INTERNATIONAL EDITION

VOL 13 NO 4, APRIL 1995

TV TECHNOLOGY

CORPORATE AND CABLE INDUSTRIES

PRODUCTION, POST PRODUCTION,

SERVING THE BROADCAST,

IN THIS ISSUE

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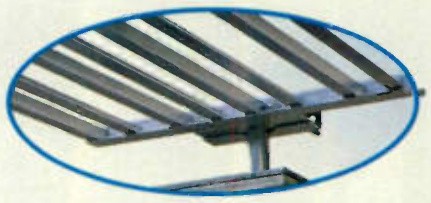
by Mark Hallinger



Teko Telecom Clearing a Path 27
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Buyers Guide

Wire Services Offering Video Feeds

by Arthur Cole

WASHINGTON, D.C.

Faced with a growing worldwide demand for television news footage, traditional print-based wire services are launching video components to their newsgathering operations.

Leading the pack are Reuters and the Associated Press, both of which now offer satellite-based news feeds to broadcast operations around the world from headquarters in London.

Reuters — which was founded in the 19th Century using carrier pigeons to deliver news of the British financial markets — recently opened its U.S. headquarters here in Washington, complete with five edit suites, four of which are Beta SP, and a 113-meter production studio. The facility serves North and South America with news feeds, and also acts as a hub for services such as video conferencing and post production.

"Our intention is to have one-stop shopping for broadcasters," said Paul Eedle, senior vice president and editor for the Americas.

Reuter's premiere offering is its 24-hour World News Service, which provides a continuous video feed of breaking events from its 1,200 journalists in 120 bureaus around the world. Unlike traditional satellite services, the World News Service provides footage as soon as it is available, rather than at designated times. Although the service has been available from London for some time, the Washington facility will now provide an uplink for use in the Americas.

Reuters also offers a range of fixed feeds, as well as live coverage for breaking stories.

MONEY TALKS

In addition to the satellite feeds, Reuters provides a Financial Television service, in which business and financial reports are delivered to desktop computers. Currently, this service is available only in Europe, but it will be introduced in the U.S. and Asia in the coming year.

Reuters is also gearing up for an on-line library footage service, in which users could tap into a whopping 26,000 hours of recorded material dating back to 1896. The footage will be available on an as-needed basis or in special-interest packages detailing, for example, pre-revolutionary Russia or Islamic art.

Currently, footage is being converted from one-inch analog PAL tape to Ampex's component DCT tape. However, Eedle said disk-based server systems could be in place by the time the service goes on-line in late 1995.

"In the long run, we plan to move all our services to the information superhighway," he said. "Our worlds of text, audio and television will become one."

Currently, the new facility in Washington

(continued on page 5)

Optex Communications recently hit the road with this Ku-band uplink truck designed by BAF Communications Corp. For a review, turn to page 36.

John Watkinson on Maintaining Data Integrity
See Page 12

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NEWS WATCH

NEWS GATHERING

SONY, ORACLE TO TARGET NEWS SYSTEMS

NEW YORK

Sony Corp. and management software company Oracle Corp. have agreed to jointly develop a line of products aimed at digital news gathering.

The strategy will focus on creating a broadcast newsroom system in which operators can combine digital, audio and text-based wire service reports on a single workstation. The system will allow journalists to combine these separate elements for custom-designed news reports.

Part of the system will involve a "client/server" computer network in which the video, audio and data could be retrieved from a central source shared by multiple workstations. In addition, the network will assist acquisition, master control, archiving and play-out functions.

The two companies will rely on their own strengths to develop the system. Oracle, based in Redwood Shores, California, with assets and revenues valued at US$2 billion, has built a strong base on its multimedia database management systems and software, while Sony will rely on its experience with television broadcast and production systems.

For further information, contact Sony Europe in the U.K. at telephone: +44-1256-483-646; FAX: +44-1256-812-232; in Japan at telephone: +81-462-30-6104; FAX: +81-462-30-5160, or circle ***Reader Service 45.***

COMPUTER VIDEO

SGI BUYS TWO FIRMS

MOUNTAIN VIEW, California

Computer workstation manufacturer Silicon Graphics Inc. (SGI) has purchased two leading-edge 3-D graphics companies in deals with a combined estimated value of US$500 million.

The purchase of Alias Research, maker of the Power Animator rendering and animation system, and Wavefront Technologies, developer of the Visualizer system, is widely viewed as a response to software giant Microsoft's increasing presence in the high-end graphics market. Last year, Microsoft took over Canada-based SoftImage, a 3-D post production graphics company.

Within SGI, the Wavefront and Alias lines will form the basis of a new subsidiary company responsible for digital graphics software products. Headed by Rob Burgess, currently president and CEO of Alias, the new subsidiary will team with Silicon Studio, a Silicon Graphics subsidiary formed last year. The two will attempt to form an open-architecture platform for customers who use multiple applications.

"With the creation of this new subsidiary, Silicon Graphics extends its reach in defining the standard for visual realism and interactivity in the world's most demanding computing environments: entertainment and industrial design," said Edward R. McCracken, chairman and CEO of Silicon Graphics.

To finance the deal, SGI plans to issue more than US$500 million in new stock.

For further information, contact SGI in the U.S. at telephone: +1-415-960-1980; FAX: +1-415-965-2658, or circle ***Reader Service 116.***

NETWORKS

PRIVATE NETWORK COMPLETED IN PORTUGAL

LISBON

In what is being called Europe's first completely private network, Televisora Indipendente do Portugal "La Quatro" has completed construction of its last transmission facility.

Televisora (TVI) now has complete coverage of Portugal through its 19 owned and operated stations.

The project began more than two years ago and was conducted largely through transmitter manufacturer Itelco SpA. of Italy, which oversaw all aspects of the system, from transmitters to antennas to towers and other hardware.

The network's 19 stations utilize a total of 24 towers ranging from 46 to 150 meters in height and holding a total of 27 UHF antennas and 45 microwave units. Of the stations, two have been outfitted with 20+10 kW transmitters, with another two stations using 5+5 kW models. Nine stations use 10+5 kW systems, while the remaining six use 2.5+2.5 kW systems. All transmitters in the network feature automatic passive reserve consisting of a single transmitter with a double 1 kW exciter for UHF.

For further information, contact Itelco in Italy at telephone: +39-763-316-231; FAX: +39-763-316-290, or circle ***Reader Service 10.***

SATELLITES

EUTELSAT PLANS HOT BIRD 3

PARIS

With Eutelsat's Hot Bird 1 expecting a successful launch at the end of March, the consortium is already turning its sites to the 1997 launch of Hot Bird 3.

The satellite will launched in early 1997 aboard either an Arianespace Ariane 4 or Ariane 5 rocket. The satellite is being manufactured by Matra Marconi Space.

At press time, all systems appeared to be in working order for the launch of Hot Bird 1, which is slated for positioning at 13 degrees East alongside Eutelsat II-FI. The final transponder selected for Hot Bird 1 was completed in early January with Eurosport and the Sci-Fi Channel Europe acquiring the last available spots.

Eurosport will switch over from its current carriage aboard II-FI, with the new satellite's Super-Widebeam coverage expected to offer greater coverage of the European continent.

The Sci-Fi Channel Europe is expected to begin service by the end of 1995 with science fiction, fantasy and science documentary programming.

For further information, contact Eutelsat in France at +33-1-4538-4757; FAX: +33-1-4538-3700, or circle ***Reader Service 94.***

NEW TECHNOLOGY

SHARP LAUNCHES 3-D TELEVISION

OXFORD, UK

Three-dimensional television moved a step closer to reality last month when Sharp Laboratories of Europe unveiled "Twin-LCD" technology before an invited audience.

The technology, which does not require special 3-D glasses, utilizes two superimposed flat screen panels with a special optical arrangement so the viewer can see one panel with the right eye and the other with the left.

"With this new display technology, we believe we have set a benchmark of quality and performance required for practical 3-D applications," said Dr. David Ezr, general manager of Sharp's Imaging Technology Department.

For further information, contact Sharp Europe in the U.K. at telephone: +44-1865-747-711; FAX: +44-1865-714-217, or circle ***Reader Service 27.***

NEW TECHNOLOGY

STATIONS ADOPT TAPELESS NEWS

HONOLULU AND SEATTLE

Station KHNL in Honolulu and NorthWest Cable News (NWCN) in Seattle should soon be operating the world's first tape-free newsrooms.

Owned by Providence Journal Broadcasting, KHNL and NWCN plan to install Avid's disk-based server production system within a few months and begin operating without tape from capture through transmission by summer or early fall.

John Hayes, television vice president of Providence Journal Broadcasting, said the move will be cost effective for KHNL, a soon-to-be NBC affiliate, and NWCN, a cable news channel in the Pacific Northwest despite the approximately $1 million per station conversion pricetag.

"In the long-term and the short-term it's a better deal," said Hayes. "Had we not taken this step today we might have had to in two or three years."

"We'll be saving money through less maintenance, and we'll be purchasing less tape," added Hayes.

Both stations have been planning to switch to tapeless for several years. Aging equipment was often refurbished rather than replaced to avoid high capital outlays on systems scheduled for replacement.

The stations will continue to use tape archives for an interim period until a digital storage solution is found.

Within a year, KHNL's news room desktop computers may be able to access the compressed video stream as well.

"The tapeless system will put editing back in the hands of the storytellers — reporters and producers — instead of technicians," said Hayes.

For further information, contact Avid in the U.S. at telephone: +1-617-221-6789; FAX: +1-617-640-1366, or circle ***Reader Service 135.***

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BIRTV: Opening China's Doors

by Deng Haiyan

GUEST COMMENTARY

The Chinese radio and TV market has certainly developed rapidly in the past 40 years, particularly in the past decade or so along with the country's dramatic economic growth and the improvement of living standards.

In the early years after the founding of the People's Republic of China, there were only 49 small radio stations with a combined transmitting power of 138 kW. At that time, the total number of radio receivers throughout the entire country was about one million. Now, China has more than 900 radio stations and the transmitting power has been increased greatly. In addition, many provinces and cities have established stereo and Hi-Fi stereo broadcast stations.

RAPID PACE

The TV industry has also been growing fast. After the founding of China's first TV station, Peking TV, on May 1, 1958, China now has some 684 provincial and municipal TV stations, in addition to China Central TV (CCTV). As well, there are more than 5,800 transmitting and relaying stations all over the country, and more and more institutes and enterprises have recently established their own closed-circuit and educational TV systems.

Satellite systems are also showing strong growth. There are more than 54,000 ground satellite stations and 50,000 kilometer-long microwave lines and 600 ground relay stations in China.

China's cable TV industry has also been growing by leaps and bounds. By the end of June, 1993, the number of established CATV stations in China had reached 1,500, with subscriptions totaling more than 20 million households. This means that nearly 10 percent of all TV sets in China are receiving CATV signals, with more than 8 million being connected each year. It is expected that by the year 2000, approximately 80 to 100 million households will subscribe to cable.

All together, China now has nearly 800 million TV sets entertaining 82 percent of the people. This is an increase from just 49.5 percent in 1981. China's radio coverage is now up to 76 percent, from 64.1 percent in 1981.

The rapid development of China's radio and TV broadcasting industry has led to the rise of a substantial broadcast equipment manufacturing industry in China. This domestic industry, together with the introduction of advanced foreign equipment, China's radio and TV products have improved in quality and quantity.

To meet the growing demand for advanced systems, and to offer an opportunity for manufacturers from around the world to witness the dynamic Chinese industry, the Beijing International Radio and TV Broadcasting Equipment Exhibition has been held successfully every two years in Beijing since 1987. Organized by China Central TV and the China Radio and TV Corporation for International Techno-Economic Cooperation (CRVT), BIRTV has long been the essence of China's vast market. The show continues to attract manufacturers, agents and professionals from all over the world to showcase their world-class technology and equipment.

...China now has nearly 800 million TV sets entertaining 82 percent of the people.

When BIRTV began in 1987, there were only 35 overseas companies and 54 domestic firms attending. But by BIRTV 1993, the fourth staging of the event, more than 100 foreign companies and 160 domestic firms applied for attendance. Unfortunately, due to space limitations, only 68 foreign and 90 domestic companies were able to exhibit.

Whether measured by the many famous exhibitors or the high quality of visitors, BIRTV '93 won unprecedented acclaim and is acknowledged as the largest and only authoritative international professional broadcast exhibition in China.

During each planning period for BIRTV, organizers always invite delegations from all parts of China headed by local radio and TV broadcasting leaders to visit the exhibition. Therefore, the show provides an excellent meeting place for all exhibitors to meet with the top decision-makers and key personnel of all radio and TV stations throughout China. These meetings have led to numerous business discussions, technology transfers, joint ventures and other cooperative agreements.

With the enlarged scope and floor space since its predecessors, the upcoming BIRTV '95 will be held August 25-28 at the China World Trade Center in Beijing.

Manufacturers and agents in the broadcast field are warmly invited to join BIRTV '95, which will provide a thorough knowledge of the Chinese market and allow all exhibitors to exchange ideas with Chinese colleagues through a wide range of seminars and presentations. BIRTV clearly has a resplendent history and magnificent prospects for bringing people together.

Organizers of BIRTV '95 are looking forward to seeing you at the show. ■

Editor's note: Deng Haiyan is a member of the Exhibition and Technical Exchange Department of the China Radio and TV Corp. for International Techno-Economic Cooperation.

For further information, contact show organizers at No. 9 Zhen Wu Miao Er Tiao, Fu Xing Men Wai St., West District, Beijing, P.R.C.; telephone: +86-609-2187; FAX: +861-326-2823.

ERRATA

The hotel pictured on the front page of the March issue was misidentified in the accompanying photo caption. The hotel is actually the Luxor.

TV Technology regrets the error and has instructed International Editor Arthur Cole, whose job it is to write photo captions and attend to other such details, to walk up and down the Las Vegas strip 10 times until he has become familiar with every single hotel and casino in town.

SHOW LISTINGS

9-13 APRIL — NAB '95

Las Vegas. The U.S.'s premiere television trade show returns to Las Vegas. For information, contact the organization at 1771 N Street NW, Washington, D.C., 20036-2891, USA; telephone +1-202-429-5350; FAX: +1-202-429-5406.

18-20 APRIL — BRASIL LINK

Rio de Janeiro. Brasil's largest pay-TV conference returns to the Inter-Continental Hotel and the Nacional Rio Conference Center. For further information, contact Global Exposition Holdings, 1909 Avenue G, Rosenberg, TX, 77471, USA; telephone: +1-713-342-9826; FAX: +1-713-342-1158.

19-21 APRIL — DIGIMEDIA '95

Geneva. The Geneva International Conference Centre will be the site of this event focusing on computer-generated imagery, animation and multimedia. For information, contact Audiovisual Eureka, 91 Boulevard de la Cluse, CH-1205, Geneva, Switzerland, telephone: +41-22-320-9033; FAX: +41-22-320-9075.

26-29 APRIL — BROADCAST TECHNOLOGY INDONESIA

Jakarta. Running concurrently with Communications Technology Indonesia, the show caters to the professional sound, film, video and lighting industries. For information, contact Show organizers at 11 Manchester Square, London, W1M 5AB, U.K.; telephone: +44-71-486-1951; FAX: +44-71-486-8773.

1-3 MAY — PAN ASIA CONVERGING COMMUNICATIONS SUMMIT

Hong Kong. The Institute for International Research will host this three-day presentation focusing on the union of telecommunications, broadcasting and computing. For further information, contact the institute at 20/F, Sui On Centre, 188 Lockhart Road, Wanchai, Hong Kong, telephone: +852-531-6100; FAX: +852-586-1999.

12-17 MAY — ANIGRAPH

Moscow. The Third Annual International Festival of Computer Graphics and Animation is scheduled. For information, contact show organizers at 3 Budayskaya, Moscow, Russia, 129128; telephone: +95-187-7310; FAX: +95-187-7560.

31 MAY-2 JUNE — IMAGINATION UTRECHT 1995

The Netherlands. Royal Dutch Fairs will present the second annual event devoted to the digital creation and delivery of text, images and sound. For further information, contact organizers at Koninklijke Nederlandse Jaarbeurs, Postbus 8500, 3503 RM Utrecht, The Netherlands; telephone: +31-30-995-662; FAX: +31-30-995-559.

1-2 JUNE — IBERICA LINK

Madrid. The second annual conference will target Spain and Portugal's growing pay-TV industry. For further information, contact Global Exposition Holdings, 1909 Avenue G, Rosenberg, TX, 77471, USA; telephone: +1-713-342-9826; FAX: +1-713-342-1158.

8-13 JUNE — ITS

Montreux. The 19th International Television Symposium will deliver technical sessions and exhibits for the broadcast, satellite, cable and post-production industries. For further information, contact organizers at P.O. Box 1451, Rue du Théatre 5, 1820 Montreux, Switzerland; telephone: +41-21-963-3220; FAX: +41-21-963-8851.

12-17 JUNE — INFOCOMM INTERNATIONAL

Dallas. The International Communications Industries Association presents this event for film, video and communications professionals. For information, contact organizers at 3150 Spring Street, Fairfax, VA, 222031-2399 USA; telephone: +1-703-273-7200; FAX: +1-703-278-8082.

*Send announcements and updates to **TV Technology International**, P.O. Box 1214, Falls Church, Virginia 22041 USA, or FAX: +1-703-998-2966.*

CONTINUED FROM PAGE 1

Wire Services Launch Video

is being used as the central hub for the Americas. Uplink to Intelsat K is on one of three 5.5-meter RSI antennas. The facility also operates a four-meter receive-only dish from Eurotech, capable of C- or Ku-band operation, and a 3.8-meter receive-only unit from Comtech.

According to Roger Shull, manager of technical operations at the facility, Reuters is planning to develop an MPEG-compressed service.

"We are working with Scientific Atlanta for compression and decompression," he said.

In the facility, central routing is handled in the analog domain by a BTS Mars switcher, which will be capable of handling serial digital signals in anticipation of the introduction of digital routing later this year.

The facility also houses five edit suites, four of which are Beta SP with Sony SP 70 editing decks, Pinnacle graphics units and GVG switchers.

Lisa Dwyer, master control operations manager at APTV's Washington D.C. hub, coordinates incoming feeds from London.

"We are planning to add a couple Avid Newscutters in the next few months," Shull said.

The edit suites all have direct, individual links to Master Control to allow editors to play material out instantly for rush editing.

In the production studio, there are Sony studio cameras, a Grass Valley 200 switcher, a Pinnacle stillstore and DVE and a Chyron Maxine.

Reuter's Washington facility is also home to the Washington bureaus of several international broadcasters. Among them are Kuwaiti TV, Global TV Canada and Telemundo, which recently launched its TeleNoticias 24-hour Spanish news service out of Miami.

Meanwhile, following a three-year planning process, the Associated Press launched its APTV television news service in November.

Also based out of London, the service is available in the Americas on the TDRS bird, NASA's former tracking and data relay satellite which has now been converted to commercial service. AP's American hub is also in Washington, along with its two radio network centers, its graphics bank system and its print wire service.

Like Reuters, AP also chose the Beta SP format, although the service can also handle Hi8 as a backup.

"The goal is that by the end of the first year, we plan to have Beta SP in 60 of our 93 foreign bureaus," said Bob Feldman, director of APTV operations in the Americas. "In the second year, all 93 bureaus will have Beta SP."

The AP service offers two fixed feeds from London to each continent, along with secondary feeds for breaking news.

"The concept is, Hong Kong and Washington and Moscow all feed material to London," Feldman said. "London does the final edit, determines what pieces belong on which continental feeds and then transmits them out in bulletins."

The AP provides what it calls "Tidy Cuts," rough cut clips of material without voiceover or an AP logo that broadcasters can personalize for their audiences.

Feeds from the AP will be in compressed digital form as soon as enough decoders become available, Feldman said.

COMPUTERIZED NEWS

In addition, the AP has developed its own PC-based newsroom editing/automation system. Known as AP NewsCenter, the system has been purchased by more than 30 other broadcasters around the world. Currently, the system is only suitable for text editing. Video and audio post production will not be available until greater compression algorithms are developed.

"The system can carry programs now, but no one has been able to store more than 30 seconds of video," Feldman said. "All of our desks in Washington have the program and are connected by a server to London. Whatever London is doing, we can see it in Washington."

In both its London and Washington facility, the AP used Sony equipment throughout, Feldman said.

For both Reuters and the AP, the new video services match the world's evolution from print-based media to more complex forms.

"For 150 years, we have been in the print business," Feldman said. "For 75 years, we have been delivering pictures. For 30 years, we've offered radio. In the past five years, we have added graphics and have launched a computer service. This is the final spoke in the wheel of an all-purpose newsroom." ■

For further information, contact Reuters in London (Telephone: +44-81-965-7733; FAX: +44-81-965-0620), or the Associated Press in the U.K. (+44-71-427-4000; FAX: +44-71-583-0207).

BUSINESS BRIEFS

Telewizja Polska Continues Upgrade

WARSAW

Polish public broadcaster Telewizja Polska (TVP) is continuing its drive to digital operation through major expansions at its production studios in Warsaw and Danzig.

The TVP has hired BTS to provide a range of its Diamond Digital video mixers and LDK 10 and 10P CCD cameras, a package valued at DM10 million.

The new systems will allow TVP to operate in 4:3 and 16:9 formats. The cameras, for example, allow instant switchability between standard and widescreen operation. The units also reduce artifacts such as vertical smear through the use of Frame Transfer technology and 2/3-inch Dynamic Pixel Management (DPM) sensors.

For further information, contact BTS in Germany at telephone: +49-6155-870-879; FAX: +49-6155-870-359, or circle Reader Service 32.

Korea Telecom Plans Cable Service

SEOUL

Korea Telecom is planning to construct a new cable television distribution network to deliver programming to cable headends via satellite.

U.S.-based Scientific-Atlanta has been selected as a subcontractor to Daewoo Telecom and will provide MPEG-based digital video compression systems, as well as earth station products. Scientific-Atlanta will also oversee construction of the network's master earth station and will provide equipment for several remote sites.

The system will deliver up to 16 channels of compressed video to cable systems throughout the Republic of Korea using Ku-band transponders on Intelsat's POR satellite. The service will be converted to Koreasat when that system is launched later this year.

For further information, contact Scientific-Atlanta in the U.S. at telephone: +1-404-903-6163; FAX: +1-404-903-6246, or circle Reader Service 105.

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Disc Triggers New Format War

by Frank Boacham

NEW YORK

A format war that everyone wants to avoid is now looming over digital video disc technology.

An alliance of eight of the world's top consumer electronics, software and entertainment companies has proposed a new dual-sided five-inch digital video disc (DVD) format with enough storage capacity to hold two full-length movies.

That new disc format, created by Toshiba and Time Warner, is incompatible with a single-sided, five-inch high density multimedia CD configuration proposed last December by Sony and Phillips.

The alliance's format became the instant front-runner as an industry standard after Sony announced it would study its specifications in an attempt to agree on a single DVD format. Then, Sony did a quick turnaround and announced it will not support the competing format.

"Sony believes the Philips/Sony specifications provide the best option for optical media for the coming multimedia era," said Nobuyuki Idei, managing director of Sony Corp.

FORMAT VOWS

With both Sony/Phillips and Toshiba/Time Warner vowing to take their incompatible formats to market next year, a new consumer video format war — reminiscent of the Beta vs. VHS battle in the 70s — is increasingly likely.

The alliance format is being backed by Toshiba Corp., Time Warner Inc., Matsushita Electric Industrial Co. Ltd., Thomson Consumer Electronics SA, Hitachi Ltd., Pioneer Electronic Corp., MCA Inc. and MGM/UA.

Additional support for the format was announced by Victor Co. of Japan (JVC), Mitsubishi Electric Corp., Nippon Columbia Co. Ltd. (Denon) and Turner Home Entertainment.

The alliance disc resembles a conventional music CD. However, each side can store up to 5 gigabytes (GB) of data, a capacity 15 times greater than available on a standard CD.

The double-sided disc is formed by back-to-back bonding of two 0.6mm-thick five-inch discs. The bonding process is similar to that now used to manufacture the current generation video laser discs.

The alliance format uses variable MPEG 2 digital image compression technology. The system allows a peak data transfer rate of 10 megabits per second and can sustain an average transfer rate of 4.94 megabits per second for the full 135 minutes on each side.

A 135-minute disc provides a minimum of three language channels and four sub-title channels and has the ability to carry as many as eight languages and 32 subtitles. This allows producers to put multiple language versions on one disc, thus reducing mastering and inventory costs and making it easier to enter a large number of markets simultaneously. Consumers will be able to choose either a dubbed, subtitled or original language version of a film.

Other features include:

- Dolby AC-3 (5.1 channel) surround audio.
- Multi-aspect ratio capability allowing full-screen, letterbox or 16:9 widescreen.
- Parental lock out capability
- Current audio CD playback compatibility

The alliance format has capabilities beyond viewing video movies. It can be used in computer-related applications both as a server supplying digital transmission networks and as a very large capacity ROM that supports full motion video in multimedia.

