and Fusion 26-input SDI scaleable multiviewers also were recom-

### Design Team

Philip Ballabon, BT proj. mgr.  
Megahertz  
Steve Hope, sr. proj. eng.  
Steve Burgess, TD  
Richard Benderz, cust. support mgr.

### Equipment List

CCC Networks KVM switch (128x128)  
Riedel Artist 128-port digital talkback  
Analog four-wire interfaces  
Videotek VTM-300 test equipment  
Eight-cube Synelec display video wall  
Zandar  
DX4 quad SDI multiviewers  
Fusion SDI scaleable multiviewers  
Megahertz  
audio monitoring units  
custom alarm software  
Kent Modular Electronics TFT screens  
Quartz 64x64 SDI/stereo audio router  
Snell & Wilcox  
DAs, converters, synchronizers, logo generator  
Courtyard SPGs and changeover  
Wharton GPS clock system with digital displays  
Leitch analog displays  
BES Electronics bargraphs  
Ikegami tube monitors  
Pharos control system

least due to budget constraints. These difficulties included integrating communications to customers via an existing engineering manual telephone exchange (EMX) into a state-of-the-art talkback system, as well as achieving acceptable desk ergonomics within the limitations of a room with a side and central pillar while respecting the room's aesthetics to make it impressive yet functional.

Getting signals in and out of an existing infrastructure is always a challenge. For this particular project, the Megahertz team had to monitor video traffic throughout the building, which meant that "hooks" had to be installed in different locations. Megahertz worked closely with external architects from the design stage up to ensure that these challenges were resolved effectively with no unexpected problems when the equipment was installed.

The integrator specified a wide range of equipment, including a Riedel Artist 128-port digital talkback system with ISDN interface and Radio Talkback interface for mobile

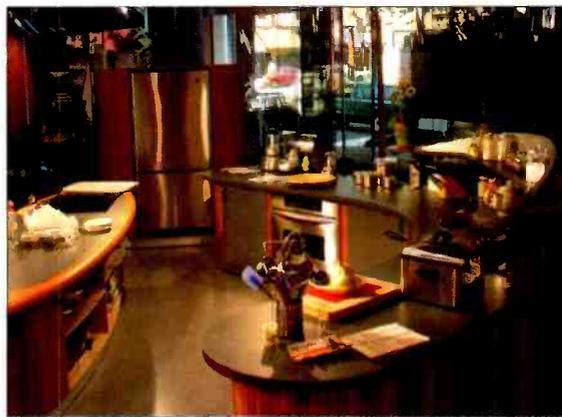
mended. Megahertz audio monitoring units with input select and PPM, Kent Modular Electronics TFT screens, a Quartz 64x64 SDI matrix, 16x16 analog matrix and 64x64 stereo analog audio matrix were installed as well. Snell & Wilcox glue equipment (DAs, converters, synchronizers, logo generator, etc), Megahertz custom alarm software, Courtyard SPGs and changeover, and Wharton GPS clock system with digital displays were implemented. Leitch analog displays, a Bose speaker system, a Sony DFS-700AP vision mixer for the studio and BES Electronics custom-made bargraphs were put in. Ikegami tube monitor and a Pharos control system finished the installation.

This technical array allows each desk to be individually equipped for a specific function, with an increasing level of sophistication toward the front of the room. If a fault cannot be dealt with quickly on the desk receiving the first notification, it will be passed on to senior engineers, with more sophisticated equipment for diagnosing and resolving the problem. ●



# Channel M

## Building a multicultural TV station



**C**hannel M was awarded an over-the-air broadcast license in early 2002. Its mandate was to provide multicultural programming in over 22 languages to the Vancouver (British Columbia, Canada) community.

The station needed to be as high-tech and automated as possible to reduce ongoing operational costs. The infrastructure needed to accommodate an eventual migration to HDTV, while initially being able to satisfy demanding local production requirements.

From this vision grew the Channel M model: Video server technology would be at the core of the station; however, the station couldn't afford a SAN or MAN system. Users of the video server platforms included news, production and on-air departments so, to ensure reliability, redundant servers would be incorporated. The station needed to provide as much storage capacity as possible to the three areas, while maintaining a tight coupling between the news back-end editing system and the front-end play-to-air system.

The station was built as an SDI plant with separate (non-embedded) AES audio. Sony IMX technology was chosen for the production and on-air areas. Sony DV Cam was chosen for news acquisition.

Working with Applied Electronics, the station brought many advanced systems together. A redundant video server core services on-air and news play-to-air. Thomson Grass Valley Vibrant editing

systems were chosen for the news back-end, and Profile XPs were chosen for playout. The servers were chosen because they can do seamless video file transfers, but also they can support both MPEG-2 50Mb and DV 25Mb formats. Avid systems were chosen as for online production editing because of the familiarity of the interface within the freelance editing community. A transcoding package was purchased to flip the Avid files from their native format into the Thomson Grass Valley server in a DV or MPEG format.

Channel M faced many challenges with the build, but Pinnacle Systems integration of MOS protocol in the newsroom solved the multiple language requirements. Requirements for video to the desktop were solved using media asset management. Virtual set technology was used to resolve issues of limited studio space. These technologies represented many firsts for Channel M. Channel M also was the first broadcaster in Canada to use COFDM technology in their microwave truck.

### Design Team

Channel M

Peter Gillespie, VP ops./eng.

Wayne Paugh, Ken Dann, Rod

Friesen, Eing Qi, Shawn Greek, eng.

Applied Electronics

Kim Edmunds, proj. mgr.

Brian Burtch, tech. mgr.

### Equipment List

Sony

HDSX and AES audio router

Flexicart

DVS9000 switcher,

DMXR-10J console

DXW35 cameras

DSR370 DV camera

MSW9000 cameras

Harris Inve 110 MAM system

Trilogy intercom

Radamec robotics

FOR-A virtual set

Miranda Kaleido monitor wall

AVID Symphony

Thomson Grass Valley Vibrant

Newsbrowse

M2100 switcher

Profile XF servers

BDL teleprompting

Pinnacle

FX Deko

Thunder

AP ENPS

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# Turner Entertainment's network operations center

**T**urner Entertainment Group, a division of Turner Broadcasting System, built an expansive new 198,000-square-foot broadcast facility at its Atlanta headquarters. The facility houses 20 Turner-owned domestic and Latin American television networks that occupy 11 control rooms, or broadcast operations centers (BOCs), centralized on the first floor. The 11 BOCs are divided among four separate "pods." Each pod features a centralized, glass-walled supervisor's area for overseeing operations and altering playlists. Each BOC features an A chain and a B chain of master control equipment for every feed. If the A chain fails, a push of a button switches to the B chain and its duplicate complement of equipment.

The transmission operations center (TOC), divided into two sections, is also on the first floor. The incoming

TOC has four quality control stations for live incoming signals and embeds the audio, using Snell & Wilcox audio embedding equipment, into the video.

The outgoing TOC features large BARCO screens along the front wall.



This area provides operators with a final look at a signal before it leaves the building. A Snell & Wilcox RollCall network monitoring and control system is instrumental to this room. The facility's main RollCall terminal is installed here to monitor equipment and pinpoint signal loss quickly. With 500 racks throughout the facility, the system minimizes failure effects.

The central equipment room (CER) comprises one half of the second floor and is laid out in network groups (TNT, TBS, etc.). Two redundant Cisco IP data routers connect to every source in the building for file distribution. A central cache area, broadcast inventory management, delivers ingested air material to a network playout server as a file when called upon by an automation system.

Snell & Wilcox IQ modular equipment occupies rack space in CER. A facilitywide installation of more than 5000 modules in 3RU enclosures handle a variety of applications.



Included in the IQ modular applications are analog and digital audio and video distribution, analog-to-digital and digital-to-analog conversion, video decoding and encoding, frame synchroni-

zation, audio conversion, sub-frame remapping, digital "proc amp" control, gamut legalization, and standards conversion for international program exchange. Most feature 10 or fewer populated slots; up to 16 slots are available in each 3RU enclosure.

The other half of the facility features a high-density storage library and the media operations center (MOC), which houses short-form and automated long-form ingest rooms; a central tape area with a variety of VTRs for dubbing between formats; and "Guard Source VTRs" to provide a third level of automation-controlled redundancy for the BOCs.

The MOC is where the media operations control center is located. Here operators can monitor everything, connect to sources in every control room and alter playlists. Snell & Wilcox audio shuffling modules are featured in the MOC, as well as other unique products that reconfigure audio tracks of various languages associated with a program.

## Equipment List

Snell & Wilcox  
IQ modular products  
RollCall network control and monitoring  
Pro-Bel automation  
Pinnacle Mediasream 900 servers with networked storage  
Cisco IP routing systems  
Thomson Grass Valley  
Trinix routers  
M2100 master control switchers  
Philips Venus routers  
Chyron Aprisa and Duet graphics  
BARCO Hydra multi-image display  
EMC data storage  
Avalon storage management  
ASACA DVD archives  
Evertz modular equipment  
Teranex digital video processors  
Scientific-Atlanta IRDs  
Tektronix audio/video T&M systems  
Nvision fiber optic transmitters

# FOX News production studio



**W**hen FOX News prepared to add a new, street-level production studio to their midtown Manhattan broadcast operations center, The Systems Group (TSG) was brought in to implement a "21<sup>st</sup> century operations suite" as part of a turn-key production facility. The addition of the studio allowed FOX News to expand its current programming to include a live audience production. This suite of control and production operations rooms includes production control, audio control and voice-over booth, tape and server playback area, satellite equipment room, and a glass-walled street level studio in the Rockefeller Center district of NYC. The space allotted for the production control rooms and the studio consisted of office space in the News Corp. building, as well as the purchase of the now defunct Dish of Salt restaurant,

which is where the studio is now operating. The facility incorporates some of the latest in multiviewer monitoring, hybrid audio mixing and network-connected production systems technology.



