BROADCAST engineering

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March 1994/$4.50

1994 NAB Convention

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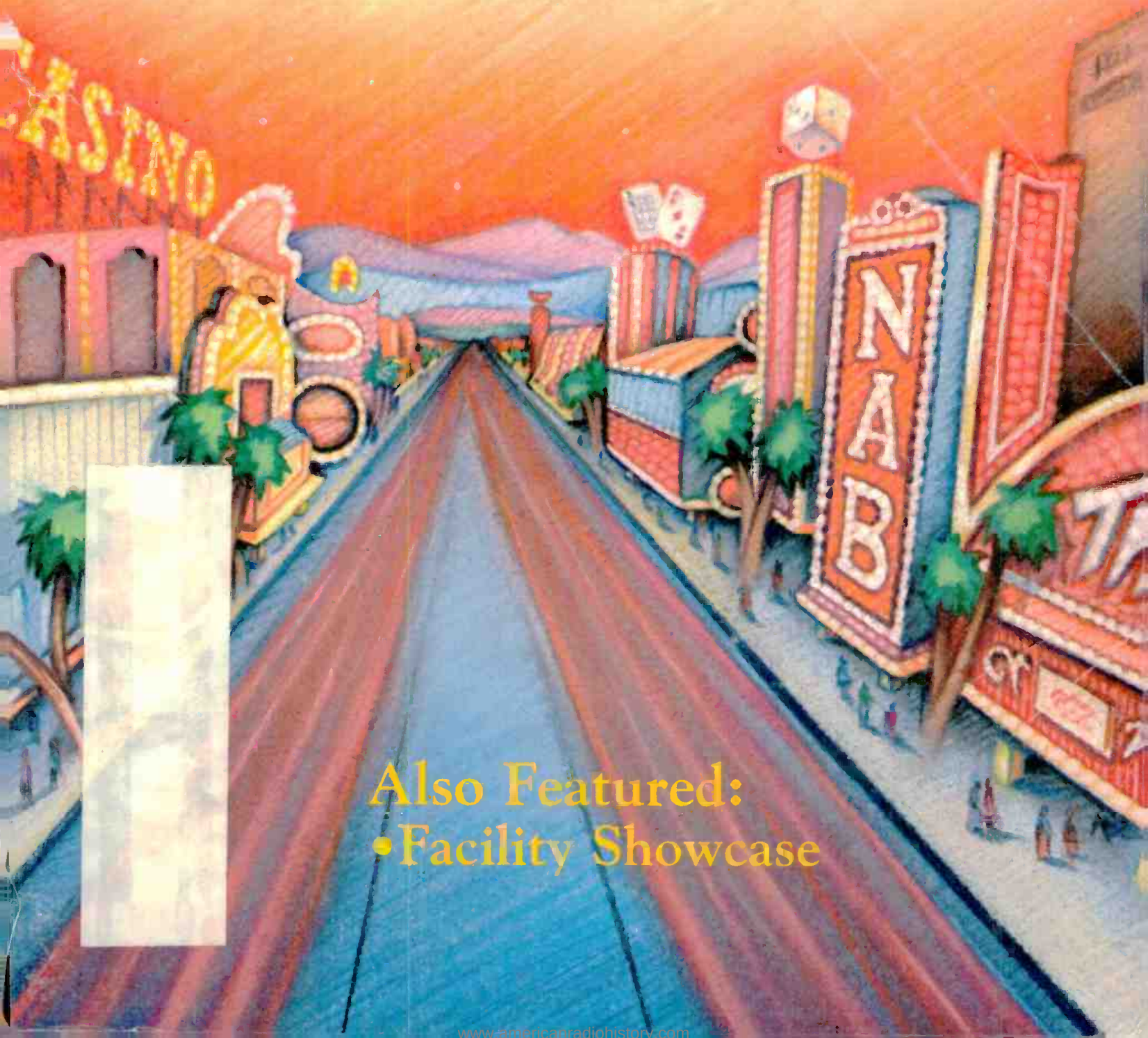
- Detailed Exhibitor Listings