As a music platform, the format could be used for longer playing, higher fidelity replacements for conventional CDs. The DVD will also be able to support high definition television when blue laser technology becomes available.

DOUBLE CAPACITY

At last year's announcement, the proposed Sony-Phillips standard specified approximately 3.7 GB of data on a single-sided, single layer disc. However, the specification included a single-sided dual-layer disc that enables a doubling of disc capacity to approximately 7.4 GB. This enhanced storage technology was billed then as a future capability being developed in collaboration with 3M.

However, in apparent response to the greater capacity of the alliance disc, Sony has now put the 7.4 GB dual-layer disc on the fast track. A Sony spokesman said demos of the dual-layer disc would be conducted in late April.

As a video carrier, the standard Sony-Phillips disc could hold about 135 minutes of MPEG 2 quality video together with multitracks of compressed digital audio and subtitling.

In a white paper on their disc, Sony-Phillips argued the single layer design eliminates "various production problems associated with laminated (two layer) discs, including the need for additional molding, sputtering and coating stages; longer production cycles; layer separations due to poor bonding and lower manufacturing yield rates."

The manufacturers also argued that a single substrate design avoids the complex and expensive servo mechanisms and optical pickups that laminated disc players have traditionally required. As a result, they say, the Sony-Phillips design can be manufactured with only minor modification at dozens of existing compact disc replication facilities worldwide and produced at a cost that is similar to that of conventional compact discs. ■

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Circle 133 On Reader Service Card

Post Production 'On the Air'

by Mark Hallinger

SEOUL, South Korea

If you think working conditions in production trucks are difficult, imagine shooting, editing and transferring video in a tiny helicopter hundreds of feet in the air.

That is what South Korean journalists and engineers will have to accomplish using a video production helicopter recently delivered to the Korean Broadcast System (KBS) from Heli-Dyne, a Hurst, Texas, company that customizes stock helicopters for media and law enforcement use.

FLYING SUITE

The sleek Bell 230 chopper is packed with much of the ENG equipment commonly found in large production trucks, including two independent Broadcast Microwave Services (BMS) TBT-50A microwave transmitters, two BMS BMR-60A receivers, Grass Valley 10XLM audio-visual switchers, Leader waveform monitors, and a turret-mounted 300 mm Sony BVP-T70 video camera.

Why pack fairly extensive production facilities in a vehicle where room is minimal? Fida Waishek, Heli-Dyne's systems engineer, said KBS wanted the capability for a variety of reasons.

"A helicopter is the only way to have effective uplink from any part of the country," said Waishek, who explained that South Korea does not have a network of stations capable of sending newstreams across the country.

In effect, the chopper serves as a low-level satellite — it receives and transmits footage from the ground. But it can also provide shots from its own cameras.

KBS posts breaking news aboard this customized ENG helicopter from Heli-Dyne.

Waishek said on-board editing also allows better shot selection because the editing is real time.

"It is easier for people on the scene to choose what is a good shot," he said.

Time delay in preparing footage of the evening newscast is also minimized because editing can begin even if the chopper is out of transmission range.

The chopper was custom-designed with versatility in mind, Waishek said. For example, the two independent microwave receive-transmit systems from BMS have deployable skid antennae for simultaneous aerial broadcast and ground relay functions. A handheld video camera to supplement the turret-mounted Sony can be operated through a sliding door, and an aft cabin contains an interior camera for on-board talent.

When the craft is out of microwave range, engineers can capture images using a Sony BVW-50 videotape recorder. Once the aircraft is within receiver range, 36 transmission combinations facilitate broadcast.

COST CONTROL

The overall cost of the system was US$5.5 million, with US$1.5 million for the production suite and the remainder as the cost of the stock helicopter. The craft is capable of staying in the air for three hours with a crew of six.

Because of the cramped quarters inside the aircraft, Heli-Dyne engineers specified monitors and amplifiers that do not use heavy individual power supplies. Using ASIC circuits for the amplifiers, for example, equipment sizes were reduced to 1/8 or 1/4 of those found in standard ENG trucks.

"Weight and size are the most crucial considerations for this application," Waishek said. ■

For further information, contact Heli-Dyne in the U.S. (Telephone: +1-817-282-9804; FAX: +1-817-282-8329), or circle ***Reader Service 75.***

Jakarta Plays Host To Television Industry

JAKARTA

The Indonesian broadcast market will be on center stage later this month as the Second Broadcast Technology Indonesia show gets unde rway.

Scheduled for April 26-29 at the new Jakarta International Exhibition Centre, the show is being held in conjunction with Communications Technology '95 and will present the latest advances in professional sound, film, video and lighting technology.

The event gets under way amid an Indonesian market that is continuing to report strong growth. Improving the nation's broadcast infrastructure to make it more efficient has been identified by the government as a major priority for the remainder of the decade.

...fierce competition has resulted in increased demand for higher quality systems.

Already, widespread deregulation kicks off. There are currently five private stations competing with the one remaining state broadcaster, TVRI. Each station is capable of nationwide coverage, and this has led to healthy competition as broadcasters outfit their plants with new systems in pursuit of the highest possible quality. In addition, the domestic stations must compete with outside satellite broadcasters, as Indonesia is one of the few Asian countries to allow satellite transmission.

With the rise of private broadcasting, a new wave of advertising has arisen, leading to gains for the nation's post production industry. Television advertising is growing at a rate of 10 percent per year. Coupled with the government's requirement that all advertising be produced locally, it is no wonder that the number of production houses has grown from 139 in 1992 to 300 in 1995.

On the radio side, privatization has led to the rise of more than 500 stations throughout the country. As in the TV market, fierce competition has resulted in increased demand for higher quality systems from domestic and overseas sources.

Due to this growth in the Indonesian market, show organizers are expecting a larger event than the 1993 exhibition. The overall Communications Technology Indonesia '93 show drew more than 135 exhibitors from 11 countries and more than 5,500 visitors over four days.

At this year's show, a wide range of manufacturers is expected. Product highlights include everything from acoustical test equipment to transmitters and conferencing gear. In addition, many of the latest computer-based post production products will be available, such as new editing systems, graphics and animation packages and control systems. There will also be a new breed of disk-based systems designed to replace tape-based operations for greater efficiency and flexibility.

Although new exhibitors are continuously being added to the show, some of the major corporations scheduled to attend at presstime included Deutsche Telekom, AT&T, Motorola, Elettronika Italy, Mitec, Varian and Jampro. ■

For further information, contact show organizers, PT Pamerindo Buana Abadi, Bank Bumi Daya Plaza, Unit 2102, 21st Floor, Jl Imam Bonjol, No. 61, Jakarta 10310, Indonesia, telephone: +62-21-325-560; FAX: +62-21-331-223.

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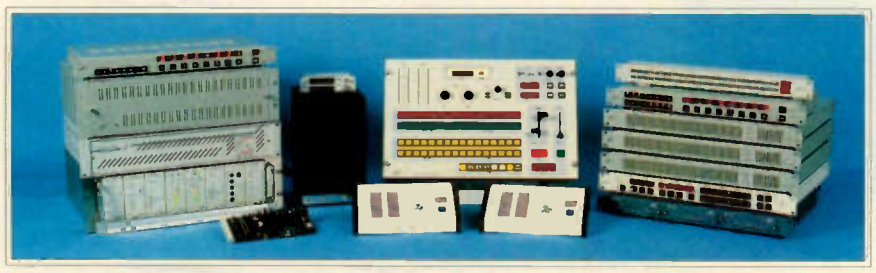

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VISUAL GRAFIKA - TO

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German TV Networks Under Fire

by Andrew von Gamm

BONN

Mounting criticism of the wasteful ways of German public television has escalated into a full-blown political quarrel on the floor of the German parliament.

News that Chancellor Helmut Kohl is lending his "full and unmitigated support" to efforts to have ARD, the first public TV and radio network, either closed or drastically reformed has caused the opposition SPD to threaten to do the same to second public network ZDF in those states that it controls.

FACE TO FACE

In an unprecedented stand-off, both sides are threatening to take those states (Länder) that each party controls out of the ARD and ZDF national systems. Both groups are using a constitutional requirement that makes broadcasting a matter for local government.

The governing CDU/CSU parties are openly calling for the closure of the ARD network and a wholesale reform of the German public broadcasting system. The move was spear-headed by the minister presidents of Bavaria and Saxony, Edmund Stoiber and Kurt Biedenkopf, who claim that the time has come for the federal government to cancel the contract requiring the 11 broadcasters to combine their resources in the form of a national system. In a position paper issued in February, they called for the 11 affiliates to produce local programming only.

Chancellor Kohl, in voicing his full support for the paper, stated that the ARD has shown itself to be "unwilling to make any move toward reform" and has allowed itself to be dominated by affiliate WDR "in its programming, personnel and finances."

Kohl also dashed any hope of an increase in the license fee and an extension to advertising timings.

"An increase in permitted advertising for public broadcasting is not even a subject for discussion," he said.

Bavarian prime minister Erwin Huber added: "The ARD can no longer act as if this debate does not concern them. If they do not reform themselves, Bavaria is prepared to unilaterally opt out of the ARD contract."

In 1991, the CDU parliamentary media committee, under the chairmanship of Minister President Bernd Neumann, called for massive reform of the network, stating that with a total of some 24,000 employees, administrative staff outnumbered those in production by 7 to 1. He also accused affiliates of "gross mismanagement and duplication of effort."

Although the ARD countered that the report was "uninformed, superficial and attention-grabbing," it nevertheless formed the basis for government demands for reform of public broadcasting.

BATTLE CRIES

Chancellor Kohl, stating that he was not going to "listen to the foolish battle cries" of the opposition, said the German public is "fed up with having to pay for the continued existence and expansion of the ARD without having any rights to be consulted." He accused the ARD of having expanded its license fee income from DM2 billion in 1984 to DM7.1 billion last year "without any perceivable increase in quality, in fact quite the opposite." In the same period, sister network ZDF increased the total income from license fees from DM0.8 billion to DM1.6 billion.

SPD politician Hans Eichel, called Kohl's speech a "transparent attempt to give help to his friends in commercial broadcasting and bend the ARD to his interests."

SPD leader Rudolf Scharping accused the chancellor of having a thin skin and overreacting to criticism levied at him during a recent ARD program.

"The ARD is a part of our cultural heritage and is there for those viewers who want to watch television without sex, violence and advertising." ■

BUSINESS BRIEF

BDP Expands Data Service

ISTANBUL, Turkey

Bogazici Data Pazarlama has undertaken an expansion of its financial data distribution network. The company has acquired new DR191 subcarrier data receivers from Wegener Communications that will allow customers to capture financial information that the BPD broadcasts via Eutelsat video subcarriers.

BDP uses a synchronous 38.4 kbps data channel to deliver the data. The company is also looking to expand its receive sites to 500 within the next two years.

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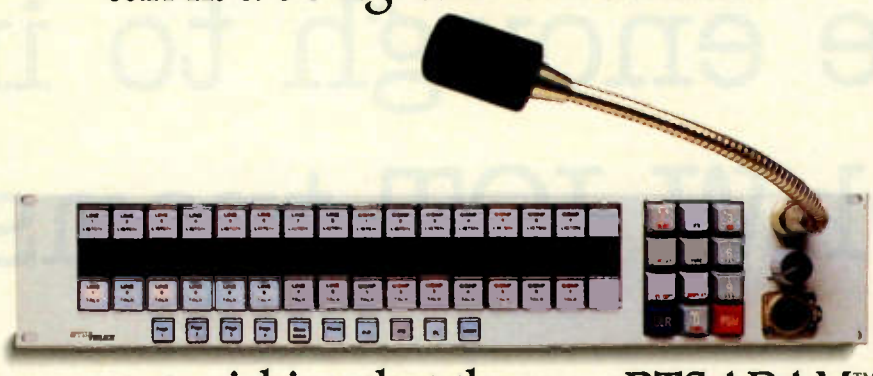

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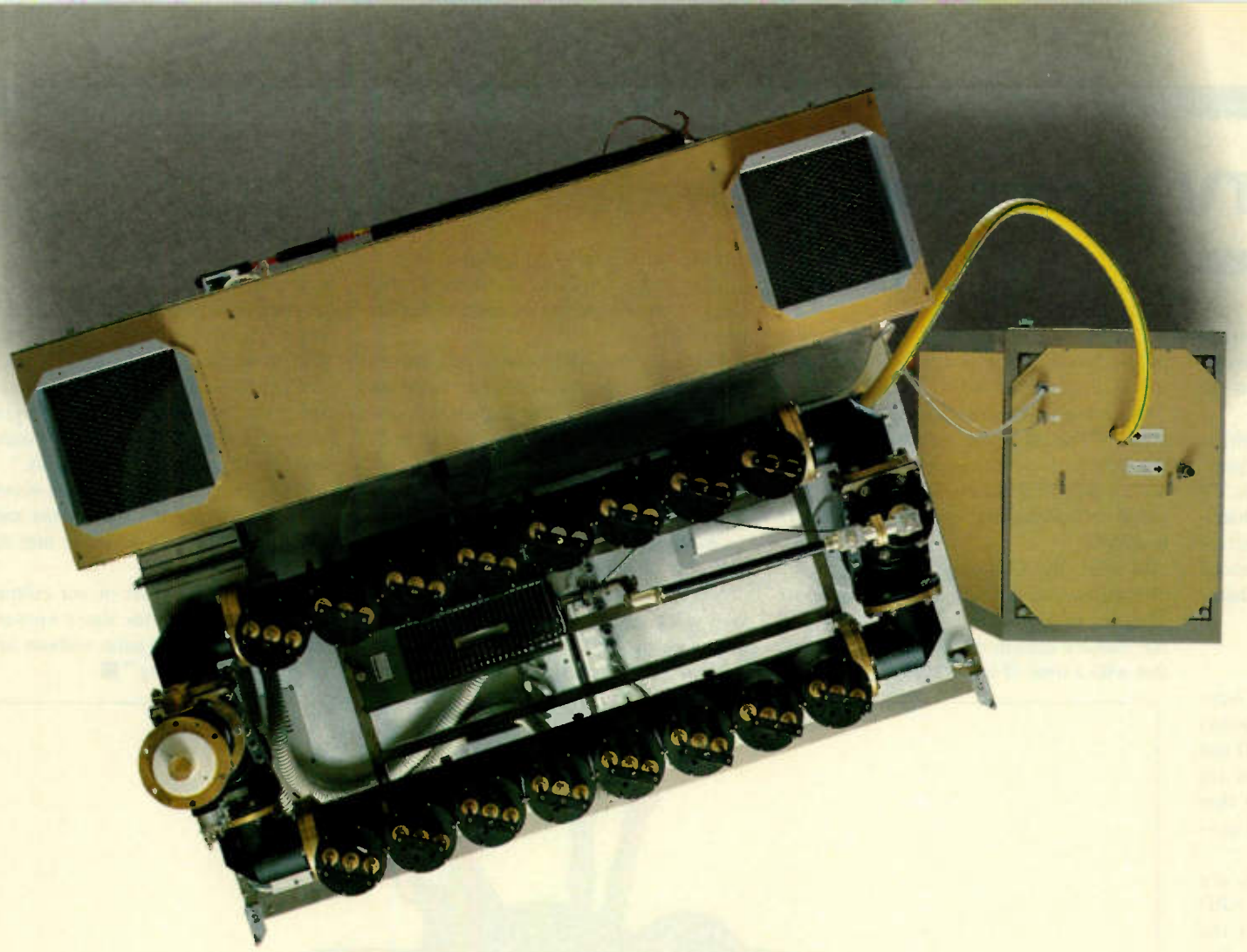

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Quick and Easy Path Analysis

by Doug Lung

RF TECHNOLOGY

This month I will continue my series on RF path analysis. I will incorporate a slightly modified version of the Fresnel zone formula I discussed last month into my spreadsheet model.

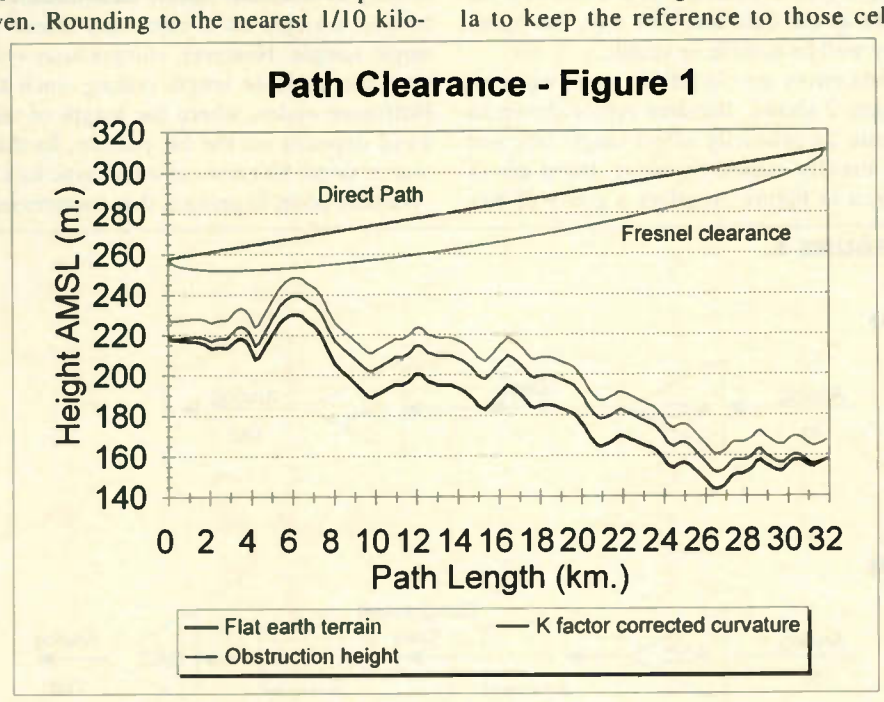
One of the easiest ways to run a correct analysis is to construct a microwave path analysis spreadsheet. There are numerous computer formats capable of this type of work. Among them are Excel, Lotus, Quattro and Quattro Pro.

Figure 1 shows a spreadsheet graph created in Quattro Pro for an actual path in San Antonio, Texas. As you can see, it contains terrain information and the Fresnel zone clearance formula I explained last month. This black and white figure really does not do it justice; it is best viewed on a color monitor. The bottom line on the graph is the flat earth terrain plot, while the line above it is the terrain plot after adding the K-factor corrected earth curvature. The line above that is the allowance for obstructions, while the straight line on the top is the direct path between the transmit and receive antennas. The curved line second from the top is the first Fresnel zone clearance required.

Note that on this model I use the full Fresnel zone clearance, not the 6/10 value often shown on graphs that is commonly used to adjust the clearance for a standard K-factor. Since I have already adjusted the terrain for K-factor, doing it again for the Fresnel zone clearance would make the model understate clearance requirements.

Figure 2 shows the layout of the spreadsheet. Using a vertical format, it is easy to adjust the spreadsheet as needed to accommodate as many terrain points as desired, up to the memory limits of your computer and spreadsheet. Most spreadsheets include a "Parse" function that allows you to import text data into the spreadsheet and separate out the numerical data. That is how I got the terrain database report from Dataworld into the spreadsheet without retyping all the numbers. I could not fit the entire spreadsheet onto the page, so I have shown the first few lines representing a section around 6 km from the transmitter - where the Fresnel clearance is the smallest — and the end of the path at the receive dish.

You can use any increment for the path length steps in column A. While a smaller increment will make a more detailed plot, you can also vary the increment along the path without affecting the accuracy at the points plotted. Depending on how your spreadsheet graph is set up, it may look strange if you do this. The numbers in Figure 2 do not appear to increment evenly because the original terrain data was converted from miles and feet to kilometers and meters. The distance steps are even. Rounding to the nearest 1/10 kilometer caused the steps to appear uneven.



Column B contains actual height above mean sea level (AMSL) from the USGS 30-second database for each plotted point on the path. Column C adds the K factor adjusted earth bulge to the terrain height AMSL in Column B. I used a constant 10 meter height for the obstruction heights in Column D, corresponding to an average-sized tree or small building. You can put in actual values for questionable clearances if you have them. Column E is the total height, which is simply the sum of the terrain with K factor adjusted earth bulge and obstruction height added together. Path height in Column F is calculated as a straight line from the transmit to receive dish.

METRIC CONVERSION

Last month I presented the how and why of Fresnel zone calculations. I calculated the clearance and subtracted it from the path height. The result is in Column G. If you looked closely at Figure 3 you might have noticed the formula is a little different than the one I used last month. That one was based on using the same unit of measure (meters) for both the heights and the path length. For the spreadsheet, I rewrote the formula to use meters for the heights and kilometers for the path length. The new formula is for calculating the first Fresnel zone clearance is:

Fresnel clearance (m) =
547.39 x SQRT[(d1 x d2)/(d x F)]

All distances are in kilometers. "d" is the direct path distance to the receiver, "d1" is the distance from the transmit antenna to the obstruction, "d2" is the distance from the potential obstruction to the receive antenna and "F" is the frequency in MHz. SQRT means square root. The result, the clearance height, is in meters.

The path clearance in Column H is obtained by subtracting the total adjusted terrain and obstruction height from the Path Height in Column F. Fresnel clearance is calculated by subtracting total adjusted terrain height from the lower Fresnel height in Column G.

Figure 3 shows the formulas used in the spreadsheet. I have described most of these in previous articles, so I won't go into details here. The "$" signs in the formulas around the variables stored in column F, rows 3 through 8, force the formula to keep the reference to those cells absolute even if the formulas are copied into another row. That makes it easy to use the spreadsheet copy command to fill in the formulas in columns C, E, F, G, H, and I in rows 16 and beyond until you reach the end of the path.

These formulas were written using Quattro Pro and should work on all versions of Quattro and Lotus spreadsheets. If you use Microsoft Excel, you will have to modify them slightly. The Excel help screens and manual describe the differences between Lotus and Excel spreadsheets.

Note that figure 3 shows only the first two lines of the path calculation. You should copy the formulas in C17, E17, F17, G17, H17 and I17 into succeeding rows as described above. If you use a standard obstruction height like I did, you can also copy the reference in D17. You can type over the copied value if you want to enter a different obstruction.

RF	A	B	C	D	E	F	G	H	I
1	Path Clearance Calculation								
2	Figure 2 - Spreadsheet								
3		Path length:				31.9	Kilometers		
4		Transmit antenna height (AMSL):				258.0	Meters		
5		Receive antenna height (AMSL):				310.5	Meters		
6		Maximum obstruction:				9.0	Meters		
7		K-factor:				1.3333			
8		Frequency:				7000	MHz.		
9									
10									
11	Title: SAN ANTONIO PATH PROFILE				Origin: 29-29-32 98-29-55				
12	Azimuth: 133.1 degrees	Path Length: 31.9 km.			Terminus: 29-17-45 98-15-31				
13									
14	Path	Terrain	+ Earth	+ Obstruct	Total	Path	Lower	Path	Fresnel
15	Length km.	AMSL m.	Bulge m.	Hgt. - m.	Height - m.	Height - m.	Fresnel hgt	Clearance	Clearance
16	0.0	219.9	219.9	9.0	228.9	258.0	258.0	29.1	29.1
17	0.2	217.8	218.1	9.0	227.1	258.2	255.6	31.1	28.5
18	0.3	217.7	218.3	9.0	227.3	258.5	254.8	31.2	27.5
19	0.5	217.5	218.4	9.0	227.4	258.7	254.2	31.4	26.9
20	0.6	217.3	218.5	9.0	227.5	259.0	253.8	31.5	26.3
RF	A	B	C	D	E	F	G	H	I
52	5.8	229.6	238.5	9.0	247.5	267.5	253.3	20.1	5.8
53	6.0	230.2	239.2	9.0	248.2	267.8	253.4	19.5	5.2
54	6.1	230.4	239.6	9.0	248.6	268.0	253.5	19.4	4.9
55	6.3	230.1	239.6	9.0	248.6	268.3	253.6	19.7	5.0
56	6.4	229.5	239.1	9.0	248.1	268.6	253.7	20.4	5.6
RF	A	B	C	D	E	F	G	H	I
210	31.2	154.7	155.9	9.0	164.9	309.5	304.3	144.6	139.4
211	31.4	155.5	156.4	9.0	165.4	309.7	305.2	144.4	139.9
212	31.5	156.4	157.0	9.0	166.0	310.0	306.3	144.0	140.3
213	31.7	157.2	157.5	9.0	166.5	310.3	307.6	143.7	141.1
214	31.9	158.3	158.3	9.0	167.3	310.5	310.5	143.2	143.2
215									
216	Original terrain data obtained from Dataworld and reformated for use here.								

```
RF:A1:   'Path Clearance Calculation
RF:A2:   'Figure 3 - Formulas
RF:B3:   "Path length:
RF:F3:   31.8651
RF:G3:   'Kilometers
RF:B4:   "Transmit antenna height (AMSL):
RF:F4:   257.95224
RF:G4:   'Meters
RF:B5:   "Receive antenna height (AMSL):
RF:F5:   310.53024
RF:G5:   'Meters
RF:B6:   "Maximum obstruction:
RF:F6:   9
RF:G6:   'Meters
RF:B7:   'K-factor:
RF:F7:   4/3
RF:B8:   'Frequency:
RF:F8:   7000
RF:G8:   'MHz.
RF:A11:  ' Title: SAN ANTONIO PATH PROFILE          Origin: 29-29-32 98-29-55
RF:A12:  ' Azimuth: 133.1 degrees  Path Length: 31.9 km.  Terminus: 29-17-45 98-15-31
RF:A14:  ^Path
RF:B14:  ^Terrain
RF:C14:  ^ + Earth
RF:D14:  ^ + Obstruct.
RF:E14:  ^Total
RF:F14:  ^Path
RF:G14:  ^Lower
RF:H14:  'Path
RF:I14:  'Fresnel
RF:A15:  ^Length km.
RF:B15:  ^ AMSL m.
RF:C15:  ^Bulge m.
RF:D15:  ^Hgt. - m.
RF:E15:  ^Height - m.
RF:F15:  ^Height - m.
RF:G15:  ^Fresnel hgt
RF:H15:  'Clearance
RF:I15:  'Clearance
RF:A16:  0
RF:B16:  219.85224
RF:C16:  (A16*($F$3-A16)/(12.75*$F$7))+B16
RF:D16:  +$F$6
RF:E16:  +D16+C16
RF:F16:  +$F$4+($F$5-$F$4)*A16/$F$3
RF:G16:  +F16-(547.39*@SQRT($A16*($F$3-$A16)/($F$8*$F$3)))
RF:H16:  +F16-E16
RF:I16:  +G16-E16
RF:A17:  0.1609344
RF:B17:  217.81006
RF:C17:  (A17*($F$3-A17)/(12.75*$F$7))+B17
RF:D17:  +$F$6
RF:E17:  +D17+C17
RF:F17:  +$F$4+($F$5-$F$4)*A17/$F$3
RF:G17:  +F17-(547.39*@SQRT($A17*($F$3-$A17)/($F$8*$F$3)))
RF:H17:  +F17-E17
RF:I17:  +G17-E17
```

▼▼▼

Wandering the floors at most trade shows, it is easy to get mesmerized by a nice looking transmitter surrounded by smooth salesmen. But how do you know if this is the transmitter you should buy? Here are some tips from my experience selecting transmitters, both full power and low power.