## Design Team

### FOX News

Warren Vanderveer, VP-op. and eng.  
Chris Bauer, dir. eng.  
Gordon Jackson, eng.

### The Systems Group

Paul Rogalinski, proj. mgr.  
John Holt, sr. systems eng.  
Darwin Clermont, install. supervisor  
Steve Losquadro, lead tech.  
John Vasilenko, proj. coordinator  
Gus Garcia, James Hughes, Joe Ortega, Rafael Sumeersarnath and Houari Ramos, tech.

## Equipment List

### Thomson

XttenDD prod. switcher  
LDK-200 digital cameras  
Accom DVeous DVE  
Quantel Picturebox SS  
Miranda Kaleido K2  
TSL USC-21 system controller  
Clarity Lion UX 67" Display  
Calrec Sigma 100 Audio Mixer  
Fujinon studio and ENG lenses  
Radamec camera robotics

The design of the new production environment marked a different path from the model that FOX News had previously used to design the entire facility. The control rooms and the entire graphics department now occupy the former office space. In addition, there are offices for the production staff of the "Dayside" show, and a local satellite equipment room that houses the equipment for the control rooms, the studio and the graphics department. The production space is used for multiple shows with individual setup needs, which made it necessary to enable the room to be reconfigured as quickly and painlessly as possible. The production control room was designed around a multiviewer-driven, rear-projection display monitor wall and competition overbridge that included serial tallies

from the production switcher, as well as router-driven dynamic tally and source ID. The same multiviewer platform sources an LCD overbridge in the audio control room, and monitoring configurations are changeable via snapshot recall between and during shows from a unique technical director cockpit. The integration of a digital switcher and mixer streamlines the process of show snapshot saving, recall and setup.

The space allocated for the build was two stories up from the existing technical and production core, located next to and above a breezeway that runs through the building. Due to the location of the new build, interfacing to the existing technical core required the addition of multiple cabling conduits, a network of demarc panels and extensive coordination with local labor groups. The implementation of the monitor wall multiviewer, the UMD system controller, the switcher and the facility router for integrated serial tallies and dynamic UMD displays proved to be one of the more challenging design aspects to implement. TSG also designed infrastructure to support the future FOX News relocation of the remote robotic camera and video shading control room. ●



# CNN

## Time Life Studios

Since the 1980s, CNN has expanded its international news organization beyond its home in Atlanta to include facilities around the globe. The most recent move for CNN involved the renovation and construction of two facilities in New York City in 2002 to accommodate news shows built around its high-profile talents, Connie Chung and Paula Zahn. The Systems Group (TSG) was appointed to help plan and execute the project, which included the renovation of the CNN facility located at 5 Penn Plaza and the construction of the new street-front studio located at the Time Life building in midtown Manhattan. These facilities were necessary for CNN to have a

bigger presence in New York.

Early in the planning process for the 5 Penn Plaza project, CNN announced plans to create the new studio facility



the expansion of routing connectivity feeds to two smaller existing studios. Thomson Grass Valley 4000 three-M/E production switchers were chosen for the facility, deployed along with a Thomson Trinitix SDI video router with a 256 x 256 channel matrix and active carding for a 192 x 192 matrix. A Venus analog router with active carding for a 256 x 256 matrix also was installed. Sony PVM and BVM video monitors using Telex KP32 intercom key panels for communication were installed in the two facilities. The new systems were cut into the existing on-air operation in a highly coordinated manner with no impact to the home viewer. Each room in Penn Plaza was individually transitioned and tested, allowing the engineers to shadow the signal path for both analog and digital systems while remaining on the air.

TSG was appointed in February 2002, with the 510 Penn Plaza segment reaching completion in May 2003. TSG

### Design Team

#### CNN

Jeff Gershgorn, dir. eng.  
Jesse Spilka, eng. mgr.  
Dave Slack, VP-imp. and planning  
Tim Sloan, tech. mgr.

#### The Systems Group

John Zulick, eng.  
John Holt, sr. eng.  
Paul Rogalinski, sr. proj. mgr.  
Darwin Clermont and DJ Rice,  
installation supervisors  
Hemant Ganesh and Steve  
Losquadro, lead tech.

### Equipment List

Thomson Grass Valley  
Trinitix SDI video router 256 X 256  
Venus Analog audio router  
4000 three-M/E production switchers  
Yamaha 02R digital audio mixer  
Vinten Quattro studio pedestals  
Telex intercom key panels KP32  
Sony  
HDC950 cameras  
PVM and BVM video monitors

in the former Time Life building and control it remotely from the 5 Penn location. The Time Life Studio was designed to give news shows dedicated high-profile studio space, with two sides of glass for public exposure to Sixth Avenue and the associated plaza. Support and technical facilities are located on the lower concourse level. Sony HDC950 video cameras mounted on Vinten Quattro studio pedestals are used to provide the studios with HD capability for the future, as well as SD quality for the initial launch. A Yamaha 02R digital audio mixer fulfills the audio production duties. Two production control rooms were updated along with

was on site within four weeks to begin the cable pulls for the production studio upgrade. The studios went from analog to a full-digital 601 operation within a six-week period. The Time Life installation started in April 2003. Testing for the Time Life studios began on May 15. The 1000-square-foot-studio launched on June 24, only 20 weeks after the award date. The 2000-square-foot-street-front studio designed for Paula Zahn came online on September 18, due to the complexities of the set design. Once all the smoke cleared, CNN had a showpiece facility for its high-profile talent and their expanding New York presence.

# Court TV's network operations center

**W**ith a surge in viewership to nearly 80 million, an aging infrastructure and equipment on the verge of obsolescence, the management at Court TV launched plans for a new 3200-square-foot digital network operations center on the 20<sup>th</sup> floor of the same Manhattan building it has occupied since 1991.

## Design Team

### Court TV

Joe Schwinghammer, VP-eng.  
A. F. Associates  
Tom Michales, pro. mgr.  
John Ciulla, sr. design eng.  
Brian Luscombe, design eng.  
Mario Patuto, automation specialist

### Sundance Digital

Robert C. Johnson, president  
Eric Harrington, dir. eng.  
Sean Pendleton, programmer  
Rick Stora, dir. broadcast ops.

### EMC Avalon

Jeffrey Esposito, mgr./proj. architect  
Deborah Farmer, proj. mgr.  
Avalon Customer Services Group  
Concadia Solutions  
Patrick Turner, sr. systems architect

## Equipment List

### Thomson Grass Valley

Profile XP servers  
M2100 MC switcher  
Trinix DV 33-256 router

### Sundance Digital

FastBreak Automation  
List Sync  
Sundance Archive Manager

### DNF 3040 controller

EMC AVALONidm software  
Sun Microsystems V880 server  
LSI Logic disk cache  
ADIC Scalar 10K robotic archive  
Sony AIT-3 tape drives

### Telestream Flip Factory

Canto Cumulus  
BARCO Hydra/Janus projection  
Chyron

Duet LEX CG  
MAX! graphics system

### Leitch Logomotion

Motorola DigiCipher II platform  
AFA equipment racks

The facility upgrade addressed both physical and technical aspects, with a server-based, highly redundant environment at the top of the network's list of requirements. The technical core of the new design would be a centralized machine room



supporting the multichannel master control room and digital asset management. Goals included improved content movement and workflow through a digital asset management system, as well as increased consistency and reliability through more technology with less human intervention. A. F. Associates, an Ascent Media company, was brought in for design guidance and overall systems implementation.

A fully redundant automation system was a necessity, and Sundance Digital's FastBreak Automation was selected to drive three Thomson Grass Valley Profile XP video servers: two PVS 1026s for play to air, and one PVS 1044 for ingesting the content. The system also is integrated with a Concadia Solutions digital asset management system and AVALONidm data storage management software controlling an ADIC Scalar 10K robotic archive and 4TB of disk cache.

FastBreak automation includes a main Air Station plus a ListSync backup station for both the East Coast and the West Coast feed. ListSync adds a level of real-time system redundancy that automatically updates the backup playlist for a seamless transfer of control. Playlist changes are reflected on both stations without manual intervention.

Sundance issues archive requests

through EMC's AVALONidm software to manage files on the disk cache and the AEIC library. Through the AVALONidm policy engine, content files not accessed after a user-defined time period are automatically deleted from the disk cache system, while all files are saved on data tape for long-term backup. This keeps the disk cache system free for new and/or more frequently used media.

Court TV also imposed discrete master control switching for the East and West Coasts. Two Thomson Grass Valley M2100s with Evertz X1202Ss for backup switching were installed. Graphic elements are achieved via two Chyron Duet LEX character generators with clip player options. Orban Optimod 6200s handle the audio processing.

An expandable Thomson Grass Valley Trinix DV 33-256 router with an Ericore control system was installed to accommodate current needs and anticipate potential requirements. Three 67-inch Barco Janus projection screens, stitched together appear as one large screen and serve as the commanding centerpiece of Court TV's master control room. Up to 90 images of any size can be shown simultaneously, and any source can display tallies, alarms and audio metering. Forecast Consoles provided all of the furniture in master control.



# Georgia Public Broadcasting

**G**eorgia Public Broadcasting (GPB) provides multiple channels of television and radio public broadcasting and a rapidly growing Internet streaming media service to educators throughout Georgia. In early 2002, GPB selected the Broadcast Solutions Group of systems contractor MCSi with SGI Professional Services to transition their infrastructure to an open digital format.