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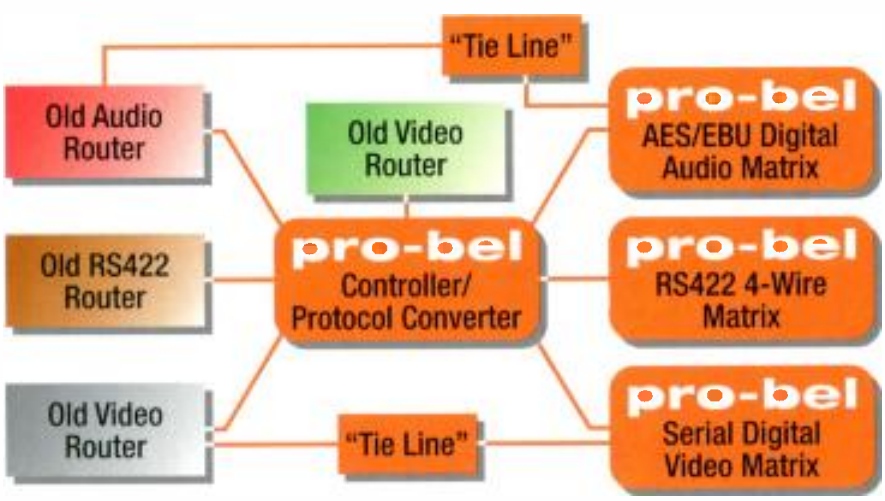

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ON THE COVER:

The broadcast industry returns to Las Vegas for the 1994 NAB Convention. Cover illustration by Doug Bowles.

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News

By Dawn Hightower, senior associate editor

Fall exhibition named "World Media Expo"

World Media Expo is the name chosen for the combined exhibition associated with the 1994 NAB Radio Show and the conferences of the Radio-Television News Directors Association, Society of Motion Picture and Television Engineers, and Society of Broadcast Engineers.

World Media Expo will be held Oct. 13-15, 1994 at the Los Angeles Convention Center and separate conferences will occupy different meeting room areas at the convention center on Oct. 12-15. Registration for any of the four conferences includes admission to the exhibition. Total attendance is projected to exceed 15,000.

NAB, which is managing World Media Expo, expects more than 350 participating companies. Information on participating as an exhibitor is available from NAB's Eric Udler at 202-429-5336.

NAB comments on FCC revisions for EBS

The National Association of Broadcasters told the Federal Communications Commission that any government effort to revise the Emergency Broadcasting System (EBS) should maximize reliance on automation and minimize unnecessary costs and audience disruptions.

The EBS system is intended to warn Americans about emergencies so that citizens can prepare and safeguard themselves. Each year, the EBS provides approximately 1,000 warnings, alerting radio and TV audiences about local and regional emergencies. The FCC is now considering replacing an outmoded EBS system. The proposed new system would employ new digital equipment, automated procedures and integrate cable television for the first time.

In comments to the FCC, NAB said the FCC should recognize the important and continuing role of broadcasters in providing such warnings, both within and outside of the EBS structure. NAB's comments also outlined several problems that might be encountered under a new EBS structure – problems that should be resolved prior to any final FCC action.

One concern is costs. NAB said many broadcasters, particularly in small markets, would be unable to absorb any significant costs for new EBS equipment. NAB also urged the commission to address the matter of station automation generically. Broadcasters want the FCC to take advantage of new statutory authority – conferred by the Congress – to reduce or eliminate the requirement for "licensed operator attendance" at broadcast stations. By reducing staff requirements, the FCC could help broadcasters lower overall costs.

NAB also cautioned regulators against adopting a revised EBS structure that would allow cable TV systems to delete or interrupt TV broadcast signals carried on cable. NAB outlined cases where cable operators deleted local stations' broadcasts of emergency information and substituted either erroneous or outdated information about these emergencies.