Rule Number One: Make sure the transmitter is capable of delivering the performance you expect. Verify actual performance by looking at the data taken as part of the Type Acceptance procedure and during station proof of performance testing.

Rule Number Two: Ask how many units have been shipped. While you certainly will get the latest technology by purchasing the first of a series, you will also be the one to find all the problems. If the new design offers so many advantages over the more tested, traditional transmitters, make sure that your unit will be upgraded at no

(continued on page 14)

Maintaining Data Integrity

by John Watkinson

VIDEO WATCH

Now that television production equipment is heavily dependent on digital technology, it is necessary to develop an understanding of its fundamentals. Because digital systems are only as good as the data they contain, data integrity is an important issue, but one that is not always given the respect it deserves.

The advantages of digital audio and video are too well-known to discuss here, but some basic truths bear repeating. First, in a well-engineered digital system, the signal quality is determined by the converters only. Figure 1a shows such a system, where an analog-to-digital converter (ADC) produces data which is then transmitted to a digital-to-analog converter (DAC). Provided the data arriving at the DAC is numerically identical to that leaving the ADC, the transmission has caused no loss of quality. The same theory is true for recorders, which can be considered a transmission with a long delay.

COMPRESSION FACTOR

The introduction of compression changes things a little. Figure 1b shows an ADC feeding a compressor. The compressed data is transmitted to a decoder which drives a DAC. Again, provided the data arriving at the decoder is the same as that leaving the compressor, the transmission has caused no loss of quality. However, in this case, quality may be lost in the ADC or in the compressor. In addition, if the data supplied to a decoder or DAC is not the same as the data that was sent, the result may well be audible or visible.

Data errors are classified in two ways, as Figure 2 shows. Random errors shown in Figure 2a primarily affect single bits and are usually caused by noise. Burst errors shown in Figure 2b affect a group of bits together in an otherwise correct message.

The result of an error depends on whether it affects a sample value, a coefficient in a compression system or the system's synchronization. Figure 3a shows the result of an incorrect MSB in a digital audio system. The DAC outputs a spike of one half maximum amplitude in the worst case. You would have to be deaf not to hear it. However, if the LSB is incorrect, chances are you would not hear it. The same would happen in a color difference signal, where an MSB error would result in one pixel that is obviously the wrong color. Figure 3b shows the result of an MSB error in digital luminance. In this case, a 0 becomes a 1 and a white spot becomes visible. Figure 3c shows what happens in an eight-pixel-square, DCT-based compression system. A single bit error in one coefficient could result in a block of 64 pixels all having the wrong value. Unless you are reading a book at the time, you are going to notice the result on the screen.

CORRECT RECEPTION

Most digital systems such as digital VTRs and serial digital interfaces (SDIs) send sample data as a serial bit stream. It is vital that this bit stream is deserialized correctly. A slippage of one or more bits will result in bits from one sample wrongly appearing in two decoded samples. Even if the bit stream is correct, all samples decoded with incorrect synchronization will be corrupted. Thus, an error affecting the synchronization system is the worst kind of error because it does damage out of proportion to its size. In uncompressed data, samples have constant word-length, and it is easy to maintain correct deserialization because a single bit in error only affects a single sample. However, compression systems use variable length coding, such as Huffmann codes, where the length of the word depends on the bit pattern. In this case, a single bit error can cause sync loss.

Another point to grasp is that compressed data is more sensitive to errors than uncompressed data. This is for two reasons: in transform coding, incorrect coefficients affect significant areas of the picture and variable length coding is more sensitive to loss of sync. So in general, you cannot use a transmission system or a recorder designed for full-bit operation for compressed data because the chances are the data integrity will not be adequate.

Clearly, errors are always bad, but the severity of the damage varies with the application. It is important in practical systems to take steps to deal with errors. There are two ways of doing this, and each is appropriate for different applications. In the first, the existence of the errors is accepted, and an error correction system is designed to handle them. In the second, the system is designed so that the occurrence of errors is negligible.

Consider magnetic tape. It is almost impossible and very expensive to make a tape with no surface defects. And even if it was possible, there is no guarantee that the tape or head will not be contaminated in use. If a sufficiently powerful error correction system is included, the specification of the tape can be relaxed so that it becomes cheaper. As there are more tapes than VTRs, the saving on tape outweighs the cost of the error correction system in the VTR.

A different approach is used on hard disks. Here, the system has random access, rather than the serial access of tape, so there is no wear mechanism. The entire disk is tested for defects, and blocks which are defective are attributed to a hypothetical file that appears in the directory. When genuine files come to be written, the bad blocks appear to be in use, so no data will be recorded there. In this case, recording only takes place on good areas of the disk, and the chances of error are much smaller. A simpler, cheaper error correction system is then adequate.

Error correction systems cause delay. There is no way to avoid this because the coding is such that an entire block of data has to be processed before it is know if it contains an error. Thus, the data block has to be held up while it is checked and corrected. In a recording application, the extra delay is no problem. But in a live system, the delay may cause problems.

In the SDI, the delay caused by error correction is intolerable, so it is not used. SDI is simply engineered so that errors do not happen. The transmission is over a relatively short distance, and it is arranged that the signals are sufficiently lower that they are unaffected by noise. As a result, the delay due to SDI is minimal. Clearly, such an approach would be hopelessly impractical with tape or with a long-distance cable transmission.

CABLE INTERFERENCE

In the case of cable interference for compressed video or audio data, the rules change. For a start, compression itself causes a delay at both the encoder and decoder. As we saw earlier, compressed data is more sensitive to errors. Therefore, in a compression transmission, it makes

(continued on page 14)

FIGURE 1.

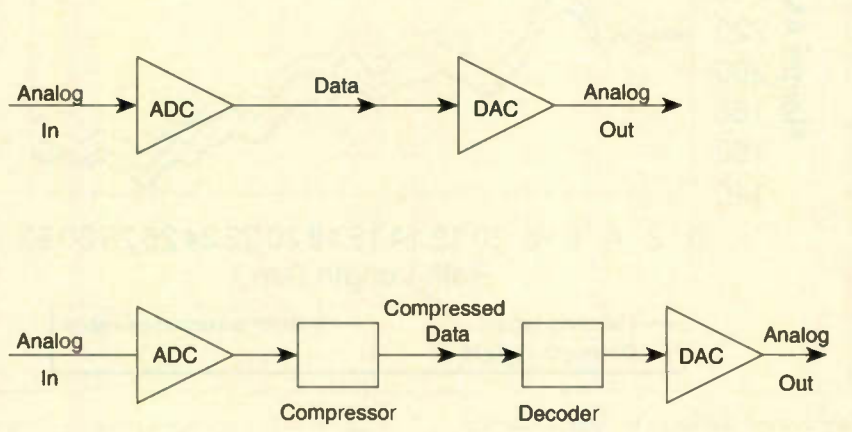


FIGURE 2.

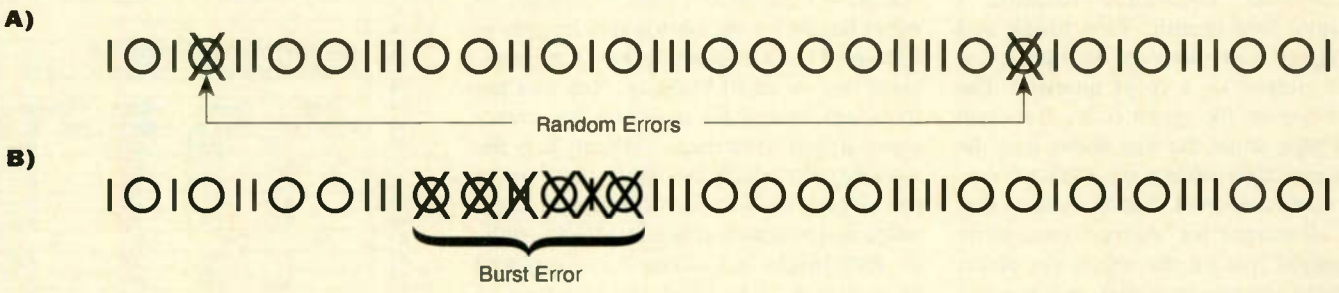
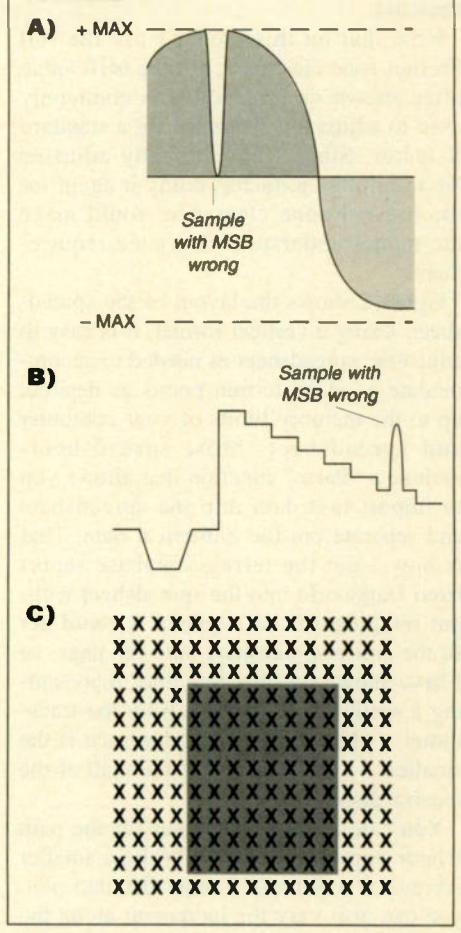


FIGURE 3.



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Good Relationships Are Vital

by Brian Kelley

CONTRACT ENGINEER

My friend is a hard worker. He has been in the production business for years and has learned to master the craft of his trade. He can keep up with the rapidly changing technological landscape, but by nature he is a reclusive person. He is quite happy to spend time by himself, attending to the fine-tuning of machinery that allows for the creative works of others to eventually find their audience. Because he is an expert at what he does, he can compete with the best in his field, and it is almost guaranteed that he will be in demand for a very long time.

This attention to details has been a benefit by providing him with job security. He knows how to get the job done, so a loss of income will almost never be a problem. However, he is almost surely destined to work for someone else for the rest of his life. Those who know "how" generally work for people who know "what."

WHO AND WHAT

Knowing "what" on its own is never enough. Working in the TV industry, one cannot afford to live in a vacuum (or with vacuum tubes). In a perfect world, decisions would probably be made based solely on the quality of the work done. But as wars, famine, crime and illness remind us, ours is most decidedly not a perfect world.

There is much talk today about the "information superhighway" and the Internet. Laying aside the technological considerations, the general idea is that of synergy — that the whole is more than the sum of the individual parts. For those in the engineering and technical fields, this means that it is not wise to work alone. Success depends not on what you know, but who you know.

When I have a job to do, I often encounter a task that I cannot handle alone. Most often, someone else comes to mind who can help, so I pick up the phone and network with others whom I can rely on for assistance. This happens so often that I scarcely notice it. When something is as natural as breathing, why bother to think about it?

What comes to us naturally also plays an absolutely crucial role in the ability to evaluate the broadcasters of emerging markets around the world. You need to know who knows whom and who is making the decisions.

Just to the north of the current conflict in Chechnya is a resort town (at least by Russian standards). I had the privilege of meeting the director of a regional station and his top aid to discuss cooperation. George, the assistant, met me at the airport in a trench coat with dark sunglasses (although it was January) and a penchant for bad cologne. He informed me that he had spent much time on the U.S. west coast.

He brought me to meet his boss, who was dressed in a Soviet-style dull brown suit coat with an outdated tie. He wore even worse cologne and had never been outside his own country. I felt something unusual about the visit, but I could not determine what it was. Something was not right. I should have listened to my instincts, but I was paying more attention to the paper structure of the organization than to the actual working structure.

Months later (not everywhere does work flow as quickly as in the West) my instincts were confirmed. I discovered that George, the assistant, had contacts of his own with other groups and was attempting to use his current position to begin a firm he would run himself. The director of the station had no idea that this was going on until he discovered that our agreement was being sidestepped by his lieutenant.

Both men had relationships and had a large circle of contacts. But one had contacts with people who could help more, at least in the current economic situation, than the other.

There are many hard-working people in our industry who are working hours that are destined to take a toll on even the strongest family unit. During my university career, I had a professor who began his first class in unusual clarity. He told us that all we needed to know to pass the course successfully was the content of one workbook he used. I made a large mental note, bought the book and never went to the class again except to take exams. I recall a friend in the same class who never missed a lecture. He barely passed the course, while I got the highest grade. My friend and I were of equal intelligence, but I was listening to what was important and focused my energies on this information rather than on the periphery offering only limited return.

Knowing the relationships that exist between decision-makers in a broadcast organization and others is like having the most important workbook in a college class.

For years I have been trying to begin work in a newly independent country not known for its user-friendliness. Many long hours have been spent developing a sales pitch and product mix to interest a prospective buyer. It was clear to me that my offer was better than anything anyone else's. I got no response.

Then I met a businessperson who had been working in the country for four years, establishing key relationships during that time. He knew the major players in the industry personally. He knew the people in government with whom they had to work. He was even a personal friend of the Prime Minister.

I switched my strategy of simply doing more of the same. Instead I began to work only with him to the exclusion of everything else we were doing in the area. In two months, I had two signed contracts and the beginnings of agreements with 15 more stations.

In Hungary we had worked well with the broadcasters in the region for quite a long time. As I am in the programming business, it made sense to target this. But by paying close attention to relationships, I met the person responsible for developing health education material for the secondary schools across the country. He was looking for video material dealing with a terminal disease and I could provide him with the material. This has opened further markets to us in other continents where they now want to do the same thing — all because of focusing on relationships.

OPEN MIND

This does not only apply to those in my programming line of business. Who you know can help pull you in new profitable directions in any field of interest, if you are also open to what may seem to be unconventional.

Consider, for instance, the booming technology of digital editing and associated equipment. Most would consider the major market for material and service contracts in this field to be broadcasters and post production facilities. Someone who knew the right person discovered another market that was not so obvious — professional sports. The Phoenix Suns (a basketball team in the southwestern U.S.) have purchased equipment which allows them to have an edited tape ready at halftime. It shows the players how to improve their game in the next half. Do you know anyone with contacts in an unusual field?

There is a lot to be said for individuals who creates their own success. Ability and knowledge help to free us from what can be unhealthy dependence on others. Our world, however, is vastly more complicated than it was a generation ago. Without others, we cannot even hope to achieve greatness, so it only makes sense to spend time developing relationships with others whom you would not necessarily call your colleagues.

Basics that have proven helpful to me are not difficult to comprehend but do take a certain amount of discipline to practice.

Remember names. Psychologists tell us that the most loved word of most individuals is their own name. Think how good it feels when someone you do not know very well knows you by name. Think how uncomfortable it makes you feel when you do not know their name. If you are not good at this by nature (and I am not) then get into the habit of using a person's name often when you meet them. You will be amazed at how it helps the memory and the conversation.

Write things down. You keep records of important documents, bills, taxes and other business materials; why not keep a record of important people? Who are they and what do they do? Who do they know? How did you meet? What ideas did you have upon meeting? The act of writing it down, whether on paper, digital assistant or computer, more deeply impresses the data upon your mind, even if you never look at it again.

Ask questions. This may be a lost art today. I have discovered that there is something of interest in nearly everyone. Since people like to talk about themselves, questions allow it to happen. Who knows, you may even discover some information you can use yourself. ■

Brian Kelley is director of Germany's New Life Network, an international distributor of family and educational television programming produced around the world.

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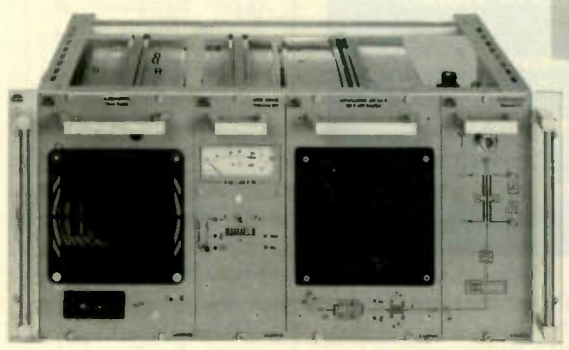

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CONTINUED FROM PAGE 11

RF Path Analysis Made Easy

extra cost for all design changes made over the next five units or so.

Rule Number Three: Obtain a list of current users of the transmitter. The number of transmitters purchased by these users should match the number of units shipped. If it does not, it may mean there are some unhappy customers the manufacturer does not want you to know about.

Rule Number Four: If the response to Rule Two was that several units had been shipped, ask what problems were discovered with the early units and how these problems were corrected. I have found most manufacturers are honest about first-run product problems. If you get an answer like "we had no problems," make sure the other users you obtain in Rule Number Three can verify that.

Rule Number Five: Look behind the front panels. How difficult will it be for you to maintain the transmitter? Is redundancy built in or are there opportunities for single-point failures? How difficult will it be to keep some signals on the air if some parts fail? Are common failure items like blowers and power supplies easy to get to and easy to replace?

Rule Number Six: Make sure factory support is available when you need it. Most transmitter manufacturers offer 24-hour service.

Rule Number Seven: If you have gotten this far and have decided this is the transmitter you want, see how much of the final payment can be delayed until the transmitter meets the agreed-upon specifications. Be sure to specify the transmitter cannot be readjusted during the testing to make it meet a specific parameter. If readjustment is demanded, then all readings done before the adjustment should be repeated to be sure they still are in spec.

▼▼▼

My UHF transmitter tube survey is turning into more of a long-running feature than a simple, statistical report. I suppose

An analysis of failed tubes alerts manufacturers to weak points in tube and system design.

I should not be surprised because several factors affect a tube's life. One thing I have noticed from the hours reported is that the longer a tube has been on the market, the longer it lasts.

I remember when the first wideband EEV external four cavity klystrons came out, the average life was around 20,000 hours. Now, five years later, I have seen the same type of tube operate more than 40,000 hours.

I believe this is due to both users and manufacturers gaining experience with the tube. When the first generation of tubes fails, station engineers and transmitter and tube manufacturer engineers take steps to prevent the same sort of failure. Sometimes these steps, like decreasing filament voltage, can be applied to tubes still in service. An analysis of failed tubes alerts manufacturers to weak points in tube and system design. Now that we have gone through a generation of Varian klystrodes and EEV IOTs, it is not unrealistic to expect to see longer lifetimes from these tubes.

Rule Number One:

Make sure the transmitter is capable of delivering the performance you expect.

Dave White at WQOW-TV in Eau Claire, Wisconsin, pointed out the perfect example of this. The broadcast klystron tube that has been manufactured the longest (at least in the U.S.) is the Varian 30 kW integral four cavity tube. Dave contacted me saying he felt my estimate of 30,000 to 40,000 hours average life for the integral cavity tubes was way off the mark. I based that on my past experience with Varian's 55 kW tubes in visual service and on the comments I received from other stations using the same tubes.

Based on more recent information, I could probably extend it to 50,000 hours. The 30 kW tubes are another story. Dave's experience includes three UHF stations using RCA TTU-30 and TTU-60 transmitters. He wrote that three of his tubes that failed last year were between 65,000 to 110,000 hours old. He also noted that in aural service, he had two tubes in service with well over 100,000 hours on them and two visual tubes with more than 70,000 hours. He said "We have not experienced ANY tube failures with less than 50,000 hours...".

A TUBE'S LIFE

Tom Stephenson at Varian sent me a detailed message outlining the tube life of Varian klystrodes at Georgia Public TV, one of the first sites to use klystrodes. All of the tubes were used in separate visual/aural service. As with the klystron, tubes in aural service seem to last longer, with the greatest lifetime reported at 42,032 hours. In visual service, the greatest lifetime so far was 24,389 hours. These tubes were still in service as of December 31, 1994, so the numbers may be higher now.

Tom did not provide data on when tubes failed, but by comparing aural life and visual life I was able to make some estimates. If I assume the aural tube had never been replaced, and if the visual hours were significantly less, that meant the visual tube had been replaced once, and I can calculate a minimum life-before-failure of about 5,000 hours and maximum life-before-failure of more than 20,000 hours. These numbers tend to support my current estimated life of 20,000 hours for visual and combined service and also my hypothesis that tubes in service today will last longer than those they replaced.

I have noticed that some transmitter manufacturers are recommending purchasing 60 kW tubes and operating them at 30 kW in combined service. It will be interesting to see if that technique extends tube life out to 30,000 hours or more, close to that obtainable with klystrons. ■

Doug Lung is vice president and director of engineering for the Telemundo Group of stations.

CONTINUED FROM PAGE 12

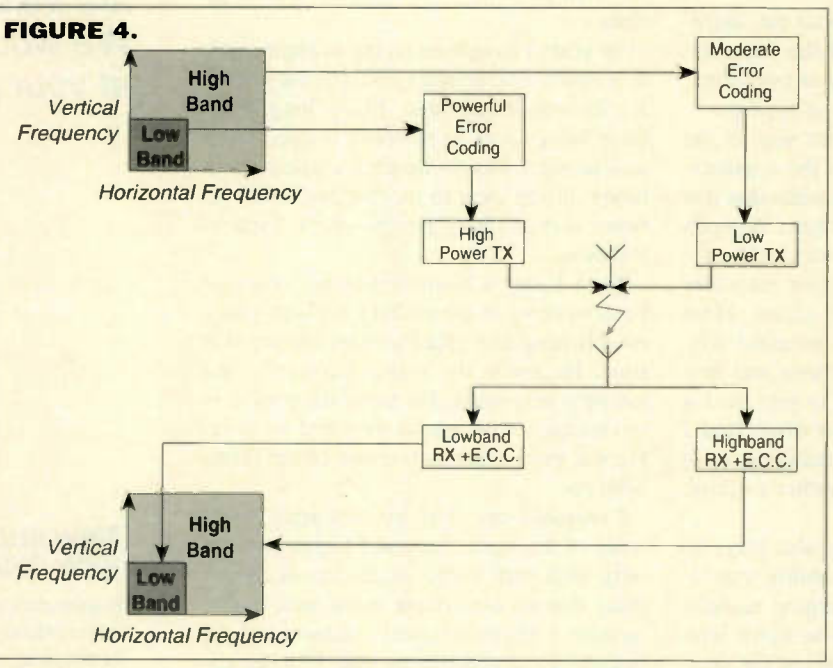
Maintaining Data Integrity

sense to include error correction to minimize the higher sensitivity. The extra delay is acceptable because there is already a significant delay due to compression.

Digital systems tend to be rather binary in their performance. In short, they either work or they do not. In this respect, analog had an advantage because it would often degrade slowly enough to get by until the equipment was off the air. However, with good design and correct management, the performance of digital systems can be made to degrade gracefully and the onset of failure can be anticipated.