The SGI architecture needed to meet not only broadcast playout requirements, but also the common data management, shared storage and archiving infrastructure that the station envisioned for both its broadcast and non-broadcast data. GPB also wanted to build a highly reliable centralized storage environment that would support both their Internet service and broadcast operation. The result of the collaboration was an IT-based, open digital infrastructure that met the station's enterprise-level storage requirements and transformed its videotape-based broadcast workflow into a simple, full digital dataflow incorporating media management.

A Hitachi Data Systems 9980V was chosen as the central disk storage environment. It has no single point of failure and is designed to grow seamlessly to dozens of terabytes. To connect all participating departments — broadcast, IT and educational streaming media — the current mixture of platforms, including SGI IRIX, Windows, Macintosh, Linux and other Unix environments, needed to be universally supported. The 64-bit heterogeneous SGI CXFS shared filesystem for storage area networks (SAN) was implemented, which allows platforms of varying operating systems to attach to the central storage — either by network or Fibre Channel — and see that storage just as though it were local to

that desktop or workstation. GPB also selected the ADIC Scalar 10K, with LTO-2 tape media, as their nearline robotic tape library.

Due to the large number of statewide educational users with varying familiarity with the information residing in the infrastructure, media management was dictated. Masstech Group's MassStore enabled automated operations, allowing material to be easily found and maintained. The system also provides the interface for the broadcast operations, moving broadcast data between the various storage systems, including SGI Media Server for broadcast MPEG 2 video servers, Virage Solution Server, and Masstech MPEG-4 proxy server.

The station chose the SGI Media Server for broadcast for its ability to ingest and play out a variety of standards-based file formats, i.e. MPEG-2 I-frame, MPEG-2 Long GOP,

DVCPRO25/50 and IMX/D-10. The media server also supports the new MXF file exchange format, ensuring that the company can handle any of today's compressed video formats. For on-air playback of four 24-hour broadcast feeds, the servers are con-



nected directly to the central storage infrastructure through a high-speed, high-availability 2Gb Fibre Channel redundant SAN fabric.

The station's post-production facilities consist of Avid Media Composer, Symphony and Avid Xpress editing suites. They will be integrated with the centralized storage — most likely using one of the interfaces SGI has developed for the Avid environment — in the next phase of the project, now underway. A Virage media asset management system also will be integrated.

For future high-definition (HD) digital broadcasting, SGI — using its Media Server for broadcast system — developed a customized server that will allow GPB to capture both SD and HD feeds (via an DVB/ASI stream). Harris Automation will control both an SGI Origin 300 video server for HDTV service and redundant SGI Media Servers for broadcast MPEG-2 video servers to provide additional SD channels and embedded data services.

GPB began broadcasting using the MCSi and SGI-designed dataflow in mid-2003. ●

## Design Team

Georgia Public Broadcasting  
Mark G. Fehlig, PE, CPBE, DE  
Mike Nixon, dir. IT  
MCSi Broadcast Solutions Group  
Gary Hawkins, sr. eng./proj. mgr.  
Michael Wright, nat'l sales mgr.  
SGI Professional Services  
Bill Buhro, solutions architect  
Tony Karam, proj. mgr.  
Tom Kaye, principal systems eng.  
Doug Squire, account mgr.

## Equipment List

SGI  
Media Server  
Origin 300 servers  
CXFS shared filesystem  
Hitachi Data Systems 9980V storage  
Masstech Group  
MassStore storage  
Mass Proxy transcoder  
ADIC Scalar robotic tape library  
Harris automation  
Brocade 2Gb Fibre Channel switches

# AMV's Studio C

In February 2003, All Mobile Videos' (AMV) Chelsea Studios, located in the Chelsea section of New York City, needed a facility to integrate their four studios at their building on 26<sup>th</sup> St. AMV needed to feed a live interactive training seminar to the 3000-member sales force of Pfizer Pharmaceuticals located around three cities — 10 hours a day for five days. The control rooms were required to be standardized as much as possible, which meant that an upgrade to an SDI backbone was in order for Studio C. Heading the renewal project was Steve Bickman, general manager of studio operations at AMV.



One of seven AMV production studios, Studio C needed to have its own identity. The studio's control room, production and engineering suites were rebuilt from the ground up, including new architecture and furniture. The rebuild covered four rooms, including the 50'x40'x14.5' sound stage, and a remodel of the existing control room. New broadcast equipment, including two consoles and a monitor wall, also were built for the control room.

The studio was completed in less than 12 weeks — from demolition to client move in. PatchAmp Systems Integration Group (SIG) was chosen for the studio design and installation.

PatchAmp SIG provided system engineering, rack layout designs, and integration based around new and existing analog and digital processing and conversion equipment. During the renovation of the studio suites, PatchAmp SIG fabricated the cable assemblies and pre-wired most of the core equipment, including the Leitch routers and Sony production switcher



in the racks. The pre-wired system reduced the onsite labor to less than four weeks.

Considering rack space and time constraint, AMV was looking for a

new solution to the conventional integrated patching and distribution core. The company chose the PatchAmp PA-5032 patching and distribution frame, a high-density DA tray that is pre-wired to the patchbays in a single 14RU frame. The tray was both digital DAs and D-A conversion DAs for analog output.

Studio C also was designed with HD in mind. The studio offers an HD backbone with the PatchAmp distribution system for complete client flexibility. This concept offers HD upgrade without the high cost associated with SD-to-HD conversion.

Since the Pfizer production, Studio C has been the home to Chelsea Studio's Media Tour clients, as well as clients needing a high-end production facility with a user-friendly environment.

## Design Team

All Mobile Video  
 Steve Bickman, gen. mgr./studio ops.  
 Nat Tam, proj. eng.  
 PatchAmp Systems Integration Group  
 Jim Tronolone, proj. eng.  
 Marcel Stubbs, proj. mgr.

## Equipment List

Sony  
 DVS 7350 production switcher  
 20N1U multiformat SDI monitor  
 HDC950 cameras and monitors  
 PatchAmp  
 PA-5032 patch and DA  
 PA-6000-Z20 downconverter  
 Leitch  
 Integrator video router  
 VIA 32 32X32 stereo audio router  
 Soundcraft K2 audio mixer  
 McCurdy CS-9500 digital intercom  
 Vinten Quattro studio pedestals  
 Telex intercom key panels

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# CSTV

## College Sports Television

**C**ollege Sports Television (CSTV) is a brand new cable/satellite service that was launched in April 2003. Located at Chelsea Piers on Manhattan's west side, the facility is actually built on Pier 62 out over the Hudson River. With a variety of existing soundstages located in the Chelsea Piers facility, CSTV chose Stage F for its studio set and an adjacent retail store to renovate and house its production and support spaces. Built in 1910 and renovated in 1992, Pier 62 remains an active docking facility for commercial ships and is part of the 30-acre entertainment complex.

CSTV's mission is to be "the place to go for college sports." CSTV produces

eight hours of original programming per night between 4 p.m. and midnight (EST). This programming ma-

space was altered to accommodate the production control rooms, as well. CSTV is operating in a networked en-

vironment for ingest, logging, editing, playout and archive. It uses DV25 as the in-house tape format with the ability to playback all 1/2-inch tape formats.

Post-production consists of four nonlinear edit bays with room for



### Design Team

Patricia Power, CSTV vp-ops.

Jim Parkinson, broadcast sys. consultant

Janson Design Group

Francisco Tsai, proj. mgr.

Karen Singh, sr. designer

Mike Braito, const. coord.

Chelsea Piers, const. coord.

Gary Backman, Sony proj. mgr.

Dave Linick, AFA proj. mgr.

Tim Hunter, set design

### Equipment List

Sony BVP-E1 triax studio cameras

DSR-2000 DVCAM VTRs

DSDR-1000 DDRs

96x96 SDI, 64x64 video, 128x12 audio,

32x32 and 32-port RS-422 router

BVM, PVM series monitors

Vinten pedestals

Jimmy Jib

Pinnacle FX Deko II and Deko 1000

character generators

Thunder XL DDR

Telex Adam CS matrix intercom

Soundcraft Series V audio console

Sennheiser wireless microphones

Leitch terminal gear

Tektronix test and measurement

Venaca S3 archive system

TBC consoles

terial is then repeated for the following two 8-hour blocks. The control rooms are located directly adjacent to the 4,000-square-foot studio, and this area contains the production control room, audio control room, video/tape and lighting control, main equipment room and master control. Unlike the typical windowless control room environment, CSTV has taken advantage of the waterfront environment and opened up the control room and master control room for passersby to see.

Architecturally, the sound stage required alterations to make it suitable for television production. Excessive ductwork and air conditioning noise was remedied by replacing existing ductwork with larger cross sections. This reduced the air velocities, while the addition of duct silencers reduced the amount of noise generated from the actual air conditioning unit. The connecting stage doors of an adjacent sound stage were sealed off to prevent noise leakage during taping (or filming), and the inside of the stage was treated with acoustic absorption to control sound decay rates. The retail

a total of six, each with local DV25 record/playback decks and 1/2-inch J series players. In addition, four nonlinear "highlight" edit rooms are used for nightly highlight packages. The systems are networked with shared storage, and all of the rooms are connected to the facility routing switcher.

Graphics are made up of several PC and MAC-based workstations. Quantel Paintbox Q Pro, which is linked to production and post-production via gigabit Ethernet, and a wideband routing switcher also are key equipment. ●



# Toronto 1

## Craig Media's newest TV facility

**W**hen Craig Media, Canada's largest, privately owned television broadcasting company, set out to launch a brand-new television station in Toronto (Canada's largest media market), the company's design philosophy was straightforward — build a new facility from scratch using the latest available technology.