To address the challenges and concerns of broadcasters, NAB asked the FCC to first issue a tentative decision on any revised EBS rules, deferring final action until receipt of further comments on how to resolve the issues identified by NAB.

NAB to feature stand-alone conferences

The latest innovations in communications can be found at the 1994 NAB Convention, featuring 12 stand-alone conferences and more than 10 football fields of TV, audio, computer and multimedia exhibits, March 20-24, in Las Vegas.

The NAB conference and exhibition is the world's largest event for the TV and radio industry. It attracts more than 64,000 industry professionals, more than 800 exhibitors, and features more than 250 seminars and workshops, led by some of the industry's top leaders. Among the NAB '94 conferences and exhibitions will be NAB MultiMedia World, co-sponsored by the Interactive Multimedia Association and featuring more than 100 exhibitors in a separate exhibit area.

New conferences include the NAB HDTV World Production Conference, a series of sessions on widescreen production techniques, post-production and emerging HDTV technologies; the Society of Motion Pictures & Television Engineers' Post Experience, an all-day event for those interested in learning about movie and TV production techniques; and the Digital Transmission Tutorial, an Institute of Electrical and Electronics Engineers Broadcast Technology Society half-day seminar, which presents the basic concepts of transmitting digital information through over-the-air broadcasting.

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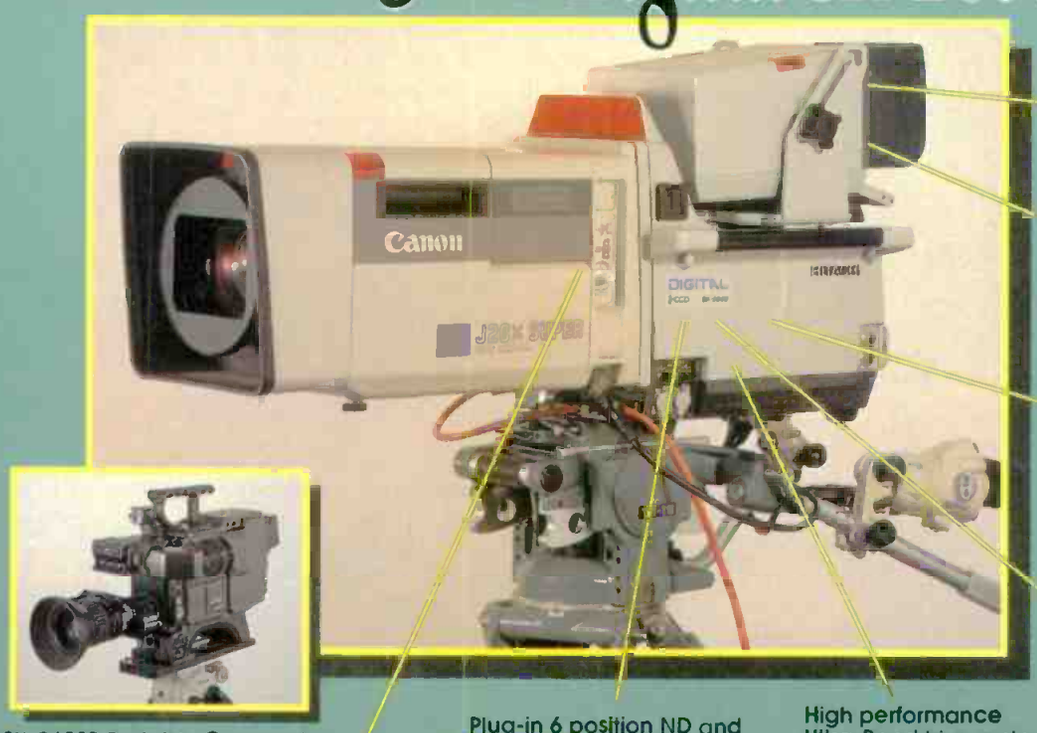