Graceful degradation can be achieved in a number of ways. The most common approach in digital VTRs is to have a concealment system that cuts in only if errors are uncorrectable. If correction is impossible, the erroneous samples are flagged and attempts are made to estimate their value from the value of samples nearby. Nothing can be determined about the state of a digital VTR by looking at the picture. However, the displays of correction and concealment rates tell the story. With tape, correctable errors are normal because tape is not perfect. Concealments are considered abnormal in professional equipment, so if the concealment rate becomes significant, something is degrading.

FIGURE 4.



In compression systems, a hierarchical approach can be used to obtain graceful degradation in digital video broadcasting. Figure 4 shows how the compression system splits the video signal into two bands. The low band contains a low-resolution, soft picture, while the high-frequency detail is contained in another band. The low band is transmitted with a large amount of error protection and possibly with more power. In good reception conditions, both bands are received well and recombined to produce a full-definition picture. In the case of impaired reception, the high-frequency band will fail first. However, the stronger low-band signal will still be available and the result will be a soft picture, which is better than no picture ar all. ■

John Watkinson is an independent consultant in digital audio, video and data technology and is the author of seven books on the subject, including The Art of Digital Audio and The Art of Digital Video; acclaimed as definitive works. He is a Fellow of the Audio Engineering Society and is listed in Who's Who in the World. Based in England, he regularly presents papers at conventions of learned societies and has presented training courses for studios, broadcasters and facilities around the world. His book on video and audio compression will be launched at NAB. John can be reached on +44-734-834285.

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Lessons from Standards Past

by Brian Flowers

ENGINEERING CORNER

The advent of digital transmission of television signals raises basic issues of standardization, so it is worth looking back at past experience in this domain.

When I joined the BBC technical staff in January of 1960, I, along with other new recruits, was given a one-week "induction course." This included a visit to the famous "Lime Grove" studios in London, of which I have two particular memories.

The first memory is of a microphone boom operator with a piece of mistletoe attached to the microphone which he deftly placed above the head of any young lady who ventured into the studio. Thus, in the Christian tradition, she was eligible for a kiss from a passing young man.

The second memory is of a strange-looking German telecine machine, which used a revolving drum with tilting mirrors to track 35 mm film in continuous motion, thereby enabling it to run at any chosen frames-per-second rate. One could truly say of this machine that "it was all done with mirrors."

Cintel subsequently made a similar machine for 16 mm film using a rotating polygon of glass, which by means of internal reflection performed the same feat as the original German Meccau telecine. This meant that World War I armies, filmed at 16 frames per second, were no longer obliged to march in double-quick time every time they appeared in a European television program.

Hollywood films were normally shot at 24 frames per second, whereas European black and white television was obliged to use 25 frames per second, locked to the 50 Hz national grid. This was to ensure that any hum on the picture would remain stationary, rather than move up or down. Therefore on a standard European telecine, when the symphony orchestra joined the action, they were heard nearly a semi-tone higher and about 4 percent faster than they originally played.

At that time, the BBC was broadcasting in the 405-line standard. RTF in France used 819 lines, and most of the rest of Europe used 625 lines, all with 25 frames-per-second and 2:1 interlace scanning.

The introduction of color television in Europe in the 1960s gave European television a chance to standardize. Everyone agreed that although the American NTSC standard was a remarkable achievement, it could be improved upon, specifically by overcoming the problem of differential phase distortion affecting color fidelity.

The German approach, led by Dr. Walter Bruch of Telefunken, was to reverse the color subcarrier (R-Y) phase on alternate lines so differential phase errors would cancel out in the decoder, hence the name PAL (Phase Alternating Line).

FRENCH APPROACH

The French engineers, on the other hand, led by Monsieur Henri de France of RTF, took a more radical approach and decided to use two frequency-modulated subcarriers for the (R-Y) and (B-Y) respectively. Unlike the quadrature phase modulation of NTSC and PAL subcarriers, which carry the two color difference signals simultaneously, FM signals do not mix, so they were obliged to send the two chrominance signals on alternate lines. Hence the name SECAM (Séquentiel à Mémoire), although it was said at the time that SECAM actually stood for "Supreme Effort Contre l'AMerique."

Anyway, we were stuck with two baseband color television standards, but at least they were both 625 lines with 25 frames-per-second and 2:1 interlace. Transcoding between the two standards was relatively easy, and on the Eurovision network we adopted the principle that transmissions should be distributed in their original standard and each participant should transcode for themselves as required.

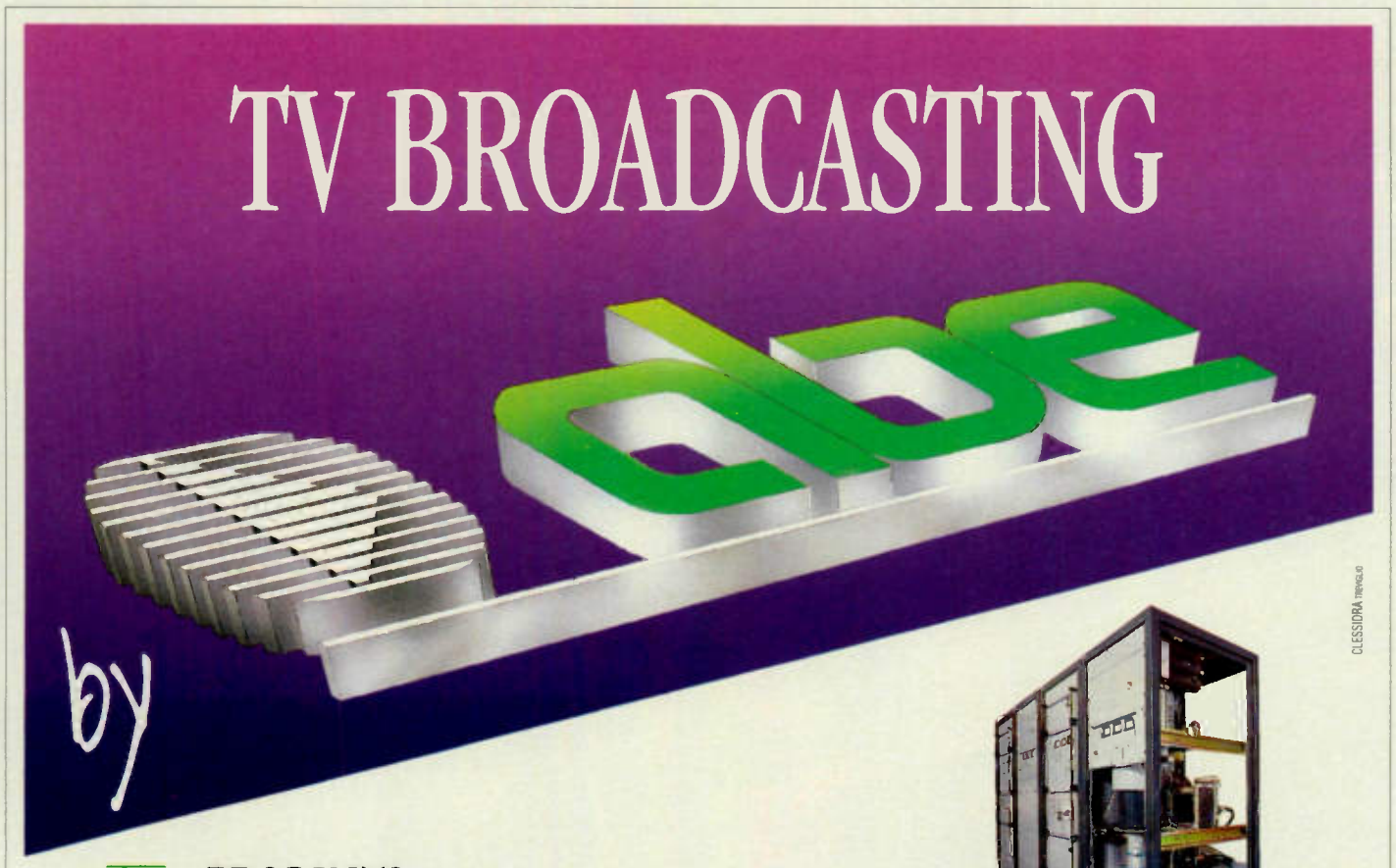
One or two South American countries, which have 60 Hz mains but wanted to have the advantages of PAL, decided to use 525-line, 30 frames-per-second PAL, known as PAL-M. This was said to stand for "Pay A Little More" for the equipment, since the studio equipment had to be specially made for a relatively small market.

Of course, I am ignoring here the plethora of actual RF broadcast standards, where the video carrier can have positive or negative modulation, the audio can be FM or AM, and the video/audio carrier-spacing can have various values.

Intercontinental satellite transmission was well-established in the late 1960s when PAL and SECAM were introduced, so the BBC research department set about trying to convert between NTSC and PAL using field-store technology. The early converters occupied a large room and the first model could only make an exact 6-to-5 ratio frame-rate conversion.

At first sight this seemed to be OK for

(continued on page 22)



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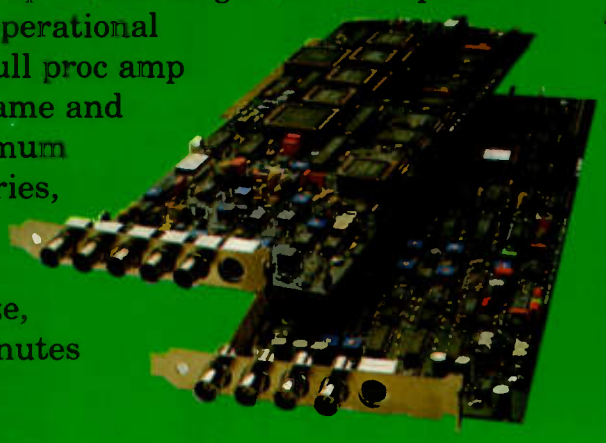

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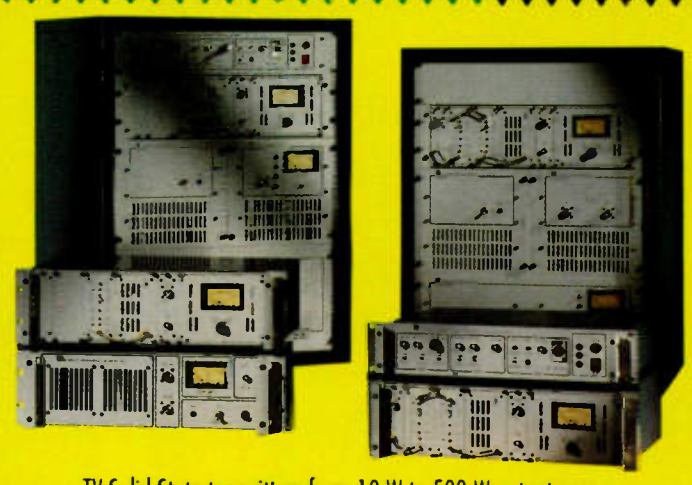

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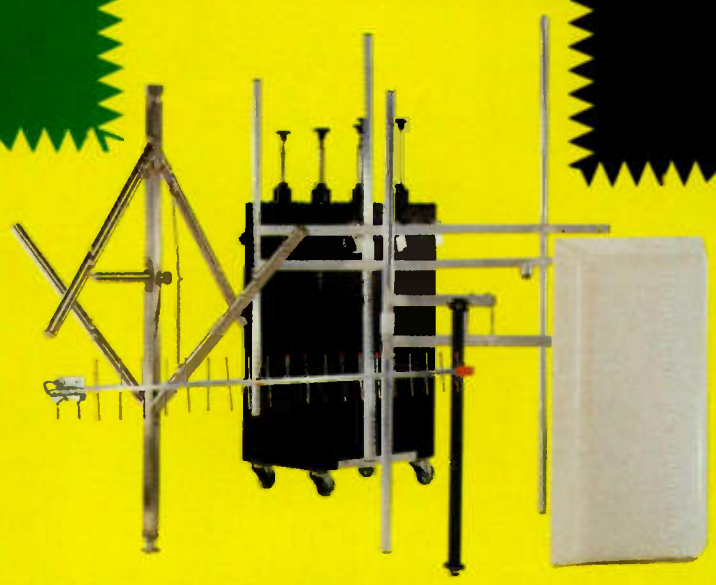

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Making the Most of Contrast

by David M. Clark

FOCUS ON LIGHTING

Lighting for both video and film shares one restraint: contrast ratio. In film, the director of photography (DP) can choose from many different emulsions to suit the mood of his pictures. He or she will light each scene to favor the emulsion in the camera. Occasionally there is a miscalculation or an unavoidable natural circumstance that causes less than ideal results. There are several methods of correcting or enhancing the film during processing — I suppose there are DPs who hate correcting their work later and DPs who shoot casually with an easy confidence that the lab will fix it.

The lighting director overseeing a live video broadcast has no second chance and must work closely with the video shader to arrive at the best combination of contrast, intensity and mood before shooting begins. Video was born as a live medium, and only after the arrival of tape recording have we developed post production capabilities. Current advances in incredibly complex editing techniques are fostering the development of image alteration machinery to correct the color and contrast of scenes that were recorded poorly.

Video was born as a live medium, and only after the arrival of tape recording have we developed post production capabilities.

Certainly, nothing can be done about a live video show. Once each frame is transmitted, there is no way to fix it. And there is the frightening awareness that the final viewing of a program will be on a screen on which color and contrast adjustments have been made by a four-year-old cartoon watcher or an adult whose day job is operating a photostat camera.

In the early days of color TV, the networks decided correctly that viewers would tend to adjust their sets based on skin tone. Early color sets tended to drift often, and adjustment of the controls or the antenna was needed every few minutes. Now cable systems deliver a near perfect and stable picture; our TVs behave with grace.

Meanwhile, the movie palaces where a projectionist proudly coaxed his carbon arc projectors to perform with exquisite delicacy for one film at a time are almost gone from our lives. Economical, modern multiplex theaters require one projectionist to oversee the almost automatic showing of different films to several audiences at once.

I will bet the young crowd of filmmakers and their young DPs are much more open to the instant-replay charm of video and are less frightened by images stored magnetically rather than on a film strip that can be held up to a light. Editing of films transferred to video or shot simultaneously in both mediums is beginning to gain favor because of the incredible speed and manipulation possible with electronic/computer editing systems. We are all coming closer to the total blending of film and tape techniques. I hope we are nearly arrived at the point where we can all simply concentrate on the picture we are composing without the need to compare the method. Perhaps we will end up like fine artists using oil paint and water colors: there are some scenes that are a little more effective in one or the other method, and some artists use both.

In early TV, the engineering staff controlled everything because we all felt they were the best authority on how the equipment worked. I remember a technical director strongly suggesting that I should add light to the darker side of the face of an actor who was supposed to be lit by an oil lamp. I did it even though I did not want a second source; I was afraid that if I did not add the light, the whole system would blow up. I now realize that if the system had remained that crude for 20 years, I would probably have quit out of frustration and gone back to the theater. But I am sure there are similar stories about early film lighting.

Lighting is an important part of making pictures for film or video, but the route from what the camera lens is pointed at in the studio to what the audience sees on the screen or the TV runs through the processing lab or the video controller. As a lighting director, I do not make pictures without help. Nor can the video controller do much about a scene where the lighting is out of balance with the mood. Video does not make pictures, people do.

Years ago, when we in the United States were wedded to 250 foot-candles as an absolute must for TV, I was startled to learn

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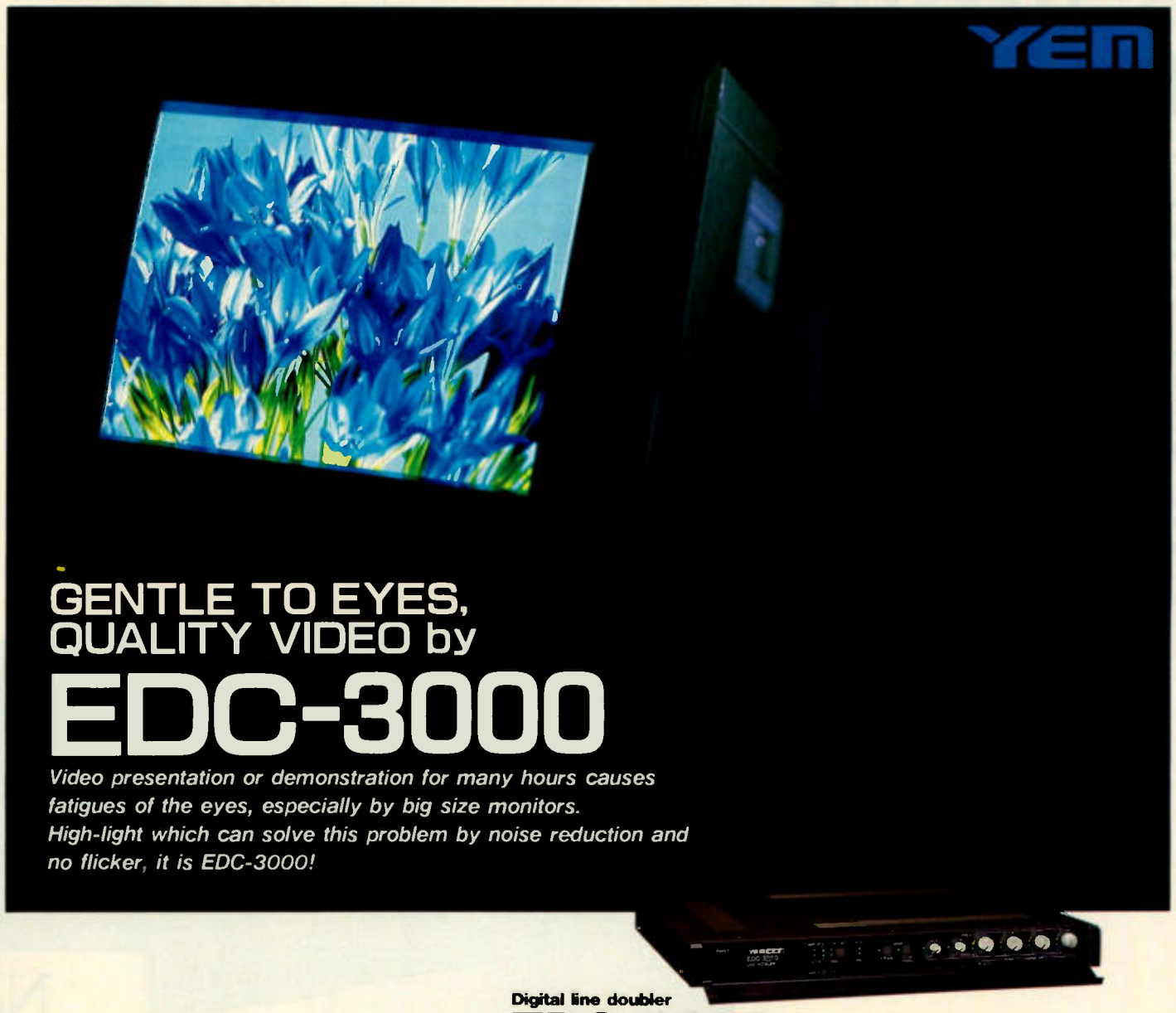


Time Is Crucial During Launch

Putting an 8,000-pound Bird in Orbit Calls for a Well-Organized Operation

by Phil Dubs

VIA SATELLITE

If you don't think that launching a satellite is risky business, then you should think again. Just in the last six months, critical space capacity has been lost to failures of one kind or another.

Pan Am Sat lost PAS-3 in December, and AT&T lost Telstar 402 last summer, not to mention the loss of China's Apstar-2 bird in January. These are three tragic losses the satellite industry will feel for years to come.

But this is not to imply that all launches are doomed; in fact, there is a greater than 95 percent chance a good launch will occur.

BIRD LAUNCHING

Putting an 8,000-pound satellite into orbit is not for the faint of heart. It takes less than 30 minutes to launch the satellite to the transfer orbit, where the launch vehicle and spacecraft part company. Needless to say, the launch is a critical part of the life of a satellite.

In the first 30 minutes, the satellite's ride is like no other for most humans. Like one of my colleagues profoundly said, "launching a satellite is nothing more than a planned explosion."

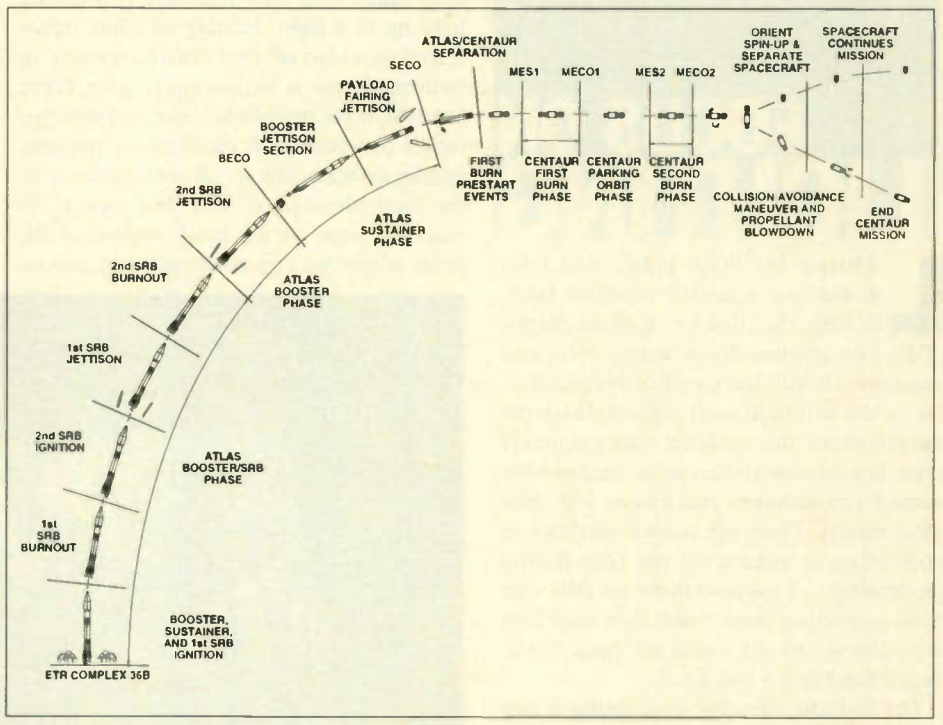
There are only five organizations that launch commercial or civilian satellites worldwide. These are Martin Marietta with the Atlas series and McDonnell Douglas with the Delta series — both of which provide launch services in the United States — Arianespace with its Ariane series in French Guiana, the Long March series for the Chinese and the Proton series for the Russians.

Although each organization uses its own launch vehicle and theories of how to get a satellite into orbit, I will focus on the technique developed by Martin Marietta. The company is responsible for launching INTELSAT 705, which will carry a transponder for my organization, GEMS TV, so it is the one I am most familiar with. With more than 500 launches and 35 years of experience, the company is one of the most successful organizations providing launch vehicles and launch services in the industry.

The launch vehicle consists of:

- A solid rocket booster stage powered by four Thiokol Castor IVA solid rocket boosters(SRB).
- A core vehicle stage (booster and sustainer) powered by Rockendyne MA-5A liquid propellant engines (RP-1 fuel and liquid oxygen).
- A Centaur upper stage powered by two Pratt and Whitney RL10A-4-1 liquid hydrogen and liquid oxygen engines with extendible nozzles.
- A 14-foot metal payload fairing that protects the spacecraft during ascent.

Currently, Martin Marietta launches from the Space Launch Complex at Cape Canaveral Air Station, east of Orlando, Florida, in the U.S. In 1996, a launch complex on the U.S. west coast will have been renovated. This facility will accept the larger Atlas launch vehicles.



This article can only provide a brief overview of the events of a launch, and maybe a better respect for the tremendous accomplishment it is to hurl a satellite toward its final orbit some 35,000 km above the earth. Many criteria must be met prior to "pushing the button."

The Mission Director's Center provides overall management control for the launch. Directors responsible for the mission provide the necessary go/no-go control and coordination. Once all the criteria has been met and just prior to liftoff, the three main Atlas engines and two solid rocket boosters fire. Their performance is verified before Atlas is released from its launch stand.

Once there is liftoff, Atlas begins its initial pitch-over and roll into a prescribed ascent profile to minimize aerodynamic loads. About a minute into the flight, the first two SRBs (solid rocket boosters) burn out and the second set of SRBs ignite. The first pair are then jettisoned when range safety conditions are met.

At about two minutes into the flight, the second set of SRBs are jettisoned, as their

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fuel is expended. At approximately 2 1/2 minutes into the flight, booster engine cutoff occurs (BECO), and the booster section is also jettisoned. For the next two minutes, the Atlas is in the sustainer solo phase. Then, 30 seconds into the solo phase, the payload fairing is jettisoned.