The result was a brand-new, dual-format broadcast facility that is now home to Toronto 1, Toronto's newest local television station in more than 30 years. Launched on September 19, 2003, Toronto 1 is an independent conventional television station for and about the greater Toronto area.

Airing in the Toronto area on Rogers Cable 15, in the surrounding area on Cogeco Cable 16 and nationally on satellite cable provider Bell ExpressVu 224, Toronto 1 is an exciting addition to the city's media landscape.

Toronto 1 is about "One Toronto" — the definitive expression of the city's contemporary ideals, voice and vision.

With more than 30 hours a week of locally produced programming, this new station not only will reflect the diversity of today's Toronto, it will provide a voice for local and Ontario-based producers and filmmakers.

After winning a license award for Toronto 1 back in April 2002, Craig Media conducted a careful review of manufacturers to provide the equipment for a new SD/HD facility, in

SD/HD master control, NEO and 6800+ SD/HD modular infrastructure products, and the new LogoMotion II SD/HD branding system. They also installed the Juno upconverter, Panacea routers, the dpsVelocityQ nonlinear editor and DPS-575 digital processing synchronizers.

A major challenge was the transformation of the selected location for the Toronto 1 station, an art deco-style structure built in 1942 and situated in the heart of downtown Toronto's emerging east media district. Extensive interior renovations were necessary to transform this historical building into a high-definition-ready, all digital broadcast facility. Ultimately, the fully integrated Leitch system allowed the dual-format facility to operate efficiently and effectively with the highest technical standard possible for the launch of Toronto 1.

With the addition of Toronto 1, Craig Media's broadcasting services are now available to approximately 40 percent of Canada's English-speaking population. The station has a 2003-04 program schedule featuring an array of original shows and co-productions, new network series, a blend of entertainment and variety fare, and a strong assortment of sports programs from NASCAR to Monday Night Football.



consultation with Sound Broadcast Limited (SBL), a Winnipeg-based systems integrator. SBL and Craig selected Leitch Technology as the primary equipment manufacturer. SBL and Craig have enjoyed a long, successful relationship with Leitch, stemming back to the debut of Craig's original broadcast services, including the launch of MTV Canada in 2001.

Craig built a fully integrated system for its new SD/HD facility using a variety of Leitch products that process content entirely in the MPEG domain, as well as flexible platforms that allow for a gradual transition from standard to high definition. Craig installed Leitch multiformat servers, Opus

### Design Team

Paul East, SBL  
Drew Craig, Craig Media  
Don Bezenar, Leitch

### Equipment List

Leitch multiformat servers  
Opus SD/HD master control  
NEO and 6800+ modular infrastructure products  
LogoMotion II SD/HD brand system  
Juno upconverter  
Panacea routers  
DPS VelocityQ nonlinear editor  
DPS-575 digital processing synchronizers

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# (SWR) Südwestrundfunk

**S**üdwestrundfunk (SWR), or Southwestern Broadcasting, is one of the first German public broadcasting stations. SWR serves more than 14 million viewers from three broadcast sites in the cities of Mainz, Baden-Baden and Stuttgart. Their current studio is approximately 15 years old, so SWR recently built a completely new studio and implemented a tapeless digital newsroom. This newsroom will allow the 50-person news team in Mainz to streamline its operations for distributed news production and play to air.

For Mainz, the station chose a solution designed by SGI Professional Services, which also served as systems integrator. The solution, based around SGI's data-centric broadcast technology, relies on the Media Server for broadcast systems (configured for DVCPRO25), as well as the Origin 300 server and the TP9400 storage system. Pinnacle Systems Liquid Blue nonlinear editors (NLEs), Dalet newsroom computer system, SGT Media Manager, SGT DBOS newsroom automation system, and MPEG-1 video browser/editor also were valuable pieces of equipment in carrying out the solution. Rather than serving strictly as a means of transporting a video signal, the new digital infrastructure enables the company to enhance its workflow and create efficiencies by allowing users to edit and browse material while it is being ingested, as well as by allowing easy reuse of the news story texts and video clips on the station's Internet Web site.

The new tapeless digital newsroom is based on IT technologies and centered on networking for computers and

storage. It uses a switched Gigabit Ethernet backbone linked to a central content store, to provide users and sys-



tems with the ability to automatically access content through efficient distribution systems. The network also provides the link from the newsroom to the balance of the facility's legacy pro-

duction, planning and archive systems. For feed and tape ingestions, an SGI

Media Server for broadcast systems is configured with eight ports (four for ingest, two for backup playout, one for low-resolution encoding and one for content review). Coupled with 44 hours of protected RAID-3 storage, the SGI Media Server uses a protected file system for high reliability. Operators schedule ingest from their workstations, and two versions of clips are created.

Low-resolution clips can be browsed and pre-edited using SGT Media Manager software on any of the 50 PC-based Dalet OpenMedia station clients. All files ingested are referenced in SGT's media asset management database and are updated via a MOS protocol gateway to the Dalet OpenMedia newsroom computer system.

High-resolution files are simultaneously transferred from the SGI ingest server to the Origin 300-based central content server, where all content is stored during the news process. It's equipped with 100 hours of the high-performance TP9400 RAID storage system, which also allows it to act as the network-attached-storage server for five high-resolution Pinnacle Liquid Blue NLEs. The NLEs have direct access to the complete central content store via the high-speed network.

SGT DBOS news automation is designed with a modular distributed architecture that allows for flexibility and future expansion, handles the news automation duties. The Media Server systems support Multi-unit Video Control Protocol, a telnet-based protocol that uses the Ethernet network. The DBOS system communicates with the OpenMedia system using MOS protocol.

SWR went on air in February 2003 and reports the facility is experiencing greater flexibility, faster time to air and smoother news operations. ●

## Design Team

### SWR

Gerhard Gaa, proj. mgr.  
Holger Kortüm, journalist  
Rupert König, prod. eng.  
Service and Projects  
Rolf Allard, Udo Fettig, Hans-Jürgen  
Grumbach, eng.

### SGI

Stephan Kappel, mgr.  
Pierre Montagne, Dirk Müller,  
Helmut Scherer and Cenk Seven,  
solution architects  
Sebastian Brings, systems eng.

## Equipment List

### SGI

Media Server with RAID-3  
Origin 300 server with SGI TP9400  
Dalet OpenMedia newsroom system  
SGT

Media Manager/ DBOS news  
automation  
Pinnacle Systems Liquid Blue NLEs



# Ohio News Network's News Wheel



**T**he Dispatch Broadcast Group's Ohio News Network (ONN) selected Crispin to provide a cost-effective solution in automating its state-wide 24-hour news channel. The legacy system required a half-hour show to be edited to tape and then replayed. The first block was reserved for the top stories. Graphics were pre-produced on the tape masters. Breaking news was manually inserted over the taped shows through a master control operator. Commercial breaks were scheduled to occur through the legacy master control automation system.

Prior to the onset of this project, the master control equipment for ONN was relocated to a new control room, consolidating master control facilities for ONN and WBNS. The project was envisioned to use existing equipment and facilities to the greatest extent possible.

The general design goal was to provide complete control over the on-air programming via the AP/ENPS newsroom system. The system needed to be capable of executing multiple active rundowns as driven by producers through ENPS. Playback of stories would originate from GVG Profiles with embedded graphics scheduled in the rundown. The graphics would originate live from a Pinnacle FX Deko II. While automated, the system would still need to support the ability for live

news and weather cut-ins. Additionally, the system would need to provide support for commercial breaks.

The Crispin News Rundown Manager also needed to support multiple active rundowns. This feature created a requirement for the FX Deko to stay synchronized with all the active rundowns. To accommodate, Crispin created another function to parse the CG events from each story created from the built-in ENPS CG editor. Crispin then provided device control of the FX Deko based on the CG objects. This had the added benefit of no longer requiring additional hardware and software to connect the FX Deko to

MOS. Leveraging existing live production components, the only new equipment required was a Videotek RS12A switcher, the Pinnacle FX Deko II and the Crispin automation system.

Live news cut-ins were accomplished by creating an ENPS object that causes automation to switch to the studio output. The director then triggers out of the live news cut-in to continue to the next news wheel element. Commercial breaks have a similar object that causes automation to trigger the master control automation to roll the break. At the end of the break, the master control automation triggers the first news wheel element of the following segment.

On schedule and on budget, the automated news wheel system was transitioned to air on September 8, 2003. With minimal investment, the existing news wheel process was automated to a more efficient operation. The entire news playback process is now driven by the ENPS newsroom system as entered by producers. Changes in show format and content order is completely controlled by ENPS and reflected immediately in the Crispin Payout control.

This approach provides broadcasters with existing news productions and the ability to add a 24-hour news channel with little investment.

## Design Team

The Dispatch Broadcast Group  
Jason Pfeister, dir. new media  
Ken Eyerman, asst. chf. eng.  
Vince Jones, ops. mgr.  
AP/ENPS  
Larry Tawes, systems eng.  
Crispin  
Mark Hunt, special proj. mgr.  
Jim Zagrabelny, software dev. mgr.  
Will Owen, software eng.

## Equipment List

Crispin Rapid Play X  
Crispin News Rundown Manager  
Thomson Grass Valley Profile and Vibrant  
Videotek RS12A switcher  
Pinnacle FX Deko II



# Time Warner Oceanic Cable Systems



Oceanic Time Warner Cable deployed a Scientific-Atlanta Prisma DT digital transport system to provide a variety of interconnect services for its cable TV and cable modem customers on the islands of Oahu, Maui and Hawaii. A fourth segment of the system is currently being installed on Kauai. In addition to serving cable customers, the network also will provide high-speed data services for government and education agencies in Hawaii.