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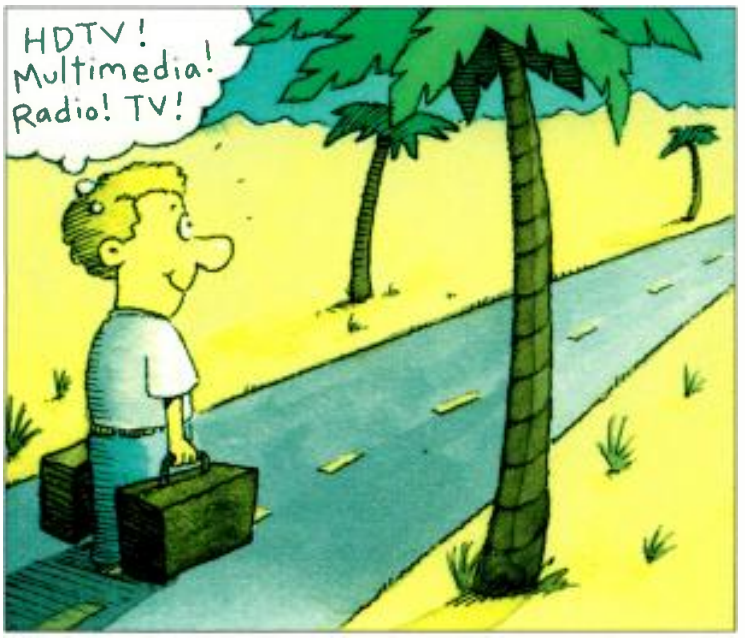
Editorial

NAB '94: Showgirls to leisure suits

My bags are packed, plane tickets have been purchased, and I've got plenty of money (as long as I stay away from the Black Jack tables). Hotel reservations have been confirmed, unfortunately, the hotel is about 10 miles from the convention center...well, I guess I'm like 50,000 others frantically preparing for the 1994 NAB Convention.

This year's extravaganza is guaranteed to be bigger than anything in the past, which is saying something. From HDTV to multimedia to good ol' broadcasting, everything from showgirls to leisure suits are sure to be on site.



In preparing for the magazine's show coverage, I had the opportunity to visit with a lot of people about the convention. The typical questions were asked: "Are you going?" "What are you looking for?" "Are you planning to just look or are you going there to buy?"

The answers to the first question were mixed. About half of those I talked with are not planning to go. However, of those planning to make the trek, most are going with specific equipment needs in mind.

This year's goal-oriented attendance to the show is somewhat different from what we've seen in years past. Previously, people sometimes attended the convention primarily because it was a social event, something many considered part of the job. Those that didn't have money to spend went to renew acquaintances or check out some of the sessions.

Not so this year. Those going to the this year's NAB Convention are planning on selecting equipment for their facilities. This attitude confirms the results of this year's *Industry Forecast*, which appeared in the January issue of *BE*. That survey showed that stations and post facilities need and are planning to buy new equipment this year. This year's NAB should be a good buying show for exhibitors and attendees.

However, if you can't attend, don't fret. The *BE* staff of editors and reporters will be there to capture all the important highlights and events. We'll replay them for you in the upcoming May issue.

Meanwhile, where did I put those plane tickets?

Brad Dick

Brad Dick, Editor

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FCC Update

Recent fines assessed by FCC

By Harry C. Martin

The FCC has released a list of rule violations and the amounts the offending stations were fined:

- Defective lock on antenna tower fence; public file lacked ownership report and issues/programs list — $2,500.
- Defective EBS equipment; licenses not posted; operation for more than 30 days with less than 90% of authorized power — $4,600
- Failure to maintain EBS generator; failure to transmit weekly EBS tests — $1,800
- Public inspection file not available when requested; lacked ownership report — $2,000
- Public file not located in community of license — $2,000
- Operation with defective EBS equipment; public file lacked issues/programs lists — $2,600
- Public file not located in community of license — $5,000
- Inoperative EBS receiver; defective remote-control equipment — $4,200
- Unable to observe transmitter metering from operating position; public file lacked issues/programs list — $3,750
- Tower enclosure fence destroyed; remote-control transmitter metering not available at remote studio — $9,000
- EBS receiver and generator inoperative; no log records of EBS tests; remote-control metering of FM is inoperative; unable to observe AM transmitter metering from operating position; public file incomplete — $11,300
- No EBS receiver or generator at remote-control location — $3,000.