CLIMBING HIGHER

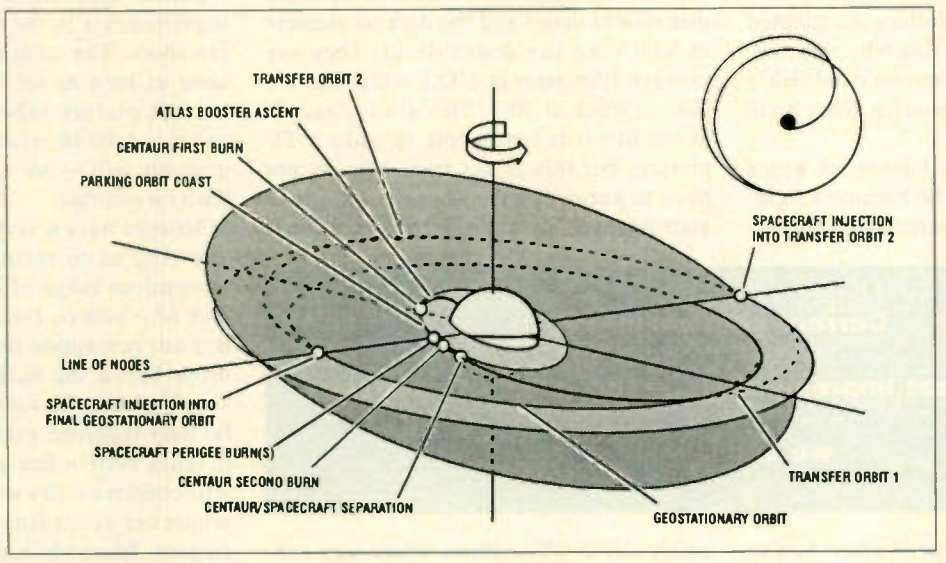
Burning propellant at a rate of 280 pounds per second, the Atlas is now about 100 miles above the earth and 325 miles down range, cruising along at about 9,840 miles an hour. At this point, SECO, sustainer engine cutoff occurs, and it is immediately followed by Atlas-Centaur separation.

The Pratt and Whitney RL-10 main engine nozzles are extended and MES 1 (Main Engine Start) takes place. We are now about five minutes into the flight. The payload and Centaur are now in "First Burn," the longer of two Centaur firings. First burn lasts about five minutes and will place the launch vehicle and payload in a slightly elliptical parking orbit. After MECO 1 (Main Engine Cutoff), the Centaur and payload will coast for about 13.5 minutes.

Once a guidance coordinated start time, which is just north of the equator for launches from Cape Canaveral, is reached, the Centaur main engines are re-ignited for a minute and a half, MES 2. The main engines will put the vehicle into the required geostationary transfer orbit. After the Centaur main engine's second burn, MECO 2 (Main Engine Cutoff) is reached.

The satellite is now separated from the launch vehicle. Just prior to separation, about four minutes after MECO 2, the Centaur provides the required spin up and specific pointing attitude need to put the spacecraft into geostationary transfer orbit.

To preclude recontacting or contaminating the free-flying spacecraft, Centaur will despin and perform a series of maneuvers called a collision and contamination avoidance maneuver. Upon completion of this sequence, the Centaur mission is complete and Centaur will unlock its vent valves and terminate its programmed flight sequence.



Once the spacecraft has been successfully placed into Transfer Orbit 1 by the launch vehicle, the spacecraft's liquid apogee kick motors are used to enlarge the orbit. Enlarging the orbit takes about three to four days.

It takes about three to four weeks for the satellite drift east/west to its assigned parking spot or orbital location. This is done very slowly to avoid overshooting its assigned location and to conserve on board fuel. I should point out that it is this on-board fuel that is used throughout the satellite's service lifetime that keeps it within the assigned "box."

The box, as you remember, is what allows us to have stationary antennas on the ground and precludes the use of moving our antennas as the satellite drifts normally in orbit. Currently, most satellites are kept at least within 0.1 degrees but, some of the newer spacecraft are capable of 0.05 degrees, especially satellites with Ku capacity.

Following a successful launch, the satellite is put through a period of in-orbit testing. These tests could take one to six weeks, and some can be made while the satellite drifts to its final operational orbital location. Test objectives include: verification of deployment of arrays and antennas, system operations, and pattern verification. These tests not only confirm the operational aspects of the satellite, but can be used later as a baseline or reference as the performance deteriorates over time.

We look forward to experiencing the launch of INTELSAT 705 firsthand. We wish both Martin Marietta and INTELSAT good luck and a safe journey to a geostationary orbit. ■

Phil Dubs is director of operations and engineering for Gems Television. GEMS TV, a programming service of International Television Inc., of Miami, provides two network feeds, serving 18 Latin American countries, Mexico, the Caribbean and the United States.

BUSINESS BRIEF

RasterOps Signs Marketing Pacts

SANTA CLARA, California

RasterOps-Truevision, a manufacturer of digital video, graphics and display systems, has forged marketing arrangements with two leading audio-video companies.

In one deal, RasterOps has agreed to lend its name to the Hitachi line of SuperScan computer displays for the Macintosh. Through its Nissei Sangyo America Ltd. subsidiary, Hitachi will manufacture, market and distribute the monitors, while gaining the RasterOps name recognition among Mac users.

RasterOps-branded displays will be available in 17-, 20, and 21-inch models, designed mainly for desktop presentation, graphics design, digital imaging and prepress applications.

In a separate agreement, RasterOps's Truevision subsidiary has entered into an estimated US$40 million multi-year OEM agreement with Avid Technology. The two companies have had a long working relationship in which Avid has incorporated numerous Truevision products into its computer-based non-linear editing and production systems.

For further information, contact RasterOps at telephone: +1-408-562-4200; FAX: +1-408-562-4065, or circle Reader Service 71.

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CONTINUED FROM PAGE 19

Lighting for Contrast Ratio

that the BBC was producing the gorgeous translucent pictures on "Masterpiece Theater" using 75 foot-candles. The British were not as advanced with air conditioning at the time, so 75 fc was all the heat they could stand. And they were using a four-tube Marconi color camera, a notoriously insensitive beast capable of a nice color image only if presented with tons of flat light.

The secret was in the video control. In credits, the Brits list their video shaders as vision controllers, which is closer to describing the art of people who understand every potential of the camera they are controlling and bring forth a level of performance that inventors of the camera never dreamed of.

I believe electronic cameras are like bottles with warning labels full of things we should not do. There are some video shaders who do not believe the label restrictions and pull the cork to release the Genie hidden inside. The manufacturers do not knowingly install the Genie and would be upset at the suggestion that anything so whimsical and unpredictable could be found inside their marvelous scientific box.

So maybe it is good that not every video controller believes in the CCU Genie. The chroma key plate behind the news is probably not a good place for him (or her) to play. My first question when I arrive at a studio to light a show is, "Who (and where) is the video controller?" By this time in my life, I have worked with most of them, but there are still surprising new ones. Most video controllers are pleased that a lighting person cares who they are, and it does not take long to establish a working relationship based on mutual aid toward a common goal.

One lighting director I know of was a video controller before he became a lighting director about 20 years ago. His personality and his background allow him to insist on setting the iris on all cameras to which he will light accordingly. Most of us have to suggest what we want to accomplish and try to make the video controller want the same thing. Actually, this team approach is very workable because the controller may notice things I miss and I might discover a problem that he is not aware of.

I see by reading this up to this point that I have drifted away from the opening sentence about contrast ratio in film and TV. Contrast ratio describes the relationship between the brightest element in a picture that retains detail and the darkest element in which we can detect detail. They say average film ratio is 100:1 while the TV ratio is stuck at 30:1. This always sounds to me like it is impossible to make a TV picture, but this is not true. You do not have to know exactly what the ratio is in your picture. All you have to watch for is embroidered white shirts where you cannot see the detail and the shirt becomes a solid white blob. Also look for dark suits that show no texture. Both are outside the possible contrast range of the TV picture tube.

Current chip cameras have made great improvements in the range of excesses we can shoot.

If the shirt is changed to a gray one and the dark suit for a lighter one, we will regain full detail. The reason video must not compensate for either excess is because we are determined to retain consistent skin tone. The shirt does not say anything — the face is where the sound comes from. If we are selling the white shirt, we can take a separate shot of it for which video can iris down so that we see the embroidery. If we widen the shot to include a face at the same iris setting, the face will be dark and muddy. The white shirt and the dark suit may be OK by themselves, but they cannot appear together in the same picture.

Current chip cameras have made great improvements in the range of excesses we can shoot. The contrast range remains the same as long as we view our pictures on current picture tubes. Even if changes occur in tube or screen design — as they probably will — we will always face some limit on contrast.

Our eyes have a very high contrast ratio, allowing us to record in our minds the tremendous range of highlights and shadows of a sunset, for example. We notice that our perception improves once the sun drops below the horizon. (Perhaps there should always be some scenes that cannot be fully recorded except in our minds.) It is fairly certain that people with cameras will continue to try to stretch the limits of whatever recording medium is in the camera. Meanwhile, it is almost time for our six o'clock news broadcast, so I must look for burnouts and see if the anchor has enough phone books to sit on. ■

David M. Clark is lighting director for Imero Fiorentino Assoc. in New York. He has won two Emmys and received numerous additional nominations for his work, and he is also a creative graphic artist, photographer and scenic designer.

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CONTINUED FROM PAGE 16

Digital Standards Need A Global Perspective

changing from 30 frames per second to 25 frames per second, but in fact there was a problem. When NTSC was developed, the color subcarrier was put at an odd multiple of half line-frequency to minimize chrominance/luminance crosstalk.

CARRIER BATTLES

It was then discovered that on the transmitted signal, the color subcarrier was beating with the audio carrier. Since the RF carrier frequencies could not be changed, the color subcarrier was moved down slightly in frequency, and since this frequency has a fixed ratio to the line and frame frequencies, they were all moved down in frequency by the same ratio.

This was of no consequence until the BBC engineers built their first color converter with its 6/5 frame-rate ratio. The converter offered a choice of two outputs.

One output had the correct PAL subcarrier frequency but incorrect sub-carrier/line frequency ratio. This meant that it could be broadcast and PAL receivers would display a color picture, although there was more chrominance/luminance crosstalk than with a correct PAL signal.

The other output maintained the correct subcarrier/line-frequency ratio, which was essential for professional VTRs, but both frequencies were slightly low in absolute terms. This meant that the color subcarrier was out of tolerance, and a PAL receiver would display only a black and white picture with this signal. However, a VTR could record the signal and replay it correctly, with the VTR locked to station sync in replay mode.

Subsequent converters were able to overcome the above problem, but it illustrates the need to keep a global perspective when setting new standards.

The world of component digital transmission offers new opportunities for creating harmony or chaos. Hopefully there will be more of the former and less of the latter. ■

Brian Flowers is head of service and project manager for the European Broadcasting Union's new Eurovision Control Center in Geneva. He studied engineering at the University of Southhampton and served for two years in the Royal Air Force before joining the BBC. In 1962, he was assigned to the EBU's control center in Brussels and has since worked at numerous levels of responsibility for the center. He is a member of the Royal Television Society.

Noise Comes from Many Sources

by Ken Hahn

AUDIO FOR VIDEO

Many technologies have significantly advanced the current state of audio for video. The result is improved audio quality along the entire audio chain — from microphone to audience. But certain conditions endure outside the realm (or, I should say, beyond the budget) of even the most sophisticated technology.

The situations of pertinence regarding audio for video are cases in which the words of an on-camera character need replacing. The visuals are appropriate, but the audio is for one reason or another unacceptable. Replacement of the dialogue is accomplished via a process know as ADR (Automatic Dialogue Replacement) or looping.

FROM THE BEGINNING

This procedure is not the result of a "cutting edge" technology, although new technologies can facilitate the procedure. Application of the ADR process by the motion picture industry has occurred since sound was first married to picture.

Audio technicians are challenged on a daily basis with production dialogue tracks that cannot be sufficiently repaired by any of the processes at their disposal. It is in these situations that they are presented with two alternatives: Either make the best of the problematic audio (in other words, live with it), or replace it with re-recorded (looped) dialogue.

There are innumerable reasons why production dialogue tracks can be labeled unacceptable.

There are innumerable reasons why production dialogue tracks can be labeled unacceptable. It is customarily assumed that dialogue is replaced for "technical" reasons. These can be classified into several groups.

Items under the heading of "equipment failure" encompass such problems as an intermittent audio cable, weak battery on an RF microphone transmitter and dropout on the recording medium. Also included is any other misaligned or defective equipment that can distort or inhibit the recording of quality audio.

Another classification is noise inherent to the shooting location. One example would be the sound of a passing distant aircraft ruining the production dialogue track of an otherwise perfect take of an ancient battle. Traffic noise, especially sirens and horns, make the recording of dialogue tracks that are otherwise free of obtrusive sounds extremely difficult in metropolitan areas.

Another category of problematic noise is that generated by the production itself. The massive power generators needed for artificial lighting are the most common noise producers on any shoot.

The "noise" inherit to the location (cheering crowd at a baseball stadium or locomotives in a rail yard) can be so loud as to mask dialogue. Placement of the camera, props, set design or costumes may not allow the location sound crew to place the recording devices within adequate range of the actors and remain out of the view of the camera.

Extraneous noise is not the only reason that dialogue may need looping. Dialogue from one character may overlap that of another, and the overlapping dialogue of both characters may be obscured by yet another voice.

Also, the director may not like the delivery of dialogue because it lacks the proper enthusiasm or inflection. In extreme cases, every word and utterance from a character has been replaced using the voice of another person.

The majority of dialogue replacement that takes place is for films and videos that are "dubbed" into a language other than that of the on-scene actors and actresses. The alternative is to use sub-titles to translate the dialogue into the alternate language. Every film slated for foreign release requires delivery of an M & E (music and effect) track. This track is comprised of every sound in the film, minus the primary spoken words. When combined with the newly recorded foreign language track, it completes the final sound track.

I have never met anyone who claims to thoroughly enjoy the ADR process. It can be frustrating, time-consuming and costly. But it does yield excellent results when all parties perform their appointed tasks. The best ADR is that which goes unnoticed by the viewer, so it is certainly a thankless job. Audiences see it every day, and most of it goes unnoticed. ■

Ken Hahn is co-founder of New York's Sync Sound and has received three Emmy awards and 12 ITS Monitor awards for his work. He may be reached c/o ***TV Technology.***

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Quality Sets Require Effort

by Dennis J. Hamilton

SPECIAL REPORT

When a television production displays forethought and planning, it shows characteristics of a "quality" piece of work. Talent that is rehearsed, professional and cast correctly for the shoot lends an aura of quality to a program.

Good camera work, shot composition and "clean" audio also leads us to evaluate a production as one containing an element of quality. I could go on, and I think most would agree that these are some of the basic attributes that contribute to what most people would consider a good quality program.

SET DESIGN

Another specific area that needs addressing, especially in the corporate and industrial television market, is that of set design. With a big enough budget, a professional set designer and a builder evaluate your needs and create the perfect set for you. But if you had that kind of budget, you would not be reading this article.

There are some very basic premises to consider when putting together a set. One is to design a set for multiple applications.

Consider what the people in the marketing department do for the people in research and development. Before the creative wizardry goes into the latest device, someone goes into the field and finds out what people want, how they will use it and exactly how much they will spend for it. Wearing the cap of the set designer in your facility, you need to ask the same questions.

What exactly do we need in a set? Do we need something for our "talking heads" quarterly reports, scheduled teleconferences or other applications from some of the more demanding clients? The answer is "yes." Think of a design that will allow you to move several pieces of furniture to fulfill your varied needs.

Most importantly, talk to your staff, bosses and clients and find out what they expect this set to do for them. Remember, in this situation, it will be better to please everyone as much as possible than to please one facet completely at the expense of the others. Make it functional and purposeful for many situations. Remember, the marketing department tries to envision all sides before deciding upon one. You must do the same to be efficient at this task.

Watch other productions and take the best of all you see, incorporating it into your designs. Make your set dimensional and layer your backgrounds. This means that you should not paint the company logo on a backdrop. Instead, using "foamcore" or an even more-permanent wooden material such as plywood or gypsum, "layer" the logo and give yourself some distance from the set so shadows will appear, thus further enhancing the appearance of depth and dimension.

Watch other productions and take the best of all you see, incorporating it into your designs.

At this point you may want to contract a local printshop or artist to professionally put together your logo for the set. There is no place for an amateur in reproducing your logo. Also note: The logo should appear on the set more than once.

I remember visiting a television station in the U.S. and watching the director of public affairs tape a short piece on "Community Involvement in Local Government." The topic was not nearly as interesting as the fact that upon close scrutiny, this shot of a man leaning on the front of his desk contained no less than six station logos. These included ones on his lapel pin, coffee cup and pencil holder to the framed logo hanging on the wall, an Emmy Statuette with a brass logo inscription and a translucent desk lamp shade with the station logo barely visible unless pointed out. Was this subliminal suggestion? Possibly. But there remained little doubt as to what station you were watching during that editorial.

Whatever you decide to do with colors, just remember to beware of the color red. As many are aware, red and television do one thing together, they bleed.

Use fabric to cover your surfaces instead of paint. Not only does it give the set a "warmer" feel and a "softer" look (even when using bright colors), but it greatly aids the fight against poor acoustics, thus improving your entire set. A commercial-grade stapler and a local fabric store can provide the raw materials necessary to cover your set. You will be amazed at the transformation that fabric — especially soft, solid flannel — will make to an otherwise boring set. Try a royal blue or a rich lighter shade of green — you may be surprised.

CREATIVE USES

Another thing to remember is how the clientele will use this set. Are you building a multifunctional set for many different clients or is this just for your weekly TV magazine that goes out on a regular basis? Try to imagine all of the changes in camera angles, furniture placement, artificial plant placement and working props that will allow your set to appear different to the viewer. Like it or not, your set is going to be visible to the viewer and the client.

If the set is for one particular shoot, consider building in different angles. This will offer the appearance of different sets when shot from a different angle. Do not be afraid to build two sets in one spot that may appear to contrast each other.

The contemporary backdrop on one side with the glass and chrome may become a welcome alternative to the "study" set on the other side with its wooden bookcases, leather chair, dark oak desk and banker's light.

It is also good to remember that this chrome and brass, if not located properly, can create some problems with your cameras that even the old hair spray treatment may not correct. Your set will make some very definite statements about your client, so design for your market.

One more thing to keep in mind is how much are you willing to spend. Your budget will dictate what materials you use for your set. But it does not need to dictate how good your set will look.

Solid granite trimmed in oak makes a beautiful counter top for your anchor, but you can find some beautiful Formica that a good carpenter can turn into a formidable comparison. The 2-inch granite runs around US$1,500, while the Formica and carpenter would total about US$300.

Whatever you decide to build, build it to last. I have visited facilities with large budgets that have sets held together by gaffer's tape, bricks and coat hangers. How much more would it cost to use plywood, carpenter's glue and wood screws?

If it has to be mobile to share space, put it on wheels. If you do not build it well with the resources you have, what good is the money you have saved when you loose the client because the set landed in its lap during your last live shoot?

And last, but not least, be resourceful in your creativity. ■

Dennis J. Hamilton is television coordinator for TPS Television in Trenton, Michigan. He has authored more than 30 articles related to television production and has toured the country speaking on production and production techniques. A freelance producer, Mr. Hamilton has two master's degrees, one of them in television production.

BUSINESS BRIEF

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Circle 96 On Reader Service Card

Systems vs. Equipment

by Craig Johnston

PRODUCTION MANAGER

Salesmen sell you equipment, but as a production manager you buy systems. That may seem like semantic quibbling, but I have found it is helpful to think that way when purchasing capital budget items.

Maybe it is easier to think of it this way: Equipment is what shows up in a box on your loading dock. A system is what is useable when it is installed in your rack.

Purchasing systems instead of equipment has at least two advantages. One is that it should help you avoid buying products that look good in company demonstrations but do not perform on the job. Another is that buying a system will help you evaluate the total price of a purchase because you will be thinking of all the peripherals necessary for a piece of equipment to do its job in your shop.

FITTING IN

When you are getting a sales demonstration on the "equipment," you are being shown various capabilities. Speed of operation, resolution, user-friendliness, and so forth are all "equipment" features.

But when it comes time to buy, you need to look beyond capabilities and ask how it is going to fit in your shop.

Signal path is a good place to start. Many of the video and audio devices we buy have some place to input a signal. What kind of signal does it take? Composite analog? Component? Which component? RGB? Digital? Which digital?

Output needs to be examined in much the same way. If the signal the equipment puts out is not compatible with your routing system, then you are going to need a format converter. In addition to the added expense they create, these converters take a toll on the signal itself, which also needs to be factored into the performance equation.

And just because the input and output of the equipment is compatible with your facility's routing switcher does not mean you have the routing capacity to handle it.

Then there is the question of control. As options, many pieces of equipment offer an array of operator control devices. For some multifunction equipment, each different function is done optimally well using a different control device.

I have found the best way to get advice on which control devices to purchase is to ask the free-lance operator hired by manufacturers to demonstrate their equipment at exhibitions.

And it is important to think beyond equipment's own control devices to automation and editor control. Does the device accept serial control? If it is to be installed in an edit bay, does it require more GPI triggers than your editor can support? Can you buy more?

Then, of course, there are monitors. Many pieces of video equipment are useless without video monitors. Often you need one good color monitor for each video channel, plus a menu monitor. You need to have monitors to turn many pieces of equipment into useable systems.

REMOTE CONTROL

Where is the equipment to be installed? Thankfully, much of the modern crop of video equipment generates a small fraction of the heat given off by its predecessors. But for environmental, cabling and maintenance concerns, the main "black box" may need to be installed in a central location in your plant while the controller and monitoring will be installed in a workstation console that could be hundreds of feet away.

Keeping this distance between the operator and central processing unit is important to remember during a product demonstration where everything is usually together on a tabletop. If, in the real world, the operator is going to have to run down a long hallway and scale two flights of stairs to reset a locked-up character generator in the heat of a live production, a different model — one with a reset button on the keyboard — may look a lot more inviting.

With all of these factors in mind, it is clear that thinking "system" instead of "equipment" can help you steer clear of lots of unhappy surprises later on. ■

Craig Johnston is the production manager at KDRV-TV in Medford, Oregon. Write him care of TV Technology.

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TECHNOLOGY UPDATE

Teko Telecom Clearing a Path

by Graziano Nanni
Sales Director
Teko Telecom

BOLOGNA, Italy

Recently, Teko Telecom was awarded a contract to construct a system for delivery of a PAL vision signal and four monophonic audio signals using a single-directional radio link.

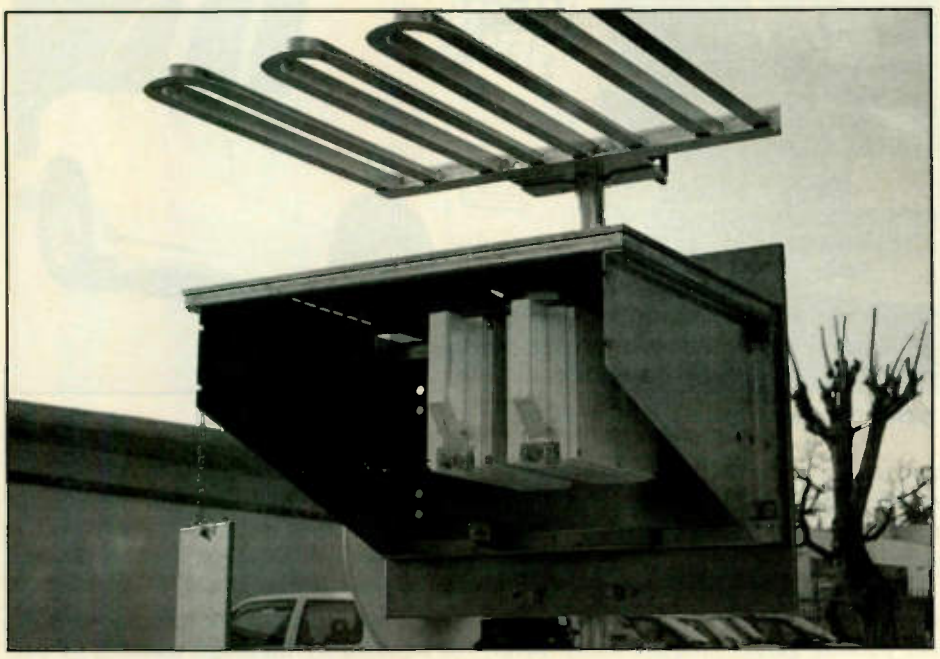
The signal was to originate from a central broadcast site and be transmitted to a primary receive site, which could also act as a repeater for additional users.

The system, requested by a regional broadcast station, was intended to transmit the TV signal with stereo sound and an FM radiophone stereo signal.

The equipment that Teko Telecom provided consisted of two separate units: one for outdoors and another for indoors. The outdoor unit is a fully water-tight structure that contains the transmission converter (from FI2 to RF) and the receiving converter (from RF to FI2). Both units are situated inside a mast support that protects the units from direct sun and heavy rainfall.

In such a configuration, the equipment can remain in areas with temperatures between -25 and +55 degrees Celsius. Temperatures as low as -45 degrees C are also achievable, although with diminished performance.