The flexible Scientific-Atlanta transport system will be used to deliver five major applications for Oceanic on the four islands via an undersea fiber-optic cable network that is believed to be the longest fiber link ever supported by Scientific-Atlanta. Fully redundant links on each island will help to protect the network in the case of a fiber cut. The applications are:

- *Video on demand* — At the master headend in Mililani on Oahu, library servers are used to store all VOD content. Rather than replicating the effort of downloading the same content at a master site on each island, the central master site on Mililani downloads content updates to remote servers that are located close to customers on each island. Oceanic is using a variety of Scientific-Atlanta Explorer set-top models to support its VOD application.

- *High-speed residential cable modem service* — All of Oceanic's residential cable modem traffic is being transported among the islands to the system's master headend in Mililani for connection to the Internet.

- *Off-air broadcast channels* — On each island, local off-air broadcast content is captured at the broadcasters' studios and transported to the Prisma DT network using the Prisma DTx service adapter. Then, the programming from all the broadcasters is included in the cable lineup for viewing on the four islands. This allows cable customers on one island to view programs that are broadcast on the other islands in pristine quality, expanding their viewing options.

- *High-speed data service for government* — Several government agencies and the Department of Education have interconnected existing networks on the three islands over OC3 and OC48 rings. The flexibility of the Scientific-Atlanta transport system and its OC3 cards has allowed Oceanic to deliver a high-speed data link for the agencies and schools.

- *Content delivery* — The Prisma DT system's delivery capabilities let Oceanic downlink the programming for its entire cable lineup at Mililani, create the complete cable package for all consumers, and use ASI to transport it on the Prisma DT system for delivery to customers. Using a Prisma DT ASI card at the master headend at the single reception site has proven to be both efficient and cost-effective. This eliminates the costly process of receiving, processing and multiplexing feeds to create identical cable channel programming lineups on each island.

Installation, integration and support services for the Oceanic network on Oahu, Maui, and Hawaii were provided by SciCare Broadband Services, Scientific-Atlanta's integration and professional services arm that provides the technical resources to help customers meet their business and technical needs. SciCare is currently supporting the Kauai installation. ●

## Design Team

Ausvin Intakanok, app. eng.  
Wes Berkey, sr. app. eng.  
Giorgio Bombelli, sys. eng.  
Ron Cartwright, transport  
ntwrk. sales eng.  
Kevin Sweeney, principal eng.  
Jeff Powell, staff eng.

## Equipment List

Master headend  
Scientific-Atlanta  
Explorer set-top models  
Prisma DT network  
Prisma DTx service adapter  
Prisma DT ASI card  
VOD servers



# WNED-TV

## incorporates Thales' MSDC-IOT



**W**hen WNED-TV, a PBS-affiliated station located in Buffalo, NY, made the decision to go digital, it wanted a reliable transmitter that was economical and upgradeable, to meet future power maximization plans.

After assessing many transmitter solutions, WNED bought the Thales MSDC-IOT transmitter to fulfill its FCC obligations. After analyzing Thales' DCX Paragon transmitter, it seemed like the perfect fit for WNED.

WNED was attracted to the significant power and cost savings the DCX Paragon would provide for the station. The transmitter was designed with cost of ownership in mind, with a beam efficiency of up to 60 percent. Since the DCX Paragon's installation in May 2003, it has provided WNED with significant financial savings.

With the purchase and installation of a new transmitter plant, there was a lot to consider, especially with the emerging MSDC IOT technology. Some of the key features offered by Thales made the decision process an easy one. One key feature is Thales' Soft Arc Technology (SAT). SAT eliminates the need for a crowbar circuit for IOT high-voltage protection. SAT has proven to be a failsafe and reliable system, passing the manufacturer's "wire test" requirement for IOT protection.

The DCX Paragon transmitter also incorporates an oil-cooled primary cooling loop inside the HPA cabinet with a liquid-to-liquid heat exchanger. Oil cooling for the MSDC IOT simplifies both the design and maintenance along with increasing the overall reliability. The liquid-to-liquid heat exchanger system allows WNED to use a standard water/glycol system external to the cabinet for

the remainder of the system, including RF loads. These features are two examples of many. It is the overall efficiency of the DCX Paragon that makes it the correct choice for an ultra-efficient, extremely reliable DTV transmitter plant incorporating the latest technologies.

In parallel with installing the DCX Paragon DTV transmitter, WNED also had Thales install an IOX analog transmitter system. WNED selected turnkey installation of services from Thales, and the entire process was extremely smooth. WNED was able to work with Thales to schedule a timely installation throughout its busy digital transition schedule.

WNED is planning to upgrade its 155kW ERP DCX Paragon to 950kW ERP in the future. Because the DCX Paragon's installation was planned to be upgradeable, any future goals for the station will be integrated easily. ●

### Design Team

Thales Broadcast & Multimedia

Tom Stone, program mgr.

Mark Grochowski, sr. rf sys. eng.

Rodney Cole, assoc. systems eng.

WNED

Jonathan Herrington, VP-eng./tech.

Ray Felckowski, mgr. trans./rf system

Radian Communication Services

Greg Gastarre, rf install. spec alist

### Equipment List

Thales DCX Paragon transmitter

ADAPT 8-VSB exciter

L3 (CEA) MSDC-IOT

IOX analog transmitter

E2V D2130 IOTs

Tektronix RFA 300 measurement set

Sencore IRD 3384 receiver/decoder

Leader LV5152DA HD monitor

Wohler ATSC-3 5.1 ch. audio monitor

Barco HDM5049 HD monitor

Dielectric NTSC/DTV combiner

DeltaStar TUC-05-16 / 80H-R panel

antenna

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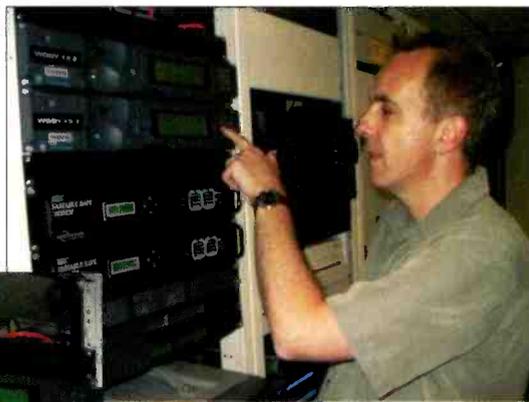
# WGBH-TV

## microwave system upgrade

**W**GBH-TV maintains a full-duplex 7GHz inter-city microwave link between WGBH in Boston and its sister station WGBY-TV in Springfield, MA, 100 miles away. The link is used for program exchange and also handles network traffic like e-mail and Web access for WGBY. In 2001, these 30-year-old systems needed to be upgraded with the latest state-of-the-art equipment, capable of handling at least DS-3 rates. A digital upgrade was run on the existing microwave link because the link was already in full service with towers, dishes, RF plumbing, shelter space, etc. There would be a one-time-only cost to purchase and install the new equipment.

The Microwave Radio Communications (MRC) proposal met all the criteria set by WGBH and WGBY. The proposal specified variable-rate modems (VRM) at each end as the baseband interface and at each repeater site to re-clock the data. These modems met the bandwidth and interface requirements the station was looking for. The MRC 2RU modem chassis has four card slots for a variety of interfaces and uses quadrature amplitude modulation

(QAM) of the IF carrier. The units installed in the system have two ASI interface modules and one T1 module, leaving one spare slot. One ASI interface is used to transport a multiplex of two MPEG pro-



and performance on the old link. MRC helped develop a link budget and, based on the numbers, suggested 16 QAM as the level to ensure acceptable performance during worst-case conditions. The maximum bit rate on the link is 60Mb/s with the 16 QAM modulation spread over three IF channels in the variable rate modem.

The upgrade took three days of replacing radios and installing modems. After installing the new equipment at all of the repeater sites, the studio ends were turned on. With a few configuration modifications in the modems and encoders, staff were seeing pictures and network data was moving. Over the past nine months, the link has been reliable except for a modem ASI jitter issue early on, which MRC has resolved.

It is likely in the near future WGBH will be adding more services on this link, including both real-time and non-real-time video transfer. ●

### Design Team

MRC

Sal Blatti, systems eng.

WGBH

Steve Harrington, dir. eng.

Michael Foti, systems eng. mgr.

Dave St. Onge, R-F systems mgr.

WGBY

Ray Miller, chf. eng.

### Equipment List

MRC

DAR radios

Variable rate modems

TANDBERG

E5720 MPEG encoders

TT1260 MPEG decoders

gram streams, each encoded at 12Mb/s. The T1 interface links the WGBH and WGBY networks.

Two Tandberg E5720 encoders and two TT1260 decoders are installed at both the WGBH and WGBY master controls, making it possible to send two program streams in each direction simultaneously. Each of the three repeater sites is configured with a modem pair for eastbound traffic and a pair for westbound traffic. A pair of modems is connected to the back. The ASI and T1 interfaces on the receive modem feed the inputs on the transmit modem to re-clock and regenerate the data, and to make it possible to breakout the ASI for troubleshooting. One challenge faced was the trade-off between bit rate and the robustness of the link. The station already had a handle on fade margins

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# WPSX-DT

## Distributed Transmission (DTx)

**W**PSX-TV is a non-commercial station owned by Pennsylvania State University, serving central Pennsylvania on analog VHF channel 3. WPSX-DT was assigned UHF channel 15 for its DTV signal. The station's city of license is Clearfield, PA, which is separated by mountains from the three major population centers of Altoona, State College and Johnstown, all of which are important to the station's success.

While the propagation characteristics of low band VHF allowed the analog channel to carry over the hills, this challenging terrain promised to block the UHF digital signal from reaching key viewing areas. Additionally, the station's over-the-air signal serves most of the population to the north of Clearfield, as there is little cable penetration in this rural area.