Quarterly issues/programs lists

All radio and TV stations, commercial and non-commercial, must prepare and maintain quarterly issues/programs lists in their public files.

The lists must provide a narrative of the important issues facing the broadcaster's community of license, and describe the programs that constitute the licensee's treatment of those issues during the preceding three months. The FCC has eliminated the requirement that a minimum of five to 10 issues be listed. Licensees listing significant programming directed to five to 10 issues may be able to demonstrate compliance with their public service obligations at renewal time.

The broadcast time, date, title and duration of each program must be included. The type of programming should also be listed. If the licensee has used one program to treat all of the listed issues, the dates, times and names of participants on specific programs should be maintained to establish that each specific community issue was discussed.

Stations should maintain records on all non-entertainment programming to provide crucial information should there be a license renewal challenge.

Issues/programs lists must be placed in a station's public inspection file by the 10th day of each calendar quarter. The lists must be retained in the public file through one license period (five years for television; seven years for radio).

If a station discovers that one or more of its issues/programs lists was erroneously prepared, it should draft a revised list and explain why the list was modified.

Martin is an attorney with Reddy, Begley & Martin, Washington, DC.

NRSC-2 AM compliance

After June 30, 1994, all AM stations must comply with NRSC-2 emission limitations, as set forth in Section 73.44(b) of the FCC rules. Also after June 30, stations complying with the NRSC-1 audio processing standard must resume making annual emissions measurements as required by Section 73.1590(a)(6) and (b) of the FCC rules to assure compliance with NRSC-2.

The NRSC-2 emission standard went into effect on June 30, 1990, and was intended to reduce second- and third-adjacent-channel interference in the AM service. Stations adhering to the NRSC-1 audio standard are presumed to be in compliance with NRSC-2 through June 30.

See "Re: Radio" in the upcoming April issue for more detailed information on the regulatory requirements and how to make the required measurements.

NAB proposes duopoly relaxation

The FCC has sought comment on a petition by the NAB seeking relaxation of certain aspects of the radio multiple ownership rules. The rules went into effect in September 1992 and permit the same entity to own multiple radio outlets in their markets.

In markets, defined by city-grade service contour overlap, of 15 or more stations, a single entity may own up to two AM stations and two FM stations as long as the stations' combined audience share in the market does not exceed 25%. In smaller markets (those having less than 15 stations), a single entity may own three stations (only two AMs or two FMs), but may not own as many as 50% of the stations in the market.

NAB's first proposal is directed to situations where ownership combinations of small-market stations are thrust into a "major" market audience share analysis because the rules do not always consider all of the listening in the "market" in connection with determining whether the 25% audience share benchmark has been surpassed. NAB wants parties in some situations where only one of the stations involved in a transaction converts the proposal into a large-market proposal to be able to elect to have it treated under the criteria for small-market transactions.

In smaller markets NAB wants the FCC to permit a broadcaster to own not more than 50% of the stations. Also, NAB proposes that the rules be changed to permit any single station or AM-FM combination owner to add one more station regardless of the percentage of market stations owned. ■

Date line

On April 1, 1994 renewal applications are due for TV stations in Delaware and Pennsylvania, and LPTVs and TV translators in Montana. Also on April 1, annual ownership reports (or ownership report certifications) are due for all commercial radio and TV stations in Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas. By April 10, all stations should place in their public files their quarterly Issues/Programs list for the first quarter of 1994. Also, June 30 is the deadline for NRSC-2 AM compliance.