The indoor unit, suitable for temperatures between 0 and 45 degrees C, consists of either a converter from 70 MHz to FI2 with a TX remote feeding and control device for the outdoor units, or a converter from FI2 to 70 MHz with an intermediate frequency filter, and AGC and an RX remote feeding and control device for the outdoor units.



Teko Telecom offers a range of portable and fixed link systems.

CABLE CONNECTION

The outdoor units are connected to their respective control units by means of a coaxial cable. Distances between the units and the control devices can reach 300 meters. For distances up to 100 meters, we suggest using RG214 coaxial cable, which can be easily installed in most buildings. More than 100 meters requires 3/8-inch cable.

The coaxial cable is also utilized to feed the outdoor units and to carry alarm, transmitted power and received field signals back to the central facility.

The modulation/demodulation units are located inside the subracks, which receive the power supply from the control units. The control units also have the ability to be self-powered.

The transmitting and receiving converters are situated in the vicinity of the antenna, permitting us to reduce the connecting feeder to the lowest possible lengths. This helps obtain optimized attenuation for the waveguides.

SMALLER IS BETTER

Added up, these minor savings allowed us to use parabolic antennas of a smaller diameter, making it easier to assemble the connecting RG214 cable header/inner unit.

Locating the RF heads close to the antenna provided us with considerable space. This is due to the use of a cheaper coaxial cable, as opposed to the waveguide, which can be installed more easily. While this makes it more difficult to access the RF converters to make repairs or change the frequency, we felt this was a good trade-off because the converters do not require regular maintenance, and Teko Telecom guarantees a very high mean-time between failures.

...the equipment can remain in areas with temperatures between –25 and +55 degrees Celsius.

The outdoor units are very light, and attaching them to the container of the antenna is possible through quick fasteners that do not require the use of tools.

As the installation is in an area that is subject to ice formation, we applied ice protection above the mast container.

After considering the data we obtained during the investigation of the site, we decided to use the 6 GHz band for the A-B link. This will reduce the fading and attenuation affects caused by rainfall. In such a long connection, rain attenuation could have produced a considerable affect.

For the B-C link, we chose the 10.3/10.7 GHz band, which offers the possibility of using smaller parabolic antennas by exploiting the better efficiency of the antennas themselves.

We designed the dimensions of the antennas so that the system could receive sufficient power to allow the link to be used 99.9 percent of the time. The dimensions are:

A-B LINK

Equipment:
Transmitter Power: 30 dBm
TX/RX Feeder Attenuation: 0.3 dB
Receiver Noise Figure: 6 dB
Receiver Threshold: 75 dBm
TX/RX antenna gain (Ø3m): 43 dB

Path Characteristics:
Attenuation in Free Space: -145.5 dB
Fading Level for less than 20 percent of worst month: 17.35 dB
Attenuation due to rain overcome for 0.01 of the time: 6.2 dB

Estimated Receiver Field Values:
Level Received without Fading: -30.1 dBm
Margin concerning threshold under worst conditions: 21.3 dB

B-C LINK

Equipment:
Transmitter Power: 30 dBm
TX/RX Feeder Attenuation: 0.5 dB
Receiver Noise Figure: 6 dB
Receiver Threshold: 75 dBm
Antenna Gain: 41.5 dB

Editor's note: The opinions expressed above are the author's alone. For further information, contact Teko Telecom in Italy (Telephone: +39-51-625-6148; FAX: +39-51-625-7670), or circle ***Reader Service 73****.*

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USER REPORT

Frontline OB Van Is WGN's Top Choice

by John R. Hampson III
Engineer
WGN-TV

CHICAGO

I love building live OB vans. Well, to say it more accurately, I love designing live OB vans — Frontline Communications of the U.S. is the actual builder. So far, I have designed three vehicles, all part of the WGN fleet of live trucks.

WGN operates mobile units to gather live news and cover events seven days a week, every day of the year. At WGN, we have some unique requirements for our mobile units, which I suppose every station has for its trucks. This is why choosing a builder is so important.

I was looking for a builder who would not try to force the idea of a "standard" OB van. Although easy to build, a "standard" OB van does not work best for our application. Luckily, Frontline listened to our needs and agreed to build the truck we wanted, while also making some great suggestions.

WGN was a tough customer for Frontline. By the time we were ready to place the order, we knew exactly the type of equipment, features and interior layout we wanted. Building a remote vehicle presents a challenging series of compromises, and a van presents the biggest challenge of all because of the limited interior space.

INITIAL PLANNING

Before I begin designing, I meet with everyone who will be driving, operating and servicing the truck. I also meet with competitors because good ideas come from experience. Our field operations personnel are "married" together as crews; each crew is made up of a technical operator and a camera person, both photojournalists.

During our design meetings, all are encouraged to present ideas — from the field crew members to the maintenance staff. We receive valuable input from these meetings. We learn the importance for the maintenance staff to have easy access to the rear of the racks, reasons for

WGN's custom-designed van from Frontline

providing all generator and air compressor maintenance from outside the vehicle, and the location of the pan/tilt controls and AC outlets.

We need a tall mast to cover the Chicago market. However, some overpasses (and our parking garage) require short travel clearance. This means recessing the mast into the floor of the van. WGN and Frontline agreed that the proper place for a mast in an OB van is at the rear of the vehicle, behind the racks.

This location provides good weight distribution and balance, as well as added work space in the operations area. Also, keeping the mast away from the driver's position makes the vehicle safer in case of a traffic accident. Special attention must be paid to heating, cooling and insulation because of Chicago's cold winters and hot summers. The on-board electrical systems (generator, inverter and "shore power") must be simple, safe, reliable and easy to maintain.

The interior design proposed by Frontline gave us the most usable rack space of any OB van.

LOOKING THEIR BEST

Sometimes our trucks are part of our news shots, so we felt that WGN trucks must be the best-looking vehicles in the business. To us, the overall appearance, fit and finish of Frontline vehicles is important. Our vans probably have more production capabilities than most stations require for OB — ergonomics are very important because space is at a premium inside the van.

We required video and audio system redundancy and lots of communications, including multiple cellular phones, two-way radios and wired and wireless IFB. The interior design proposed by Frontline gave us the most usable rack space of any OB van. All our equipment was accommodated, and there is even rack space left over for future growth.

Safety is one of our biggest concerns. It seems that there are far too many opportunities to hurt yourself or damage your equipment during the course of covering live news. Much of our safety awareness is handled by thorough training of our operators.

Our Frontline vans have a carefully designed system of alarms, warning lights, interlocks, floodlights and beacons to assist and protect the crews. The communications antennas are mounted so that RF energy is shielded from the interior of the van, and we have "Transmitter On" lights that are illuminated whenever the microwave equipment is energized. The vehicle also has warning and information placards posted at all positions to remind even the most careful operator that safety comes first.

Our Frontline-built vans and trucks excel in all these categories, and to say that we are pleased with them is an understatement. Our working relationship with Frontline has been a good experience for both companies.

We have exactly the vans we want, and Frontline has new ideas to incorporate into its trucks in the future. We hope some of our experience will trickle down and make broadcasting from the field easier, safer and more comfortable for us all.

Editor's note: John Hampson has been working at WGN-TV since 1981. Prior to this, he worked for public and private networks and stations in the U.S. He is a member of NATA, ITVA and NAB.

The opinions expressed above are the author's alone. For further information, contact Frontline in the U.S. (Telephone: +1-813-541-4441: FAX: +1-813-541-7116), or circle ***Reader Service 66.***

BUYERS BRIEFS

TFT Inc. has introduced the DMM-92 spectrally efficient digital studio-transmitter link modem designed to deliver digital audio and data.

The system provides 256 kbps stereo audio, two 64 kbps SCAs and a 6.9 kbps data stream along a 75 kHz composite baseband. This allows the system to transmit digitally over existing 950 MHz STLs without equipment modification.

The system is compatible with virtually all analog-to-digital codecs, including MUSICAM, APT-X, Dolby, OKI and numerous other algorithms.

For further information circle ***Reader Service 72.***

Standard Communications has introduced the Omni Global VU CAM830/830I control access module designed for full automation of satellite facilities.

The unit is an upgrade to Standard's MT830 satellite receiver, offering access to and control of all essential functions, including video and audio output levels with individual channel memory, as well as automatic scan modes for RF frequency and audio subcarriers. The unit can be easily retrofitted into any existing MT830 installations, but it is also available as a factory-ordered accessory.

The access module offers control of up to 30 receivers, which can be located at multiple off-site facilities. The unit allows operators to preview, edit or replace receiver profiles on an IBM-compatible PC. It features a single-level menu for quick programming of formats, all within a Windows environment.

The international version of the CAM830 demodulates PAL, SECAM and NTSC, while both versions can select different satellite feeds and transponders at any time using an automatic timer menu.

For further information, circle ***Reader Service 134.***

N Systems Inc. (NSI) has available the Stiletto line of high-performance antennas featuring an advanced asymmetrical reflector and a state-of-the-art asymmetrical offset feed for reduced wind load.

The reflector is available in 4 x 8-foot and 3 x 6-foot designs, capable of operation in 2, 7, and 13 GHz bands.

The offset feed design prevents under- or over-illumination and provides lower sidelobes for better directivity and isolation.

For further information, circle ***Reader Service 19.***

Ikegami Electronics has delivered the new PP-90 portable video link for wireless transmission of one video and two audio channels.

The system features waterproof housing and is compatible with various types of antennas, such as parabolic and horn-type.

Operators can select from 12 preset channels within the 1.3-18.8 GHz band, and it can also be used as a relay station with the unit's 70 Mhz IF input and output.

Weighing only 3.5 kg, the system also features a color bar generator and a 1 kHz audio tone generator.

For further information, circle ***Reader Service 104.***

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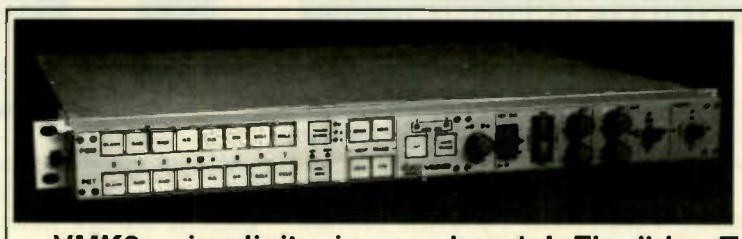

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- BKGD - presets the transition from the video of the PGM BUS to the one selected on the PST BUS.
- KEY1 - presets the insertion ON/OFF of the KEY1 signal in PGM.
- KEY2 - presets the insertion ON/OFF of the KEY2 signal uponKEY1 signal.
- FTB - Presets fading to black and reopening of PGM.

Applications: O.B.Van, little TV studios, control rooms, training studios, emergency mixer, wherever the room is minimum, transportable rack equipment, etc.

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- Multilevel effects
- Preset next transition
- Simultaneously transition among Program, Preset, Key1, Key2
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- Linear insert KEY1, KEY2 (transparent effect)
- Fade to black
- Effects preview
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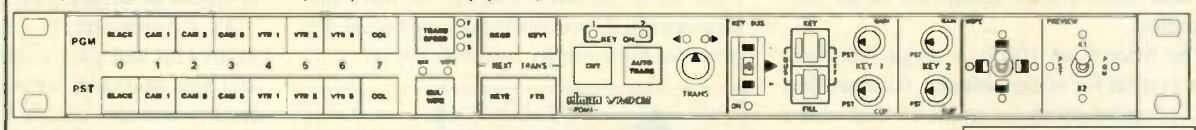
- Optional: 1 rack unit remote control panel connected by RS422



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MARKETPLACE

HIGHLIGHTING THE LATEST PRODUCTS AVAILABLE TO PROFESSIONALS IN THE VIDEO INDUSTRY.

STILL STORE

Pinnacle Systems has provided the Flashnet Plus still storage and video network system using Hewlett-Packard video server technology.

The system manages hundreds of thousands of still images from 10 or more workstations on a single network via a PC-based open-architecture platform.

Flashnet Plus supports both NTSC and PAL in analog composite or component or serial digital formats using 4:2:2:4 signal processing. Linear keying is also available.

For further information, contact the company in the U.S. at telephone: +1-408-720-9669; FAX: +1-408-720-9674, or circle **Reader Service 15.**

MASTER CONTROL

Odetics Broadcast has introduced the MicroCart family of spot delivery systems, combining videotape and optical and digital disk recorders for automated on-air presentation.

The MicroCart 100 is a single spot-per-cart system for station breaks, commercials and programming in small to mid-sized broadcast operations.

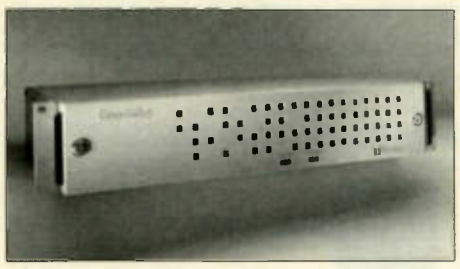
Scheduling and sequencing is controlled by an IBM PC-compatible computer with Windows-based software from which operators can perform edits right up until air time.

For further information, contact the company in the U.S. at telephone: +1-714-774-5000; FAX: +1-714-774-9432, or circle **Reader Service 28.**

VIDEO CODEC

Grass Valley has introduced the J Series multichannel DS3 video codec offering JPEG compression for the processing of digital video, audio and data.

The unit features full-motion and full-color Betacam SP-quality resolution and CD-quality audio.



The J Series is available in a range of configurations, with a single module offering up to four channels of video, each with four channels of audio.

For further information, contact Grass Valley in the U.S. at telephone: +1-916-478-3000; FAX: +1-916-478-3187, or circle **Reader Service 80.**

TELETEXT MANAGEMENT

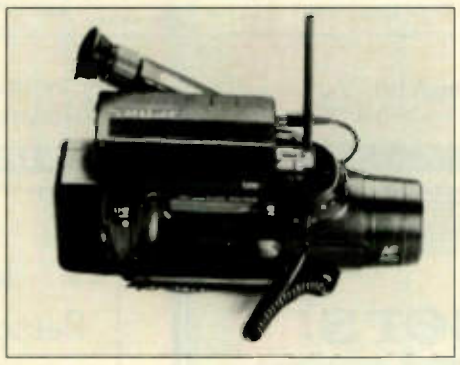
Intelfax Developments has launched its new Vitesse teletext management system, consolidating all teletext components under a LAN environment.

Based on client-server networking standards, Vitesse offers a powerful database and transmission management facility using standard PC hardware.

For further information, contact the company in the U.K. at telephone +44-171-928-3044; FAX: +44-171-928-1836, or circle **Reader Service 131.**

WIRELESS TRANSMITTER

The new VP line of wireless systems from Shure Brothers consists of three battery-operated receiver/transmitter combinations for high quality sound delivery.



Features include mirror imaging, audio processing, separate squelch and monitor adjustments, a balanced mic level output and a headphone jack.

Central to the system is the VP3 portable receiver, an eight-ounce unit that delivers up to seven hours of operation.

For further information, contact the company in the U.S. at telephone: +1-708-866-2200; FAX: +1-708-866-2279, or circle **Reader Service 84.**

STUDIO LENS

Canon is providing the J20 series of studio lenses featuring an access window for easy maintenance, an external LED indicator system and a computer-controlled four-position turret.

The lens's internal focusing system offers wide-angle operation with reduced distortion and minimal variation of chromatic aberration while focusing.

Also featured are shielded belts to counter RF noise, anti-reflective paints to reduce ghosting and low-reflection coating that cuts down on flaring.

For further information, contact the company in Japan at +81-44-733-6111; FAX: +81-44-711-2317, or circle **Reader Service 11.**

KEYER/MIXER

Oxtel Ltd. has developed EasyMix, a low-cost down-stream keyer and AB mixer for component serial digital operations.

As a down-stream keyer, the unit provides clip and gain controls, linear keying and key masking, as well as a key invert facility and anti-aliased keying.

In mixer mode, it can fade or wipe between two program inputs either manually or automatically using an autotransition function.

For further information, contact the company in the U.K. at telephone: +44-1235-510-000; FAX: +44-1235-511-000, or circle **Reader Service 29.**

ALIGNMENT GENERATORS

Philips TV Test Equipment is offering the new PM line of hand-held color alignment generators designed to operate as separate instruments or as a unit with a color analyzer.

The PM 5639/82 and PM 5639/83 provide all signals needed for daily maintenance of color monitors, including PLUGE for cut-off adjustment, window signals at various levels for color reference adjustment and split-field or SMPTE color bars for chroma gain and adjustment.

For further information, contact the company in the Netherlands at telephone: +31-407-88620; FAX: +31-407-88256, or circle **Reader Service 1.**

INPUT BOARD

Optivision Inc. has released the OptiVideo digital video input board for inputting digital component or analog video into a personal computer.

The board connects to the company's OptiVideo MPEG encoder to offer real-time audio and video compression and is compatible with Optivision's digital video filter board.

For further information, contact the company in the U.S. at telephone +1-415-855-0200; FAX: +1-415-855-0222, or circle **Reader Service 52.**

CHARACTER GENERATOR

Aston Electronic Design has delivered the Ethos character generator offering two broadcast-quality output channels.

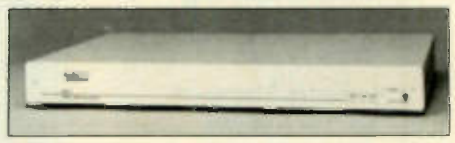
Through an innovative internal architecture, Ethos provides high-speed operation and a range of features suited for live on-air operation.

For further information, contact the company in the U.K. at telephone: +44-252-836-221; FAX: +44-252-837-923, or circle **Reader Service 113.**

TEST MANAGER

The new GAT-1 GPIB-to-APIB command translator from Audio Precision allows test equipment using the proprietary Audio Precision Interface Bus (APIB) to operate response commands from IEE-488 General Purpose Interface Bus (GPIB) controllers.

By using the GAT-1, users of APIB equipment, such as Audio Precision's System One. can operate all test and measurement functions using either APIB or GPIB controllers. In addition, the unit allows APIB modules to be combined with GPIB devices.



The GAT-1 operates independently of audio analyzers, allowing specialized industrial systems for DC measurement or switching to be configured using GPIB controllers.

For further information, contact the company in the U.S. at telephone: +1-503-627-0832; FAX: +1-503-641=8906, or circle **Reader Service 55.**

MINIATURE MIC

The KM 184 from Georg Neumann GmbH is a miniature microphone representing the combination of the company's KM 84 condenser mic and the transformerless circuitry of the KM 140.

Frequency range is 20-20.000 Hz with a maximum SPL of 138 dB with 0.5 percent THD. .

For further information, contact the company in Germany at +49-30-4177-240; FAX: +49-30-4177-2450, or circle **Reader Service 86.**

Send new product press releases along with black and white photographs to: **Marketplace Editor, P.O. Box 1214, Falls Church, VA 22041**

USER REPORT

RF Tech Forges Link for Prego

by Rubén Montés
Chief Engineer
Prego Televisión

BOGOTÁ, Colombia

Colombia lies on the northwest corner of the South American peninsula, bordering the Atlantic, Pacific and Caribbean oceans and encompassing a rugged section of the Andes Mountains.

Despite this varied terrain, Colombian television has not yet started to use satellite uplinks, due to the fact that until recently, satellite use was regulated by the government. Instead, Colombian production entities have turned to microwave technology to create stable links between studios and transmission sites, as well as for mobile feeds from almost any part of the country. Colombia currently has one of the largest microwave systems in the world.

Prego Televisión, a news organization and studio based in Bogotá, recently revamped its production facilities. We turned to RF Technology of the U.S. for microwave equipment.

Prego produces a daily half-hour news show and a live weekly talk show in its studio, and we recently began producing five more half-hour news shows. The studio audio and video signals are linked by microwave to Inravisión, the government transmission center, from which all Colombian transmissions originate. This is achieved by transmitting with an RF 1804C from the studio and receiving the signal with an RF 1805C at Inravisión. All news shows transmit at 18 GHz, a government-assigned frequency.

For live mobile feeds within Bogotá, Prego uses the portable RF 223C transmitter and sends the signal to an RF HCR-200D receiver located above the city in the mountains. Prego is able to optimize the reception by controlling the movement of the receiver with a Continental Microwave CRC-305 remote control. The mountain receiver bounces the signal back to Prego, which then sends it to Inravisión. With this system, Prego is able to cover 80 percent of the city.

For mobile feeds in other parts of the country, Prego uses the portable RF 202D transmitter at the site and places and RF 200D receiver at the nearest Telecom station. Telecom is our national telephone and communications company. The transmission is received at Telecom and sent to the Bogotá studio through Telecom's microwave network. Although this system requires precise logistical coordination, it is stable and fast and enables Prego to transmit live signals from almost any site in the country.

The Colombian government recently passed a law that will privatize television by the end of 1995. There will be at least two new private networks created, each of which will have its own transmission facility. Inravisión will only be responsible for transmitting government programming. In the privatized television world, we may see satellite links come into more use. But the established microwave networks, as well as the investment that television companies have made in microwave equipment, ensure that microwave transmission will play a large role in getting Colombian programming on the air. ■

Editor's note: Rubén Montés oversees all engineering and technical aspects of Prego Televisión.

For further information, contact RF Technology in the U.S. (Telephone: +1-203-866-4283; FAX: +1-203-853-3513), or circle ***Reader Service 117.***

BUYERS BRIEFS

The **Andrew Corp.** 4.6 C-band earth station antenna, which has received final Intelsat F-1 Type approval, features Gregorian optics for high-gain and pattern control, optional motorizable mount and steptrack controls and a large enclosure with a security door.

The antenna offers a wideband, four-part feed system 3.625 to 4.2 GHz Rx and 5.8 to 6.425 GHz Tx. In addition, it boasts a voltage axial ratio of 1.06 in both Rx and Tx bands.

For more information, circle Reader Service 44.

The **Studio Technologies IFB Plus** Series is a sonically advanced interrupted foldback system for ENG trucks, SNG trucks and remote-production applications. The system allows newscasters, reporters and other on-air talent to hear program audio and receive audio cues from directors or producers.

The IFB Plus Series consists of the Model 2 central controller, the Model 22 access station, the Model 32 talent amplifier and associated products.

The Model 2 central controller provides two independent IFB channels, and fits in one space of a standard audio equipment rack.

For more information, circle Reader Service 102.

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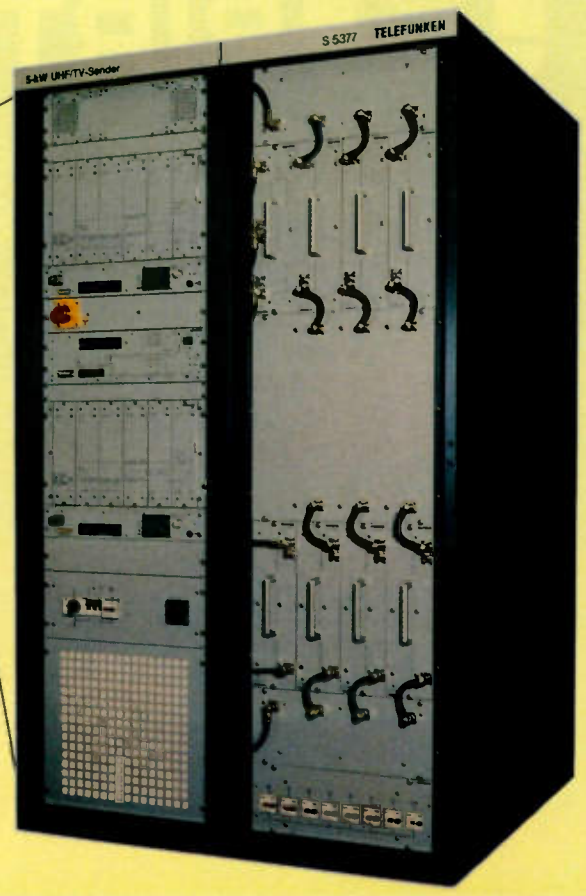

The essential parameters at a glance

- Frequency range: Band IV/V
- Separate vision-sound amplification
- Output power 5 kW, expandable to 10 kW or 20 kW
- Vision-sound combiner integrated in TX

- Remote control: V.24 / RS 232 C interface, BITBUS optional
- Air cooling: all variations for in- and outlet ducting possible
- Performance data conform to the specifications of DeutscheTelekom

Low space requirements

- TX accomodated in two standard 19"-racks Dimensions W 1200 x D 1200 x H 2000 mm

High efficiency

- Efficiency corresponds to comparable tube TX
- Power consumption appr. 16 kW at black level ca. 12,5 kW at APL 50%
- Cooling air requirements ca. 50 m3 / min

Service friendly, high operational reliability

- Identical RF-amplifier racks for vision- and sound-final stages
- Amplifiers can be replaced during operation

- µP-controlled presetting of the RF amplifiers
- Mean junction temperature 120° C

- Each 1 kW RF-amplifier module has a dedicated power supply unit
- No final stage reserve necessary (solid-state redundancy)

- Sufficient test points available for control purposes
- The major operating parameters of the amplifiers are displayed in the control unit

- Passive reserve drive optional

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USER REPORT

Microwave Radio Livens Up WPHL

by David E. Smith
Engineering Manager
WPHL-TV

PHILADELPHIA

In September 1994, WPHL-TV, Channel 17, in Philadelphia started broadcasting a daily, one-hour newscast. Running at 10 p.m., this newscast marked our station's debut into local news programming. For many independent stations anticipating a move into local newscasts, the expense and learning curve of starting up a news operation could be intimidating.