To meet the challenging service demands, the station selected a new technology called Distributed Transmission (DTx) working with their consulting engineer Merrill Weiss. The possibility of relocating the main transmitter to a location that would better serve the three population centers was considered, but no location exists that would allow service to all of the desired areas. Also, any move would have significantly impacted the



coverage of the northern region. DTx promised to allow the station to deploy multiple transmitters throughout the region to target all of the desired population centers, and to operate them all on the same channel. The key to DTx is that the signals from all transmitters in the network are identical. This allows interference received from any one transmitter's signal to the desired signal from another to be treated as multipath. This, in combination with its ability to control the timing of the multiple signals, allows a well-designed distributed transmitter network (DTxN) to take advantage of the equalizers built into every DTV receiver to maximize coverage and minimize interference.

Axcera developed a custom system consisting of a 30kW Innovator DT solid-state transmitter for Clearfield and three medium-power transmitters serving State College, Altoona and Johnstown, plus a distributed transmission adapter called the DTXA2B. The station then applied



for an experimental license and placed the order with Axcera.

Axcera delivered as promised, and the system has met the station's goals. In addition to bringing DTV to areas that would otherwise be underserved, the system is currently being used for testing to help promote the DTx standard, which is currently a Candidate Standard at the ATSC.

### Design Team

#### WPSX-TV

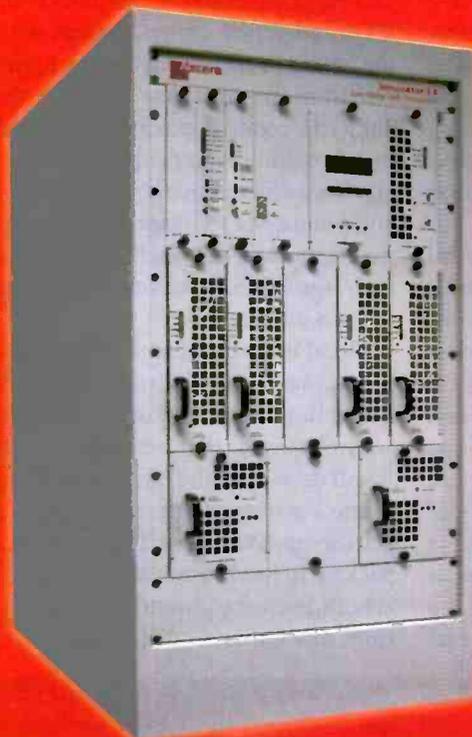
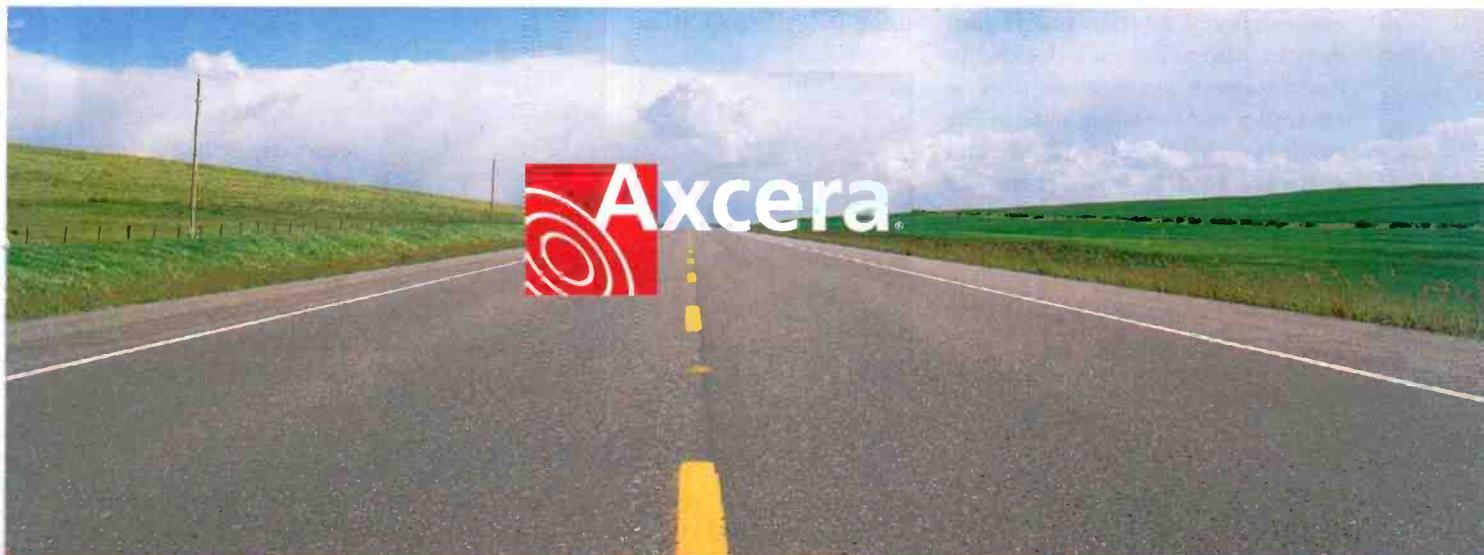
Carl Fisher, CE  
Tom Wonderling, asst. CE  
Duane Champion, IT dir.  
George Thurman, tech. dir.  
Kate Domico, tech. dir.  
Merrill Weiss, consultant

#### Axcera

Dan Dickey, VP, eng.  
Bob Welch, sr. mgr., tech. support  
Dave Hershberger, principal eng.  
Lance Dolfi, field service eng.



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# WLVT

## PBS 39

**W**hen WLVT was starting our DTV migration in the year 2000, it needed an automation system that could handle multicast programming and an ever-growing record schedule. WLVT came upon MicroFirst and were intrigued by its prior experience in building microcontrollers that it used as port expanders and interfaces to various devices. MicroFirst then decided to build its own automation process controller and operating system. The result is a package of hardware and software that is built from the ground up for real-time, mission-critical operation.

The MicroFirst Digital Automation System or D.A.S. with its real-time

operating system will boot in under 10 seconds and start running any schedules that are loaded. The operating controls are a suite of programs that run on Windows 2000 or XP workstations and connect over the Ethernet network using TCP/IP. Application



every day. If the DAS does not find a schedule for a certain date, it determines if a default schedule is established. If it finds one, then that is run. This way, a schedule only needs to be created for the days that some of the network programming is preempted.

### Design Team:

Bill Ziegler, chief tech. officer  
 Paul Keller, asst. CTO  
 John Scarpa, CEO MicroFirst  
 John Beneat, CTO MicroFirst  
 George Teplansky, dir. bus. dev.

### Equipment List:

6 DSR-4000 IRDs  
 7 Panasonic AJ-D960 DVCPro 50 VCRs  
 2 Sony BVW-75 Betacam VCRs  
 1 Sony DVR-10 D2 VCR via VCR Expander  
 2 Sony BVU-950 UMatric vcrs via VCR Expander  
 4 Pinnacle MediaStream decoders  
 2 Pinnacle MediaStream encoders  
 1 Thomson Jupiter Router controller  
 1 LTC clock  
 1 Sony SVO-5800 S-VHS VCR via VCR Expander  
 1 Panasonic AG-6500 VHS VCR via GPI VCR Expander  
 4 Panasonic AG-6300 VHS VCRs via GPI VCR Expander  
 1 Leitch DPS-575 logo key via GPI  
 3 Miranda Oxtel ImageStores  
 1 NVision router controller  
 1 Leitch AgileVision.

functions include: schedule import/export, editing and event monitoring with alarming and manual override; machine control for manual device control, server ingest and clip trimming; media database management; resource configuration; and a log viewer that can be filtered by any number of parameters. Up to 10 workstations can connect to an automation processor at the same time.

All resources are available to all schedules. There is no need to restrict a device to a particular function. WLVT normally runs three schedules: analog, digital and record. The record schedule is used for incoming and outgoing network feeds. Schedules can be built arbitrarily far in advance and still edited at the last second. A feature that is particularly useful is branding one of the DTV services as the default schedule. This service is a network feed that is the same format

The Machine Control Program is used for manual control of devices. Its GUI makes for an intuitive operation. The server dubbing screen docks the VTR and server control panels with the ability to enter a cue point or grab one from the tape. One feature is the ability to create duplicate clips based on an existing server clip. A duplicate clip has a different name and start and end points. WLVT records multi-segment shows off the satellite, and then each segment is broken out of that one file as a duplicate clip.

MicroFirst worked well for WLVT's needs. Many of the features came from suggestions from the users. Need to control a device that is not on the list? It will develop it and either download it into a system or refer a Web page to get the updates from. The result is a package of hardware and software that is built from the ground up for a real-time, mission-critical operation. ●

# WTTW-TV

## public television programming

**W**TTW-TV has been providing Chicago and its surrounding metropolitan area with locally and nationally produced public television programming for many years. In 1965, a studio facility was constructed on the north side of the city. The WTTW analog master control and associated tape room facility from the 1960s had undergone several rebuilds prompting the query whether to refurbish again or start anew. WTTW re-purposed the old facility for other operations and decided to build a new broadcast facility.

Working with both architectural and interior design firms, a new space was created for a highly functional work environment.

In April 2002, WTTW-DT started broadcasting from the Sears Tower using a combination of upconverted analog WTTW programming, plus high-definition content, both locally produced



program converts record lists generated by the Myers Information Systems ProTrack traffic system and prepares them for automatic recording. Three Sundance prep stations allow for program evaluation and preparation for air as well as a place to examine database information. Sundance SIDON controllers provide RS-422 control to most of the broadcast devices in the system. The Sundance Air Station gets a playlist from ProTrack and provides direct control of a server decoder for playout. The Air Station issues commands to the router, switcher and ancillary equipment through SIDON.

WTTW uses a Sundance ListSync computer to parallel their main Air Station for redundancy. The SalesView program allows individuals not directly connected to the Sundance network infrastructure to query the content database, as well as call-up individual items to stream over an internal house network. In WTTW's case, they directly control a server decoder wired to an RF modulator. The DBOC is centered on Thomson Trinx and Venus routing switchers controlled by the Thomson Jupiter control system. A Thomson Venue AES audio router and four Saturn Master Control switchers are controlled by the Sundance Digital FastBreak automation system. ●

### Design Team

#### WTTW

Jerry Hanna, VP-eng.  
 Fred Engel, dir. eng. ops.  
 Robert Bruner, sr. eng. elect.  
 Michael Tompany, const. EIC  
 Dennis Raymond, sr. eng. ops.  
 John Oppy, elect. main. tech.  
 Shaw Saepoung, elect. main. tech.  
 Alan Skierkiewicz, elect. main. tech.  
 Ted Szubza, elect. main. tech.  
 Robert Wratschko, elect. main. tech.

#### Sundance Digital

Robert C. Johnson, pres.  
 Annie Billings, field eng.  
 Rick Stora, dir. broadcast ops.  
 Eric Harrington, dir. eng.  
 Harol Lutz and Associates, architect  
 Studio Designs Group, interior desgr.  
 Roscor, primary vendor

### Equipment List

SeaChange International Broadcast Media Cluster  
 Sencore Stream server  
 Thomson Trinx video router  
 Venus audio router  
 Jupiter control system  
 Saturn master control switcher  
 360 Systems Digicart II  
 Miranda K2 monitors  
 Sundance Digital FastBreak auto. sys.

and from PBS. WTTW decided to use its employees in the electronic maintenance and design group and built the facility without the help of a systems integrator. Engineering managers researched equipment, tactics and budgets and developed an overall system design while vendors selected equipment and furnished implementation ideas.

WTTW chose the SeaChange Broadcast Media Cluster because its 5-node server provides more than 1800 hours of SD program storage at 12 MB/s. It also has 11 encoders and 15 decoders allowing for multiple channel playout. With the advent of digital multichannel capability, WTTW had to decide how to cost-effectively get multiple channel streams on the air. Sundance Digital's FastBreak Automation system was chosen as the automation vendor because its system provides a user-friendly GUI, traffic and record log conversion capability, and flexible database management.

Several programs make up Sundance Digital's FastBreak Automation system: The Sundance Intelli-Sat

# KLRU-TV

## Multichannel DTV Project

**K**LRU-TV concluded its planning in late 2002 for a phased transition to a multichannel DTV operation. KLRU has become an adopter of what evolved to be the classic model of a large-market PBS multichannel DTV operation.

KLRU wanted to install an all-digital production environment solely in pre-existing rack space, and to do the work without interruption of its current station backbone. The system also needed to enhance and introduce functionality in a variety of ways, while balancing and maximizing future workflow. Along with the ability to multicast and to broadcast in HD formats, KLRU's primary project design goals included increasing from



two to four channels under automation control (two NTSC, two DTV), with the option of increasing in the future as DTV needs change and adding the ability to store and trim NTSC, SDI, HD-SDI, and ASI files on a server. Increasing server I/O capability and adding automated file transfers between traffic and automation, as well as an interface to the DTV MPEG-2

multiplexer system for smooth dayparting reconfigurations was also important. Implementing transparent file transfer from the traffic system and an interface to the DTV MPEG-2 multiplexer for smooth dayparting reconfigurations also was necessary. After an extensive review process, KLRU selected SignaSys in early 2003 to provide overall project management, transition planning, system en-

gineering, technology integration, system installation, and testing services. SignaSys delivered a plant-wide automation system, as well as comprehensive integrated ATSC encoding and transmission server systems. Director of engineering David Kuipers decided on SignaSys after he visited the Multi-Channel Broadcast Alliance (MBA) lab in its San Jose, CA. headquarters. The MBA Lab demonstrated multiple software interfaces to control, monitor and day-part multiple channels. This system emulated a complete



master control operation, thereby KLRU could evaluate its DTV system architecture needs before spending money on technology.

At times, a project's accomplishments are emphasized by overcoming unforeseen crises. KLRU and SignaSys faced an obstacle partway through the project: The initially chosen automation manufacturer discontinued its

product and downsized its operation to "support-only" mode. As the centerpiece of the new DTV facility and the core enabler of efficient workflow, this development could have turned the project into a disaster for SignaSys and become a long-term burden for KLRU. SignaSys promptly identified Crispin's System 2000 as the replacement for KLRU's distinct automation requirements within the project

schedule and the budget constraints.

SignaSys completed KLRU's transition in early October 2003. KLRU's DTV facility now has an integrated 4 SD + 1 HD encoder and mux system,

an automation system with a traffic interface, a dynamic PSIP, 'glass cockpit' MCR monitoring, closed captioning, and last of all, DTV EAS capabilities.

KLRU is located in Austin, TX. Broadcasting for more than 40 years, KLRU continues to be a leader in providing public television programming, community services, and public events. ●

*Studio photo courtesy of Scott Newton at Austin City Limits.*

### Design Team

#### SignaSys

David Lingenfelter, prog. mgr.  
Stan Becker, sr. systems architect  
Jim Bostrom, sr. systems eng.  
Don Fox, installation group mgr.  
John Denito, lead install. tech.

#### KLRU-TV

David Kuipers, dir. eng.  
Brad Wilkinson, proj. consult.

### Equipment List

AVP Digital Audio/Video Jackfields  
Crispin System 2000 automation  
Evertz HDTV logo inserter, HDTV caption encoder, multiformat HD test signal generator  
Miranda virtual monitor wall  
Omneon mediaserver 2101  
Sencore ATSC receiver/decoders  
Tandberg Television 5821 HD and 5710 SD encoders  
5000 Mux transport stream  
Tektronix Test & QC  
Teranex Volare 210 upconverter  
Triveni Digital ATSC PSIP  
ProTrack interface module

# Cumulus Media-Nashville

**A**tanta-based Cumulus Media owns high-quality FM and AM radio stations in 56 U.S. markets and the Caribbean. This number increased to 272 recently, following the acquisition of Nashville, TN-based WSM-FM and WWTN-FM, marking the fourth and fifth company-owned stations in that city alone.

With five stations broadcasting from two different facilities within the city limits, it was time to consolidate all operations under one roof. The media company already owned a two-story building in Nashville, so location was not a problem. Both floors were gutted to accommodate the remodeling required to add WSM-FM and WWTN-FM to existing stations WRQQ-FM, WQQK-FM and WNPL-FM.

The first floor was renovated for administration, business and sales. The second floor was rebuilt to house the studios and relevant personnel. The heating and air-conditioning systems were obsolete and needed to be replaced, and the entire electrical system was inadequate and required new lines to be installed. The ultimate design emerged following a tremendous amount of thought, planning and consultations with program directors and air staff.

Attention to detail was a priority. Each piece of furniture was designed to fit each room. Where people would sit and where TV monitors would go was taken into consideration. An acoustical consulting firm was hired to offer advice on achieving maximum efficiency in each room's noise rating.

Breaking with tradition, Cumulus built clusters, or "pods," instead of linear rows of studios. Each air studio is

grouped with its program director's office. Keeping each station's personnel together helped preserve its individual personality, and placing the program director in the cluster keeps him close to his people and the heart of the broadcast.

Another significant feature of the facility is a glass-enclosed live performance studio with its own separate control room. Designed and built



around the specific needs of live acts, the room will serve a

dual purpose as both a radio and TV studio. The company consulted with engineers from Country Music Television (CMT) and the Grand Ole Opry to be sure the studio incorporated enough functionality to accommodate acts both large and small, both radio and television. A daily morning television program, complete with graphics, will originate from the fully featured studio.

Once the architectural plans were

nailed down, it was time for technical considerations. The media group has enjoyed a long-standing relationship with Wheatstone, so it was an easy decision to go with Wheatstone's work-surface technology again. The entire facility is being built digital, from the CDs to the transmitter, with source gear

as the only possible exception. The media company chose Wheatstone's new digital, modular D-9TV console to process audio on the television side of the operation,

and a G-5 for the radio end. The entire infrastructure is based around a digital audio BRIDGE network router — a dual domain routing system that is expandable via fiber optic links to multiple router cages. The company designed its Houston, TX, and Eugene, OR, facilities around the BRIDGE system as well.