For WPHL-TV, this has not been a problem. The newscast is produced by KR Video, a unit of Knight-Ridder Publications, which actually produces the program that airs on WPHL.

The technical support for the newscast is provided by the WPHL engineering staff. The newscast is anchored from our studio on the edge of Philadelphia. At least once during each newscast, a live update is given from the offices of the Philadelphia Inquirer, the daily newspaper published by Knight-Ridder. The Inquirer building is in downtown Philadelphia, about 3.5 miles from our studio.

To support the newscast, a number of technical additions were necessary, especially in the area of remote news gathering and central receive systems. Key considerations were the ease of installation, technical features, reliability and ease of operation of the equipment.

MICROWAVE LINKS

For microwave transmitters, receivers and antennas, KR Video selected systems from Microwave Radio Corp., such as the new Millennium Series products. These included the 2 GHz 2T4 transmitter in the live mobile truck purchased from BAF, the Millennium CR central receive system used at two sites and the UltraScan Steerable central receive antenna.

To receive live news feeds, two central receive sites were installed: one at our STL tower, which is located at our studio, and the other site at the Inquirer Building. To link the Inquirer Building with our studio, we installed a duplex 18 GHz microwave link, also from Microwave Radio Corp. The central receive sites are managed with slaves and a master antenna control system from Troll Technology.

WPHL rents transmission space on a tower that is fully loaded, so the choices for a central receive site were limited. WPHL's STL tower, located next to the studio building, was originally planned for a total of three dishes, the 8-foot STL and two others. The 2 GHz central receive antenna and 18 GHz ICR antenna had to have wind loads that fit within the tower's load design.

We chose the UltraScan antenna from Microwave Radio Corp. as ideal for our situation because it is a steerable antenna with good directivity and gain. It is also extremely light for a steerable antenna; about 65 pounds, including the integral radome. The UltraScan also features a modern design, with solid-state RF switching in the feed.

Because of the small size (about 35 inches in diameter) and light weight of the UltraScan, we had no tower loading problems. In fact, the UltraScan left us with considerable reserve tower strength. We also were able to place the antenna directly at the top of the tower, giving us an ideal situation for receiving signals with no ghosting or blind spots.

CAPS AND CHOKES

The UltraScan control cable runs 300 feet down the tower to our control room. To handle the RF generated by a nearby AM station, WPHL personnel constructed a box with 0.001 bypass caps and RF chokes on each control line, which shunts the RF prior to the Troll Technology antenna slave control system.

For the central receive system at the Inquirer Building, we choose the SectorScan antenna system from Microwave Radio. The SectorScan features four fixed antenna elements, each with a 90-degree beamwidth, giving us the full 360 degrees regardless of the building restrictions.

At both central receive sites, we installed a wideband 2 GHz central receiver from Microwave Radio Corp., the Millennium CR central receiver. The Millennium CR integrates well with the antenna and control system, and it offers a lot of flexibility. Several different IF filters are available, up to four audio subcarriers can be installed, and 7 and 13 GHz antennas can be directly supported through block downconverters.

The central receive antennas are controlled by Troll Technology local slave controllers and a master antenna controller. The Troll system also controls another interesting aspect of this system: the remote control newsroom camera located at the Inquirer city newsroom. When the live cutaways to the city room are made during the newscast, the camera is remotely operated by our studio, 3.5 miles away. The MicroLink III duplex ICR handles two channels of audio and one video channel in each direction.

The ICR, which links our studio with the Inquirer Building, is a MicroLink III from Microwave Radio Corp. We placed the 4-foot dish at 150 feet on the STL tower and visually aimed the antenna at the Inquirer Building. When the Inquirer Building end was complete, the path worked without adjustment at the STL tower end.

At the Inquirer Building, the ICR is at the

(continued on page 37)

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Facing the Future

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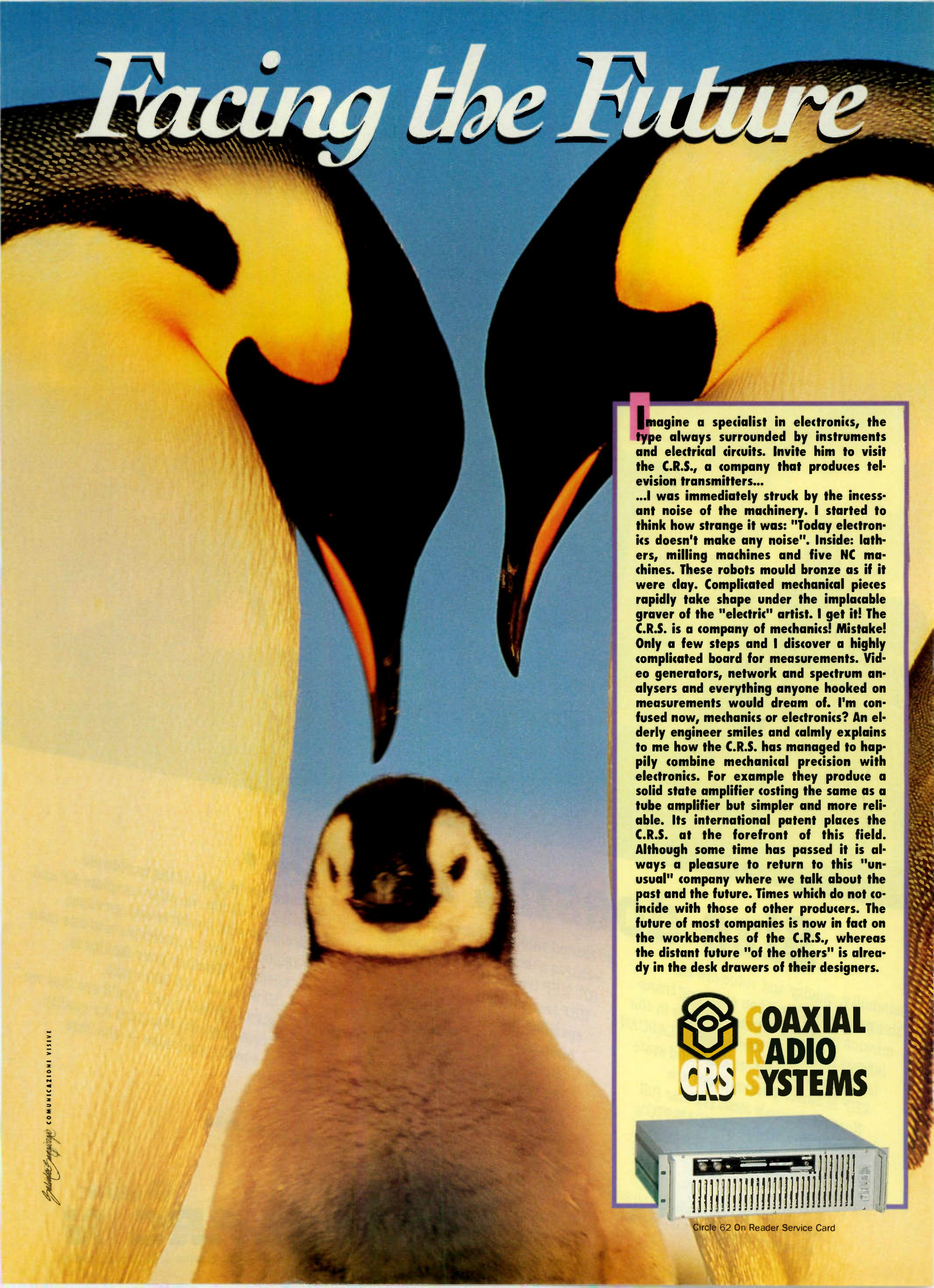
...I was immediately struck by the incessant noise of the machinery. I started to think how strange it was: "Today electronics doesn't make any noise". Inside: lathers, milling machines and five NC machines. These robots mould bronze as if it were clay. Complicated mechanical pieces rapidly take shape under the implacable graver of the "electric" artist. I get it! The C.R.S. is a company of mechanics! Mistake! Only a few steps and I discover a highly complicated board for measurements. Video generators, network and spectrum analysers and everything anyone hooked on measurements would dream of. I'm confused now, mechanics or electronics? An elderly engineer smiles and calmly explains to me how the C.R.S. has managed to happily combine mechanical precision with electronics. For example they produce a solid state amplifier costing the same as a tube amplifier but simpler and more reliable. Its international patent places the C.R.S. at the forefront of this field. Although some time has passed it is always a pleasure to return to this "unusual" company where we talk about the past and the future. Times which do not coincide with those of other producers. The future of most companies is now in fact on the workbenches of the C.R.S., whereas the distant future "of the others" is already in the desk drawers of their designers.



COAXIAL RADIO SYSTEMS

Circle 62 On Reader Service Card

Salvatore Gregorio COMUNICAZIONI VISIVE

TECHNOLOGY UPDATE

ABE's PM7 Meets Many Needs

by Monica Poletti
ABE Elettronica

CARAVAGGIO, Italy

ABE Elettronica, Advanced Broadcasting Electronics, is one of the leading manufacturers of terrestrial TV RF transmission equipment, covering VHF, UHF and microwave frequencies.

Located near Milan, the company has accumulated a wealth of design and manufacturing experience over the past 20 years.

ABE's product line comprises a series of VHF and UHF transmitters and transposers in power ranges up to 10 kW, in addition to a wide range of microwave link equipment. New products this year include high-power solid-state UHF and VHF transmitters and the new PM7 6.4-8.5 GHz microwave link.

The new system complements ABE's existing line of 2, 10 and 14 GHz models. The PM7 is available in a choice of mechanical formats covering fixed indoor/outdoor, mobile, or tripod-mounted operation.

INSIDE OUT

Various configurations are available, including fixed indoor systems housed in one or two standard 3 rack unit (RU) chassis containing IF 70 MHz modulators and demodulators, as well as accompanying transmitters and receivers. Also available are fixed or portable outdoor versions with modulator and demodulator units in stationary or moveable containers and RF heads for transmitters and receivers in outdoor sealed units.

In all PM7 systems, the modulators and demodulators are designed with sufficient bandwidth to carry one video channel and up to four audio, data or service channels. For use with external data modems, suitable baseband input and output connectors are provided on the front panels of the modulator and demodulator.

At microwave repeating stations, PM series links may be used as non-demodulating IF repeaters or as receiver-transmitters with baseband interfaces.

For ENG applications, ABE has introduced a new version of the PM/P series, the PM2.5/P. With enhanced frequency range up to 2.5 GHz, this version features a typical output power of +23 dBm, along with the incorporation of automatic chominance correction at the receiver output.

Frequency synthesis, a cornerstone of ABE's microwave technology, is used in the local oscillators in PM7 and PM2.5/P link systems. New low-noise oscillators employing surface-mount PCB technology are also featured.

Recently, ABE delivered a link system to a Cyprus user consisting of a portable tripod-mounted unit for use in the 7 GHz band. The customer required a system to work in frequency diversity with two transmitters and two receivers at each end, without any common units except the parabolic antennas.

RF SEPARATION

The RF transmitter heads are contained in separate sealed boxes, and each contains a synthesized up-converter from 70 MHz directly to the final output frequency. 1W output level is produced by a multi-stage power amplifier made up of cascaded GAs-FET-tuned amplifiers optimized for the particular band.

Prior to the first amplifier, a tunable bandpass filter with four elements was used to remove the unwanted products of mixing and the oscillator component itself. Once the desired frequency had been set on the synthesizer programming switchers, the UHF VCO set-up, with correct operating voltage, and the multiplier and filters were correctly tuned. With no other adjustments necessary when operating the link, the boxes may remain sealed.

The two RF receiver heads are also in sealed boxes. Each present a four-section filter to the incoming signal, followed by two stages of low-noise amplification in GAs-FET amps. Signal-to-noise performance is enhanced by image rejection prior to the down-converting mixer.

The local oscillator for this mixer, which is identical to that in the transmit head, is synthesized. It comprises a UHF VCO, followed by a two-stage x12 frequency multiplier and a microprocessor-controlled programmable divider that allows rapid adjustment to any operating frequency in steps of 10 kHz. The synthesizer is referenced to a fixed high-stability 5 MHz low-noise oscillator. Prior to the output of the receive head, the 70 MHz IF signal is amplified, monitored for signal strength and applied to a wide dynamic range limiter.

The dual link system requires the two pairs of RF heads to be multiplexed into the transmitting and receiving antennas. This is achieved fairly simply using low-cost circulators in one of the transmit heads and one of the receive heads. Connections from one RF head to the other, and then to the antenna, are made in semi-flexible, low-loss coaxial cable.

At the end of each link, the complete assembly is mounted on a tripod fitted with an adjustable pan-and-tilt mechanism. The two 70 MHz IF signals are taken to and from the RF heads through robust coaxial cables, up to 150 meters in length, which also serve

(continued on page 36)

Strongest link.

Your satellite receiver is the most important link in your reception chain. And the one thing you can always count on - the signal never gets better than it is at the receiver. It creates the most important link to video and audio technical performance and initial S/N ratio.

Which is a very good reason to specify Standard Communications Corp.'s new rebroadcast *Intercontinental* satellite TV receiver - but it's not the only reason.

It has all the features professional operators need most: total flexibility in both C/Ku-band operation, rebroadcast quality certified video on NTSC, PAL and SECAM signals, and a universal power supply built for the rigorous demands of 24-hour-a-day operation.

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A unique 70 MHz I.F. spectrum inversion circuit allows Ku-band to C-band or vice versa I.F. uplink or downlink turnarounds.

The *Intercontinental* is built for knowledgeable and discriminating engineers and offers proof of performance RS250C and CCIR567 certification. It features six I.F. bandpass filters, from 36 MHz to 16 MHz, five audio filter selections from 880 to 75 KHz, and six audio de-emphasis circuits.

There is much more you should know about the *Intercontinental* - and Standard Communications - than we can tell you in a single ad. Call us or fax us. We'll send you more information showing you how to get the best performance and peace of mind. Link up with our new *Intercontinental*.

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USER REPORT

BAF Puts U.K.'s Optex in Gear

by John Maciejewski
Director of Operations
Optex Communications

LONDON

When Optex Communications needed to purchase a Ku-band mobile uplink vehicle, there where a number of factors to consider in addition to the uplink itself.

In its 25 years of service to the broadcast industry, OpTex has developed a world-wide client base. To service uplink requests, it was immediately apparent that both flyaway and vehicle solutions would be considered for the equipment specification. The truck solution has several advantages, including ease of transport and speed of set-up. The decision was made by OpTex to use a truck-based solution wherever possible for rapid response needs.

RAPID DEPLOYMENT

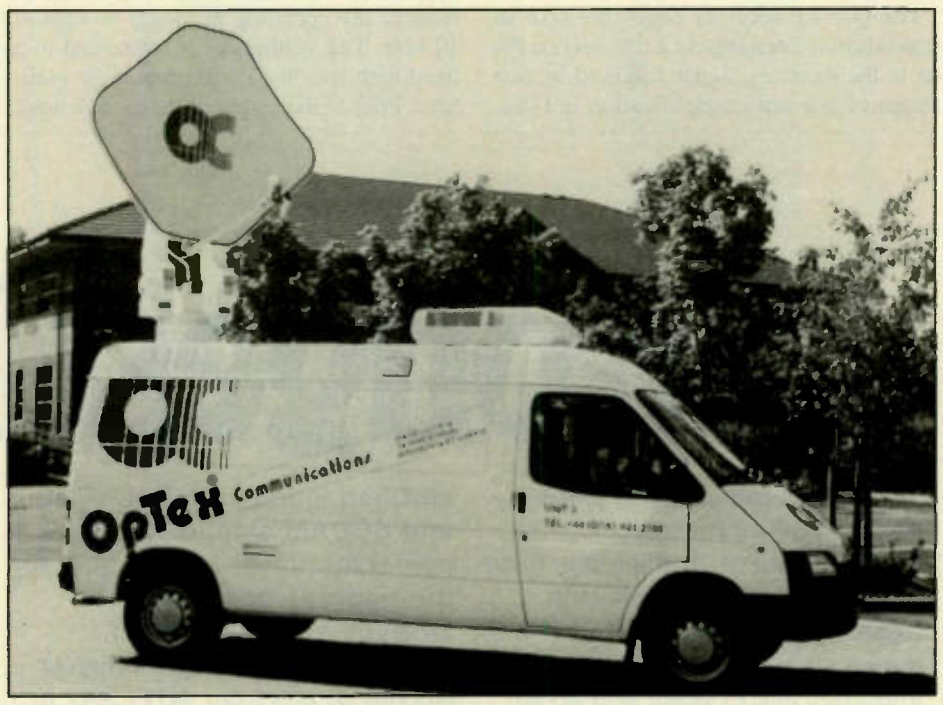
A major requirement would be for the vehicle to have the ability to travel rapidly and cost-effectively. Another requirement would be that the vehicle be compact in size, as not every location is capable of accommodating a traditional-sized satellite truck or OB van, especially old European cities.

However, the main requirement was that the vehicle have the ability to be operated by a single person who holds only a usual car license. In Europe this dictates that the vehicle must weigh no more than 3,500 kg, a challenge indeed for our systems integrators.

Several suppliers of mobile uplink equipment where consulted and the project was put out to tender. After consideration, the proposal offered by BAF Communications was accepted.

The BAF solution is based on a Ford Transit diesel van. This gives the completed vehicle a very familiar feel to the operators and proves less intimidating than larger vehicles. The diesel engine gives excellent fuel economy, which is important in an industry where jobs may be in different countries many hundreds of miles apart. The completed vehicle weighs in at just over 3,000 kg, giving over 450 kg of spare capacity that can be utilized with additional equipment capabilities, cable or lighting and stands.

The exceptionally light weight was achieved by using a revolutionary design pioneered by BAF's coach-building engineers. This consists of a lining of very thin aluminum sheet and a backing of a blown foam to bond the inner and outer sheeting together. This also forms a very good insulating layer both thermally and acoustically. This technique removes the characteristic drumming often associated with panel van conversions of this type.



BAF outfitted Optex Communications with this customized truck.

On location, OpTex Unit 3 can be easily deployed, powered by either a single phase feed or by the on-board 12 kW Fisher Panda diesel generator. The generator has been rated to supply the full load of the vehicle and a possible 4 kW of lighting. Fuel is supplied from the vehicle main fuel tank and gives a duration in excess of six hours at full load, leaving enough fuel to drive the vehicle to a filling station for refuelling.

Antenna deployment and pointing is fully automatic using BAF's own antenna controller fitted into the racks inside the vehicle and a specially designed antenna positioner mounted onto the roof. The antenna positioning and control system was a significant factor in placing the order with BAF as the ability to swiftly and accurately deploy and align the antenna is imperative in a news situation. This, combined with the ultra-light weight design and zero maintenance aspects of the positioner. give the operators little to worry about in the field.

The jacks fitted to the vehicle carry this ease of use and lack of maintenance theme further. They are single action hydraulic types, built especially in the U.K. to the requirements of this vehicle. The simple design removes many of the problems associated with jacking systems on vehicles. Again, apart from the occasional checks on the system fluid levels, the jacks require no routine attention.

In use, the deployment and retraction is controlled from a single switch mounted just inside the sliding door of the vehicle. This allows the operator to ensure that the rams do not extend onto a cable or drain and that the vehicle is stable before the antenna system is deployed. The vehicle is prevented from starting if the jacks are down or the antenna or doors are in use.

The vehicle is fully air-conditioned and heated by the same roof-mounted Coleman unit. 6,000 BTU of air-conditioning and 1 kW of heating ensure that equipment (not to mention the operators) is kept at peak functional temperature at all times whatever the external climate.

Lighting around the vehicle is again inventive. The lights mount flush with the vehicle sides and employ a fresnel lens to direct the light from the unit into the area required. This gives a very clean exterior to the vehicle without affecting the intensity of the rigging lighting. Interior lights are recessed filament lights for general work and individually switched spot lights for operational conditions. All lighting is low voltage and operated from the vehicle DC system to allow set up and tear down, even without mains or generator power.

The uplink system is based on tried and tested equipment. The conversion from baseband to 14 GHz is carried out by dual Continental Microwave video exciters, chosen for their exceptional performance and proven reliability in vehicle installations. The exciters are provided with "data specification" convertors that allow the addition of compressed video equipment at a later date should OpTex's clients require increased flexibility or security. Standard transmission standards are PAL, NTSC and MAC.

The combination of MCL 300W phase combined HPAs and the CML 1.5-meter carbon fiber antenna gives a maximum system EIRP of 72 dBW. This is more than sufficient for operation in most areas of Europe to both European and international satellite systems. The phase combiner is a new version provided by Mitec that gives high performance with automatic redundancy switching in a very compact light-weight package.

DOWN TO EARTH

The receive system is based around a Standard Intercontinental satellite receiver for video monitoring and a Tektronix 1705A spectrum monitor to ensure that the antenna is correctly aligned and that the cross polarization is nulled before transmission begins. Although the antenna positioning can be fully automatic, operators check the traffic before they transmit to verify that the correct satellite and transponder is selected by the computer in the antenna control system.

The baseband system is comprehensive. Dual Betacams are fitted as standard, and the ability to carry out two-machine editing or VTR playback is one of the great strengths of this particular design of BAF vehicle and sets the OpTex truck apart from much of the opposition.

Full video and audio monitoring is specified: three multistandard video monitors, a Hamlet video scope, PPM meters and audio and video distribution and switching by Probel.

Inputs to the vehicle are via a dedicated input panel on the side of the van. This board gives four video inputs and outputs and four stereo audio inputs and outputs. Two telephone inputs are provided on the panel for the internal wired communications. A GSM telephone is also fitted to allow communications virtually anywhere in Europe to and from the vehicle with a single standard telephone number.

OpTex Unit 3 was commissioned in the autumn of 1994 and made its debut at IBC in Amsterdam where it uplinked the Reuters daily exhibition coverage. The vehicle attracted considerable interest from delegates attending the convention due to the clean looks and considerable abilities of the vehicle. Since then, Unit 3 has worked at venues throughout the UK and mainland Europe as part of OpTex Communications' services to broadcasters and corporate users representing the new generation of uplink vehicles. ■

John Maciejewski has worked in the broadcast industry for a number of years and currently oversees all of Optex's technical operations.

The opinions expressed above are the author's along. For further information, contact BAF in the U.S. (Telephone: +1-407-324-8250; FAX: +1-407-324-7860), or circle ***Reader Service 18.***

CONTINUED FROM PAGE 35

ABE Offers Versatility In PM7 Microwave

to carry the DC supply currents for the RF heads.

Each transmitter head is fed with 70 MHz IF signals and DC supplies from its modulator unit mounted in a portable carrying case. Within this unit are up to four baseband audio subcarrier modulators and a UHF wideband video frequency modulator with pre-emphasis. This double-conversion technique permits high rejection of unwanted sideband components in the fixed-frequency UHF/70 MHz converter that provides the IF feed to the head. The audio subcarriers and the UHF/70 MHz converter are PLL frequency-stabilized.

At the receive site, the two 70 MHz IF signals from the RF heads are each fed to a demodulator unit, again via up to 150 meters of coaxial cable that also take DC back to the heads. After further limiting, the composite baseband signal is derived in a 70 MHz discriminator with frequency de-emphasis. Suitable video filtering and the requisite audio discrimination provide the separate baseband outputs.

In operation, the dual-link system has proven to be extremely simple to set up. Optical alignment followed by panning and elevation adjustments can rapidly be carried out, facilitated by the IF test output available from the receive heads. A meter is also available inside the head for direct observation during receive antenna panning.

All the units have been found to be very rugged in operation. The same style of equipment used at 10 GHz has been type-approved by the Italian PTT.

Good operational reliability is achieved by units working under arduous conditions in the field. ABE's manufacturing and test labs are equipped with modern test gear for setting up individual modules and complete systems. ■

For further information, contact ABE in Italy (Telephone: +39-363-351-007; FAX: +39-363-50756), or circle ***Reader Service 89.***

USER REPORT

Citytv Supports the PROceiver

by Bruce Cowan
Manager of Engineering
Citytv

TORONTO

Citytv is an independent commercial UHF broadcaster located in Canada's largest city, Toronto, Ontario. Our programming is intensely local. Even our call-sign signifies our local image.

Our market is very competitive, with all major Canadian and U.S. networks available off-air. Citytv broadcasts on channel 57 from our 15Kw NEC solid state transmitter located on the 1800-foot CN Tower.

Like many stations, news coverage is a major part of our program schedule. Since 1980, our CityPulse News has had a very high "live remote" content. Our ENG units provide live feeds into each of four daily newscasts.

A subcarrier on the main audio channel has been used for many years to feed intercom to our mobile ENG microwave trucks.