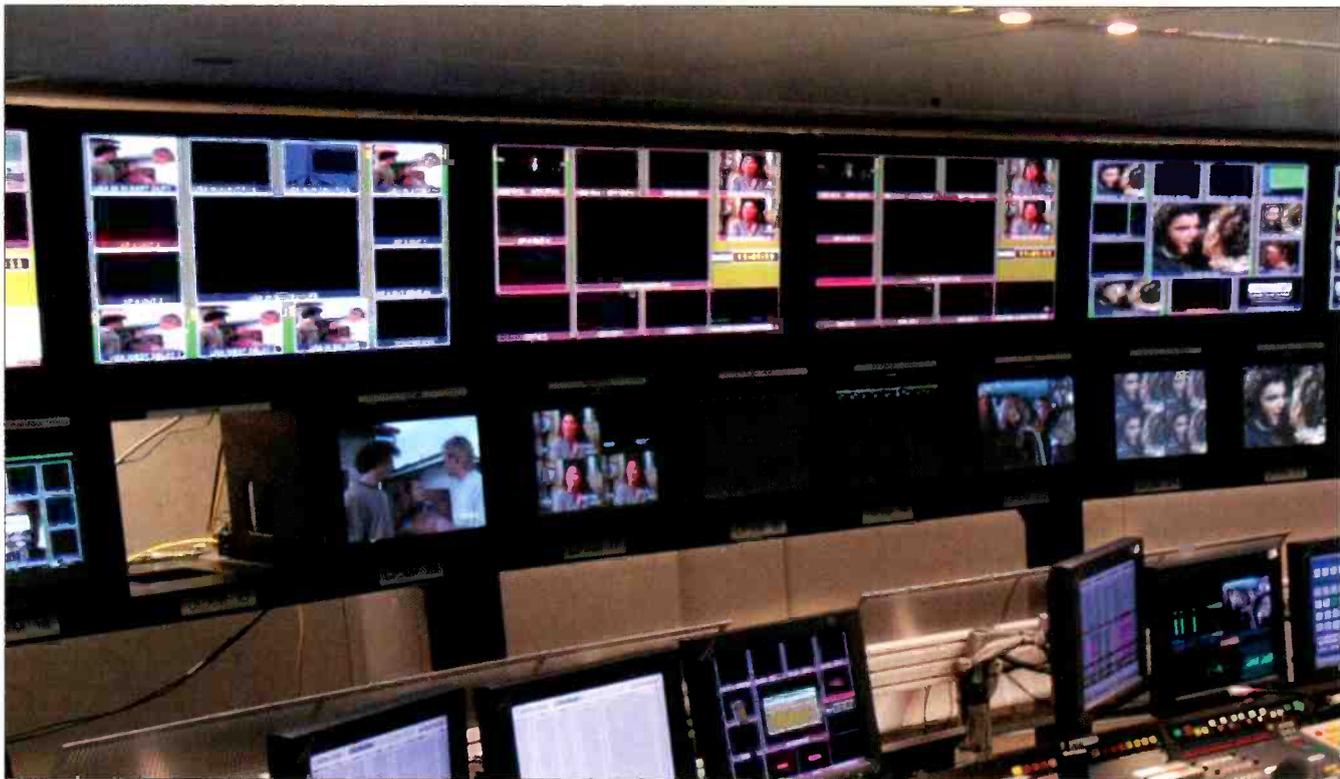
A great deal of equipment, furniture and functionality had to be packed into the five-station, 19,000-square-foot facility. The compact D-9 capitalizes on work-surface area. Its configuration includes multiple outputs, surround sound options, subgroups, DCM masters, monitor functions and communication circuits, as well as a wealth of operational functions.

With a low profile, through-counter design, the G-5's compatibility with the BRIDGE router digital audio network system will allow all studio control surfaces to access a common pool of shared signal sources. The media company chose fiber-optics over cable for digital links from each studio to the rack room. These single-run digital links saved enormously on wiring costs.

Completion of the five-station complex is scheduled for February 2004. ●

## Equipment List

Scott Studios automation  
Wheatstone  
D-9 TV digital television console  
G-5 digital audio radio console  
BRIDGE digital audio network router  
European Cabinetry furniture



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www.addenda.com

**Adrienne Electronics**  
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www.adrielec.com

**Adtec Digital**  
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www.adteccinc.com

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Equipment (ATEC)**  
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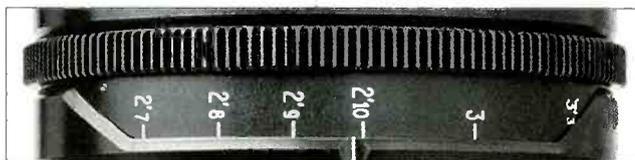
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**Universal Television's network origination center.**  
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[www.astro-systems.com](http://www.astro-systems.com)

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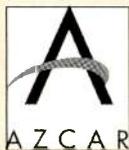
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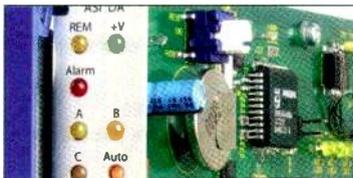
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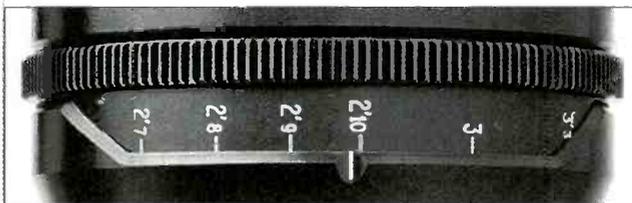
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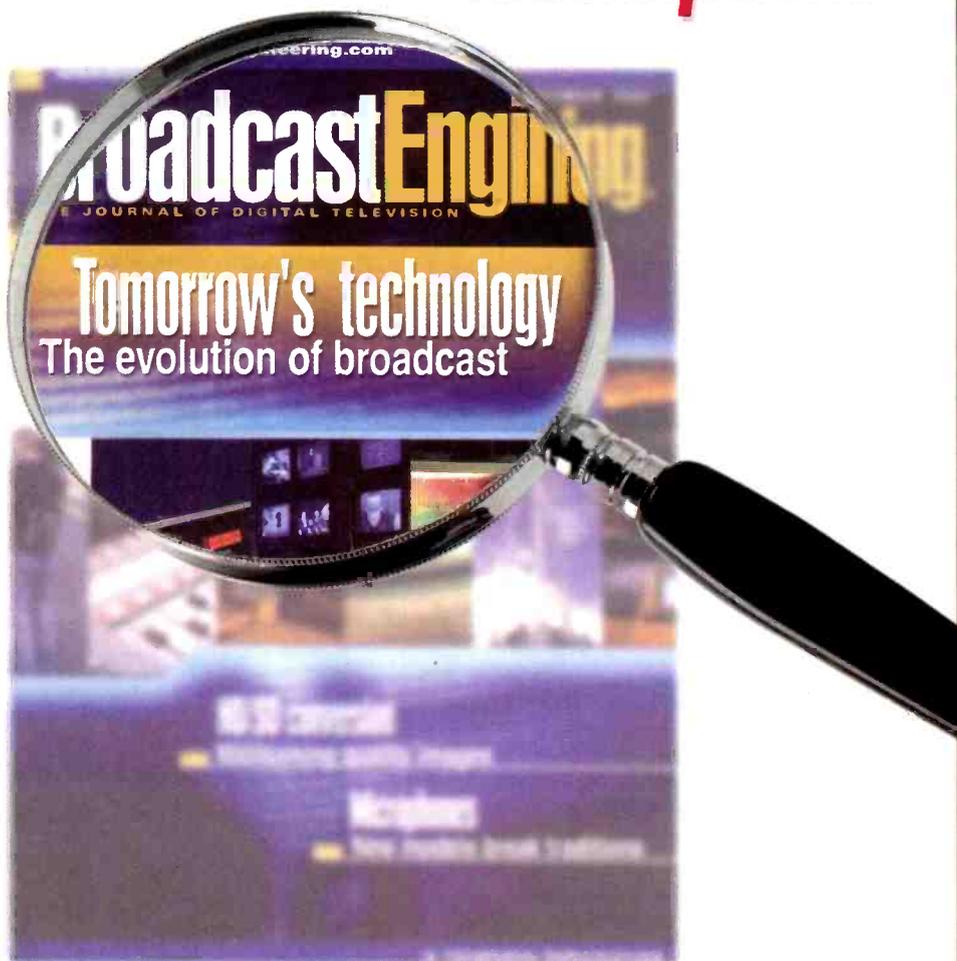
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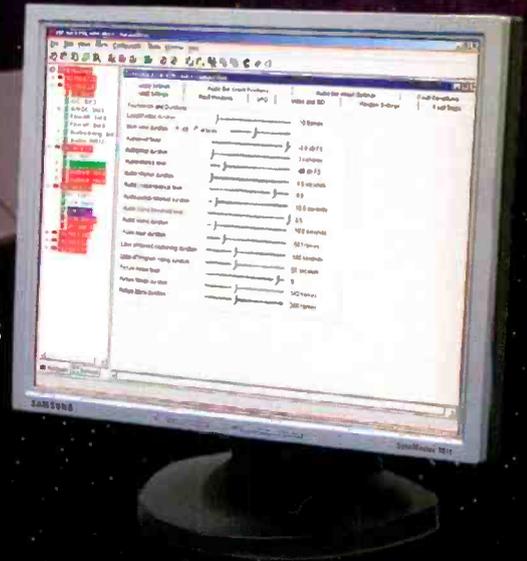
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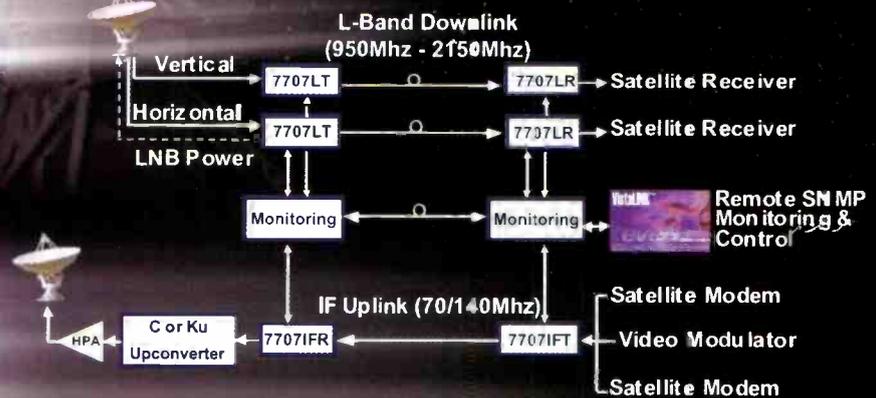
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