Before stereo audio, we transmitted an audio subcarrier at 39.34 kHz and received it with a modified FM broadcast SCMO demodulator. It worked extremely well. Our intercom system fed our subcarrier generator at the transmitter via a telephone line. The director simply had to push a key on the intercom panel and he or she could talk to the truck or talent. A second channel on the ENG microwave provided the path for return intercom.

The 39.34 kHz subcarrier was located within the spectrum allocated to the stereo L-R subcarrier, and therefore we were forced to end its use when we began BTSC transmission. Fortunately, the BTSC format included not only the secondary audio program (SAP) channel for consumer use, but also a Professional audio subcarrier for broadcaster use. Stereo generators and PRO generators became available; however, PRO receivers were difficult to obtain.

The PRO subcarrier is located at 102.3 kHz within the composite stereo baseband signal. Our existing SCMO demodulator was modified, but we had an unacceptable amount of noise and high-frequency hiss.

We spent a considerable amount of time searching for a simple, high-quality UHF PRO receiver, but in 1992, Modulation Sciences developed their SideKick PRO generator and PRO receiver.

The SideKick PRO generator is a stand-alone unit with a crystal-controlled oscillator, built-in audio compressor, selectable 150-microsecond pre-emphasis, high-frequency limiter, subcarrier mute circuit and a remote control interconnect. Also available is a noise generator for AM noise measurements. The front panel has a large meter for monitoring all major functions, such as high-frequency reduction, audio compression ratio and subcarrier deviation.

KEY COMPANION

The companion receiver, which is a key element, is a single-channel FM receiver. A distinct advantage is that it is not an intercarrier receiver. The PROceiver does not rely on the visual carrier, but tunes to the FM aural carrier. Channel selection is via internal dip switches. Audio outputs are provided for the main program channel, PRO channel and a convenient mixed output.

A major difficulty with the PRO channel (or any single carrier transmission system) is the effect that multipath has on the signal. Relatively small amounts of multipath can render the signal useless.

Our original installation consisted of a single high-gain channel 57 yagi. This antenna would be pointed toward the broadcast transmitter after the microwave feed was set up. Often, the operators would report distorted PRO channel audio.

With further investigation, it was determined that our problem was not signal strength, but multipath distortion. Simply stated, multipath will affect a given frequency at certain physical locations. Move a short distance, and the multipath problem disappears. Often, this distance can be as small as 1/4 wavelength.

We followed Modulation Sciences' recommendation and switched to multiple receive antennas on our ENG truck. The yagi was replaced with three simple 1/4-wave, vertically polarized whip antennas using standard two-way radio mounts. At our frequency (730 MHz), physical size of the antenna was certainly not a problem. Two were placed 1/4-wavelength apart. The third was placed another full wavelength from the first. This was done so that when the operator located his vehicle for an optimum microwave path, he or she could switch between off-air antennas for the best PRO signal.

In 1993, we added a Modulation Sciences SAP generator for transmitting program listing information, coarse language movie tracks and descriptive audio. With stereo, SAP and PRO subcarriers, we have fully implemented BTSC multiple channel audio transmission.

We also operate a channel 31 rebroadcast transmitter near the city of London, Ontario. This transmitter passes wideband audio (including SAP and PRO) from the STL straight through to the aural exciter. Recovery of the PRO signal through this transmitter has also been acceptable.

Modulation Sciences has provided us with a complete solution. I have found their equipment to be excellent for performance and reliability. ■

Editor's note: Bruce Cowan is a certified engineering technician, a licensed amateur radio operator and a member of the SMPTE. He has been with Citytv for 18 years and has held the position of technical maintenance supervisor and transmission supervisor.

The opinions expressed above are the author's alone. For further information, contact Modulation Sciences in the U.S. (Telephone: +1-908-302-3090; FAX: +1-908-302-0206), or circle ***Reader Service 118.***

CONTINUED FROM PAGE 32

MicroLink Livens WPHL

300-foot level, 20 feet above the bells that chime every 15 minutes. Thankfully, we were able to stop the bells when extended work periods were necessary.

We mounted a 10 x 1 switcher, the newsroom camera controls, and the SectorScan and Troll remote slave controllers in a newsroom closet located on the fifth floor of the Inquirer Building. The 18 GHz equipment is mounted in a heated rack in the dome room, near the antennas. Future plans call for a second feed in this location, so we decided that it was better to keep the receiver and transmitter near the antenna.

The rack is heated by an electric flexible strip heater, wired through a thermostat to come on at 40 degrees Fahrenheit. The Troll control system allows us to switch between and control the 2 GHz central receive system and camera systems, with the switcher output feeding the 18 GHz link back to WPHL.

Starting a local news operation can be quite intimidating. By working cooperatively with KR Video, WPHL-TV was able to give its audience the service of a local newscast with minimal risk and investment.

A successful news operation also depends upon reliable and effective equipment. The electronic news-gathering, central receive systems and ICR systems provided by Microwave Radio Corp. have been quite effective for WPHL-TV and KR Video.

Editor's note: David Smith has been engineering manager at WPHL for the past seven years. He has a degree in electronic technology from Temple University and an associate degree in management from Bucks County Community College.

The opinions expressed are the author's alone. For further information, contact Microwave Radio Corporation in the U.S. (Telephone: +1-508-250-1110; FAX: +1-508-256-6225), or circle ***Reader Service 115.***

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CAMERAS

Want to Sell

Panasonic WV555B 3-tube color, b/w finder, 12x6.6 Fuji zoom, $700/BO. L Waldeck, SFY, 120 Gladwin Ave, Leonia NJ 07605. 201-947-1788.

Ikegami 730A camera w/12x1 zoom lens, 2 rain covers, multi-pin camera cable, Anton Bauer "Lifesaver" batt chrgr, Ikegami pwr sply, 3 Ikegami hard shell shpg cases, all xlnt cond, $1500. C Vieira, Total Video Prod, 11 Prince St, Fairhaven MA 02719. 508-993-2346.

Sony EVO-9100 Hi-8 camcorder, hadr case, 4 batts, AC adaptor, 1.5 range extender, low hrs, manual, mint, $1400. Charley, TVE of NY, 718-263-6300.

Camera pkg: Sony DXC-325, Vinten V5 tripod, Sony VO-8800 port, $7000/BO. John, 617-439-0992.

Sony DXC-325L camera pkg w/DXC-325H head, CA-325 camera adaptor, VCT-12 tripod adaptor plate, DXF-325H viewfinder, CCQ-2BRS 2m 14-pin cable, & LC-325 case, no lens, xlnt, $2300. J Dore, 408-553-2323.

Panasonic AG-3 3-CCD, S-VHS camcorder, low hrs, 10x zoom, 2 batts+10Ah rechg belt pack, chrgrs, AC adapter, cables, access, case, xlnt, $1700. Les, 406-442-9500.

Sharp XC B10, diode gun station 3-tube camera, like new w/case, tripod plate, $1495. D Brennan, Brennan Prod, 205-823-0088.

Panasonic F250 3-chip w/7450, dockable & case, $5500; S745 port adaptor, Bogen tripod, BO; have $20K in video & computers. Steve, 801-281-0241.

Sharp XC 700 w/viewfinder, Fujinon 12Ax9B lens (ERM-70), A/C adapter, tripod plate, run cable, hard case, $1900. Mike, 703-951-8625.

Sony DXC 537A, 750 lines res, & Sony PVV-1A docking Betacam SP pkg, w/hard case, both mint cond w/less than 50 hrs, $14,500/BO; Ikegami HL-95D, $1000/BO; Docking Ampex CVR-1A Betacam VCR, less than 100 hrs, $2000/BO. M Darrah, Oregon, 503-223-8689.

Panasonic AGDP800XL Supercam, w/14x Fujinon lens, case, tripod plate, 2 Anton-Bauer batts, & chrgr, BO. Greg, 607-687-0545.

Sony BVP-3 w/CA-3 camera adapter, no lens, good cond, $2300. K Campel, 203-322-3000.

NEC SP3A 3-chip camera, will dock to Beta, MII & 8M, 16.1 Fuji Eagle GSE, all manuals, $3500. H Ferguson, Pumpkin Creek, 520 Coffey Ave, N Wilkesboro NC 28659. 910-667-7717.

Canon L-1, low mileage/xlnt cond, 2 lenses, 2 batts, hard case, filter set, $2700. Dan, 212-534-33257.

Sony DXC 3000A, 2 VTR cbls, tripod plate, shpg case, $3500. Kerry, 334-794-4101.

CAMERA ACCESSORIES

Want to Sell

Sony CA-3A (3) camera adapters, xlnt cond w/manuals, BO. Jim, 508-478-1762.

Schneider lenses available, lg selection, sport lenses, ENG, TV44, TV56, TV80 17x8.5 W/2x studio, like new, BO. Andy, 216-947-2030.

Davis Sanborn tripod, $95; Sony camera cable, new, CCQ-BRS, $65; Tamron studio lens cntrls, $415. Ray, 515-255-9162.

Starcase USCE28-1 cstm case w/console wheels, $800. M Jacobs, 312-477-4900.

DIGITAL EFFECTS

Want to Sell

Ampex ADO 3000 DVE w/perspective, digimat & rotation, $18,900. E Wayne, 800-400-8980.

Lyon Lamb MiniV AS2 animation cntrlr, performs single frame rcdg & frame grabbing from computer graphics systs to standard video rcdrs, xlnt cond, $1950. M Rupersburg, 313-881-0600 xt 3103.

EDITING EQUIPMENT

Want to Sell

Microtime T-300 TBCs (2), $1700/both. E Stevens, 81 Lancaster Ave, Malvern PA 19355. 610-889-9676.

Edit syst: Videomedia Mickey 2 Edit, 400 event EDL, 3-VLAN cntrl boxes 1-RS232, 2-RS422, Sony VP-9000 plyr/source w/serial interface, Sony VO-9850 edit, Hotronic AH91 dual-chnl TBC w/xitions, Toaster 3.1, 10MB RAM, ADPro Vers 2.5, 2-B/W preview monitors, video patch bay, audio patch bay, prefer to sell as syst, $17,500/BO. John, 617-439-0992.

JVC 411 port deck, xlnt cond, $1100; Panasonic AG 7400 port deck, xlnt cond, $1300. Dave, 216-351-3145.

Ecco-Ives II A/B, microprocessor-based video tape edit syst, 2.4 software + interfaces, $1100; Platex Elite A/B edit cntrlr, $1500; JVC RM-86U edit remote cntrl, $800. M Jacobs, 312-477-4900.

JVC edit syst, w/BR-6400U, BR-8600U edit, RM-86U edit cntrlr, edit cntrlr cables, $4000/BO. Perry, 800-698-0307.

Loaded & precise A/B-roll TC cntrlr for JVC, Sony, Panasonic: IVES II A/B TC gen/read, BB/sync gen, capstan bump, auto fades, GPI/Take, mem, EDL print & serial, w/3 interfaces & monitor, $975/BO. Steve, 608-251-8855.

Panasonic AGA750 edit cntrlr, assembly, A/V insert, great cond, all orig pkgng & manuals, $1000/BO. M McCleery, One By One Video, 210 Cherry Ave, Voorhees NJ 08043. 609-354-0074.

Sony VO edit syst, Sony VO 5800 plyr/rcdr, Sony VO 5850 edit deck, Sony VO 5600 plyr/rcdr, 2 Panasonic BT-1300N col monitors, all exc cond, $5500. C Vieira, Total Video Prod, 11 Prince St, Fairhaven MA 02719. 508-993-2346.

Sony RM440 w/cntrl cables, great cond, $800/BO. M Howard, 601-335-1552.

Panasonic WJ-MX-50, orig carton, like new, Y/C, hundreds of DVEs, plus freeze, paint, mosaic & strobe, chroma/luma key, GPI trigger, TAO compatible, $3500. Michael, 914-472-5377.

Panasonic AG-7650 w/TBC, $2500; AG-7750 w/TBC, $3500; AG650 edit cntrlr, $400; have $20K in video & computers. Steve, 801-281-0241.

JVC RM-G810 edit cntrlr, mint cond, $750; Panasonic AG-A96-P edit cntrlr, mint cond, $150. Jerry, 704-487-9057.

Pride Integrated Video 2001 A-B roll edit cntrl syst for Amiga, Integrated Toaster cntrl, incl all cables & latest software, like new, $800/BO; DPS Personal TBC III full-frame TBC card for Amiga or PC w/computer cntrl, full proc amp cntrls, color correction, monochrome mode, frame or field freeze, strobe, xlnt in Toaster set-up, like new, $650/BO. B Jones, Digital TV Prod, 509-332-5858.

Sony VO-2850 edit VTR 3/4", BO; Sony VO-2860 edit VTR 3/4", w/edit cbls, $1200; Sony BVE-900 plug-ins, BKE-915, $300; BKE-916, $300; BKE-906, $300; BKE-901, $300; Sony TC-13 for BVU-800 series, BO. Joe, Starfire Video, 910-867-5149.

Future Video EC 1000 PRO/TCMK II SMPTE TC edit cntrlr, w/computer interface & software for PC, $750. L Waldeck, SFY, 120 Gladwin Ave, Leonia NJ 07605. 201-947-1788.

LIGHTING

Want to Sell

Sun Gun hand-held light kit w/cable, handle, daylight filter, Cine 60 30-v batt belt, & built-in chrgr, incl lockable aluminum shpg case, xlnt cond, $400/BO. B Jones, Digital TV Prod, 509-332-5858.

MOVIE PROD EQUIP

Want to Sell

Beaulieu R-16, 12-120 Angenieux zoom lens, zoom stick, lens shade/filter holder, 7 filters, 2 500ma batts, chrgr, 200' magazine, Nikon F to C mount adaptor, sync gen, manual, well cared for, $1450. Charley, TVE of NY, 718-263-6300.

SIGNAL PROCESSING

Want to Sell

Lyon Lamb RTC, accepts RGB signals from virtually any computer & creates bdct-quality NTSC video signal, xlnt cond, $15,500. M Rupersburg, 313-881-0600 xt 3103.

Sigma CSG-460 color sync gen, Crystal & genlock modes, SC & H phase adjustable, 10 outputs, manual, original box, mint cond, $650. Charley, TVE of NY, 718-263-6300.

Laird CG7000 w/keyboard & 2 font mods, $550. Mike, 703-951-8625.

Fortel Y-688 TBC, like new, $1600; Nova 620 TBC, nvr used, $950; Lenco PCE-466 color encoder, RGB to NTCS, like new, $900. K Campel, 203-322-3000.

CCI Electronics 810 composite to Y/C S-VHS xcoding video DA, xlnt cond, BO; JVC SA-T22U TBC boards for 22 Series deck, w/component adapter, nvr used, BO. Jim, 508-478-1762.

Magnl 2002S genlock board & cntrlr for Amiga, incl bdct titler CG software, front pack, & more, $600/BO; Hotronics AH 91 dual chnl TBC w/fx, frame/field freeze, dissolves, wipes, push/reveal, pixel, $2500/BO. J Sutherland, 508-888-1235.

SWITCHERS

Want to Sell

Grass Valley 110 switcher, 18 mos old, v. clean, $7750/BO; ADO 100 (2D), $9995/BO. Tim (for pkg price), 201-808-4546.

Intergroup 9035 production switcher, $1000; Intergroup 982 10-input 1-output to audio follow routing switcher, $200. M Jacobs, 312-477-4900.

ECHOlab SE/6 prod SEG 3 mix-fx, 5-keyers, mint, $7500; ISI 902 prod SEG 2 mix-fx, $750. K Campel, 203-322-3000.

GVG 100 switcher w/all upgrades, $6000. E Wayne, 800-400-8980.

TRANSMITTERS

Want to Sell

Transmitters. TV/FM/AM. New and used. Low prices. Espanlo, Portugues. Miami, 305-757-9207.

Especiales de Abril: Harris BTD50L, RCA TT-30FL, Harris BT18L, banda bajo VHF, Linear 1 y 5 kilo UHF, RCA TT-50FH, banda alto, muchas mas. Microondas, antenas. Su lengua, Miami, 305-757-9207.

Chyron Dual Chnl RGU-2, graphics & titling sys, w/2 color encoders, w/downstream keyers, & font compose unit, $4000; Videomedia "Magnum" edit cntrlr for Sony vid rcdrs, $950. K Campel, 203-322-3000.

Tektronix 1480R Telemation equip, Stairs step color & sync equip, Videotek RS12, RS10 w/remote, new, BO. J Salazar, 210-278-3523.

Laird 1500 color char gens (3), w/dual DD, 70 resident fonts, standard keyboard, demo, $1500; Intergroup 625-4 Chromakeyer w/4-input selector switch, $200. M Jacobs, 312-477-4900.

Sony FCG 700 frame code gen, $225; GV 3256A sync gen, $595. D Nobles, 404-978-1299.

JVC CR-600 3/4" source VTR, $2500; JVC CR-850 3/4" edit VTRs (2), $2500/ea. M Jacobs, 312-477-4900.

Sony VO9800 3/4" UMatic SP, good cond, $3500; Sony VO9850 3/4 UMatic SP edit/rcd plyr, good cond, $4500. H Ferguson, Pumpkin Creek, 520 Coffey Ave, N Wilkesboro NC 28659. 910-667-7717.

Sony BVH 2000 w/BVT 2000, w/DT, completely recond w/TC, $18,000; JVC 3/4" CR600 source rcdr, CR 850 edit, approx 1000 hrs, clean, $4500. E Stevens, 81 Lancaster Ave, Malvern PA 19355. 610-889-9676.

Panasonic AG 7500 S-VHS edit VCR, low hrs, $2495/BO. D Brennan, Brennan Prod, 205-823-0088.

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USED EQUIPMENT

Want to Sell

VCR/VTRS/REC MEDIA

Want to Sell

Sony BVU 100 field rcdr/plyr, PortaBrace bag, 2 Sony BP-90 deck batts, AC pwr sply, BP-90 batt chrgr, xlnt cond, $1000. C Vieira, Total Video Prod, 11 Prince St, Fairhaven MA 02719. 508-993-2346.

Sony PVV1-A Beta-SP dockable rcdr, brand new, nvr used, docks to DXC-537A & DXC-327A, $6500. 718-847-4667, John.

Sony UVW-1800 Betacam SP plyr/rcdr, mint cond w/less than 20 hrs, $7000/BO; Sony Betacam VTR plybk adaptor VA-300, mint cond, used once, $1650/BO. M Darrah, Oregon, 503-223-8689.

Sony SLO-323 industrial Betamax rcdr, Beta 1 rcd/plybk, xlnt cond, little use, $500/BO. J Sutherland, 508-888-1235.

Panasonic NV-8420 port VHS rcdr w/AC pwr sply, $300; Sony VO-9800 3/4" SP VTR, 478 hrs on heads, TC & TBC not incl, $4000; Sony VO-9800 3/4" SP VTR, 120 hrs on heads, TC & TBC not incl, $4000; Sony VO-9850 3/4" SP VTR, 611 hrs on heads, TC & TBC not incl, $5950. E Wayne, 800-400-8980.

Panasonic AG6300 VHS, $350; Panasonic AG7800 SVHS duplicator deck, $900; will trade items. D Nobles, 404-978-1299.

Panasonic 300 CLE w/AG-7450, docked, also 2-pc syst w/stand-alone adaptor, etc, low hrs, VITC, etc, $5800/BO; Vinten Vision 5, xlnt, $1400. John, 808-955-6742.

Sony 5800, xlnt cond, $2100; Sony 5600, $900. G Frei, NY Eye Surgery Ctr, 1101 Pelham Pkwy N, Bronx NY 10469. 718-519-1000.

Sony VO-6800, 50 hrs, vry clean, w/Sony CMA-7, unused, $1300. Joe, Starfire Video, 910-867-5149.

Panasonic AGDS850 edit VCR w/dig slo-mo, full field drop out compensator, TBC, TC rcdr/gen, BO. Greg, 607-687-0545.

Sony 3/4 umatic & JVC, trade or sell for 1/2 S-VHS or TBCs or cash, VO8800, VO5800, 5850, VP7000, VP5000, EVO 250 & CR850. J Salazar, 210-278-3523.

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VIDEO PROD EQUIP

Want to Sell

Sony BVU110 3/4" port, case, TC, xlnt cond, $750. B James, G & B Pro Photo, 255 E Colorado Blvd, Pasadena CA 91101. 818-440-1909.

For-A VTW-222S CG S-VHS & composite xcoding, 32 pg mem, 500 colors, cut, roll & crawl modes, manual & orig box, $750. Charley, TVE of NY, 718-263-6300.

Quanta OCC 500 char gen, twin disk drives, mulit-font option, instant font sizing, good cond, $2495/BO. D Brennan, Brennan Prod, 205-823-0088.

Post suite equip: Chyron Scribe, $5000; Sony BVE-910 edit, $4000; Sony MXP-29 mixer, $2000; Abekas A-53 D, $27,000; Intergroup 9600 switcher, $3000; Ikegami monitor TM20-16R, $1000; Ikegami monitor (6) PM9-5 9" b/w, $150/ea; Hitachi Z-31C camera, $1000; Intergroup down stream keyer DSK-950, $1000; Grass Valley 9510 sync gen, $1000; Sony RM-40 edit cntrlr, $1500; all in exc cond. Joe, 205-942-8888.

Videonics TMI Titlemaker, low hrs, $225. L Waldeck, SFY, 120 Gladwin Ave, Leonia NJ 07605. 201-947-1788.

Sony LVR-3000N laser videodisk rcdr/plyr, rcds & plysbk 24 mins or 43,500 frames of video & audio per side, xlnt cond, used twice, $11,500. M Rupersburg, 313-881-0600 xt 3103.

Panasonic AG-7450A dockable rcdr. Kerry, 334-794-4101.

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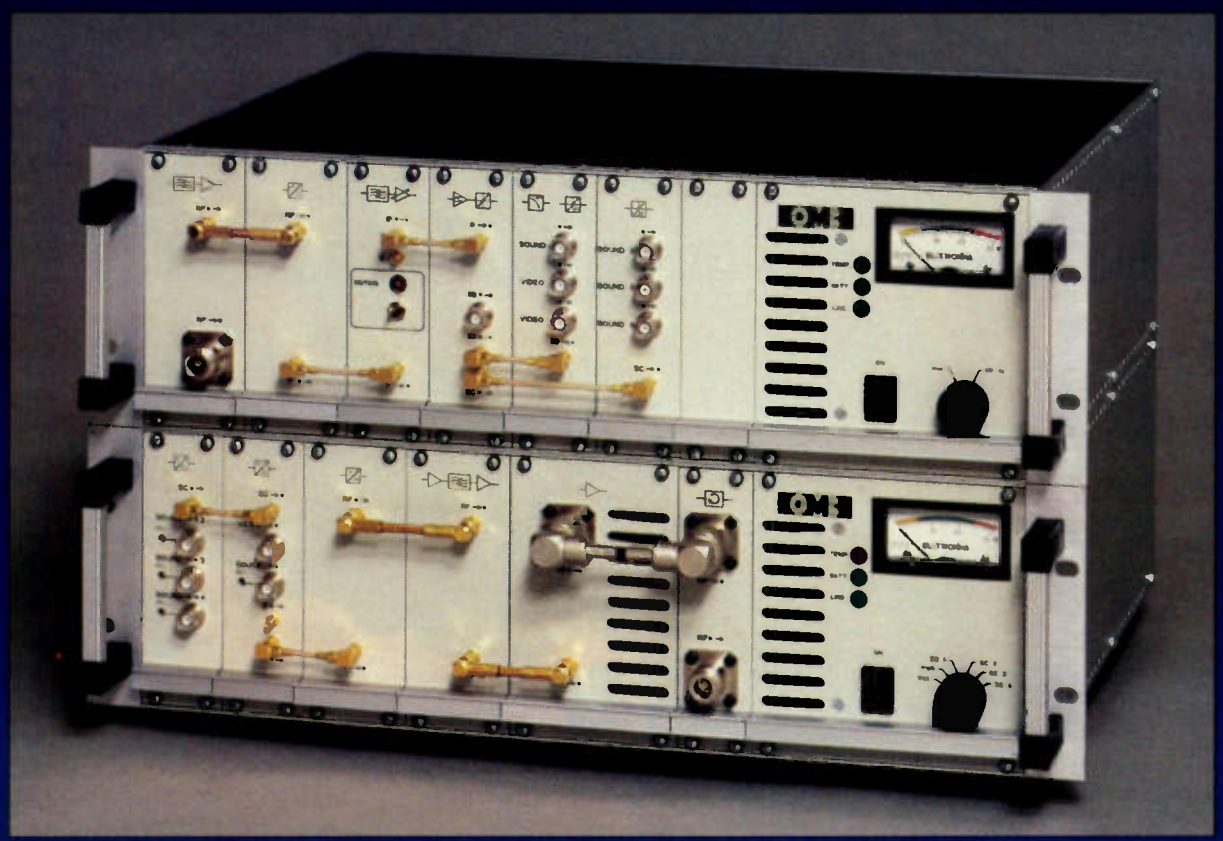

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