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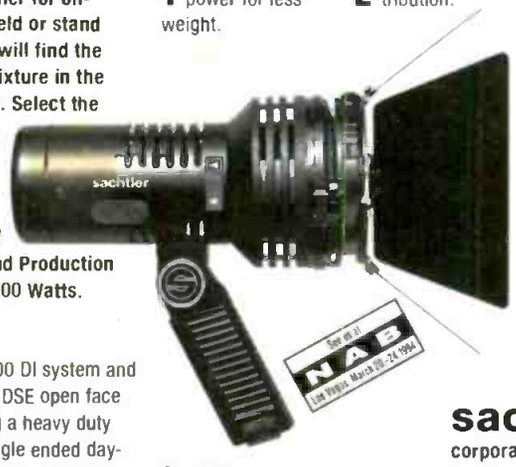

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Part 3

Strictly TV

Digital video

Connectivity

By Curtis Chan

In the past two months, we have covered some of the connection standards used in the digital video domain. This month we will conclude the series with some suggestions on how to implement these divergent technologies.

Cable selection

To start with, even the best equipment's high-quality output can be significantly degraded if poor-quality cable is used to connect equipment. In analog, video cables have low losses from DC to approximately 10MHz, but show increasing attenuation (with respect to length and type) at the higher frequencies usually associated with digital video. In the case of serial digital signals, losses can be equalized easily by using a reclocking circuit consisting of a PLL with an LC or RC oscillator. Parallel regeneration and equalization is more complex and will be discussed later.

The only caveat with coax used for serial digital transmission is that the frequency response should be roughly proportional to one over the square root of the frequency for frequencies below 1MHz. This is because low-frequency deviation can impair the operation of automatic equalizers. Luckily, there are numerous cables that meet the requirements for serial digital transmission. In the United States, the main ones include Belden 8281, 9292, 1505A and equivalents. The 1505A cable is thinner, lower in cost, more flexible, and has less attenuation at high frequencies than 8281 cable.

Connectors and patch panels

Since the introduction of digital video, we have seen more BNC connectors with 75Ω impedance rather than the standard 50Ω. This impedance mismatch is not a problem at analog frequencies, but needs to be considered when routing digital video signals around a facility. It is advisable to use 75Ω connectors where applicable and to make sure they will mate with existing 50Ω BNC connectors. Extend the same practice to patch panels to avoid reflections. In newer installations, maintain the option of using 75Ω patch panels that exhibit low reactive components up to 300MHz.

Chan is principal of Chan and Associates, a marketing consulting service for audio, broadcast and post-production, Fullerton, CA.

Equalization and regeneration

Those who have installed digital signal paths understand that electronic properties, including frequency rolloff and phase distortion, act on the digital signal's integrity. Although a digital signal has a certain degree of robustness, there is a point at which data cannot be recovered. In video, the most common problem will be either a degradation or complete loss of the picture. In either case, long cable runs are the main culprit. To combat this, most digital equipment provides some type of equalization and signal regeneration at its inputs for signal recovery. This allows signal retransmission with a minimal accumulation of errors. For digital video, both serial and parallel equalization and regeneration are available.

It is advisable to use 75Ω connectors where applicable and to make sure they will mate with existing 50Ω BNC connectors.

As discussed earlier, serial regeneration is the simplest process. It encompasses cable equalization for cable runs of 1m or less, clock and data recovery, and the retransmission of the data using the recovered clock. Reclocking of the signal is handled by a PLL-based oscillator circuit. Parallel regeneration is much more complex and involves three steps. The first step is deserialization of the signal and is usually handled by a decoder. From here, parallel reclocking of the signals takes place and then the signal is re-encoded and serialized through either an internal or external serializer. With recent advances, this can take place on a chip with little support electronics or as a piggyback board integrated into the signal path.

It should also be noted that a parallel regenerator has a loop bandwidth of only a few hertz compared to its serial counterpart. As a result, the parallel scheme can reduce jitter more than a serial regenerator, but at the expense of greater complexity. The inherent jitter in a crystal-controlled time base used in parallel regeneration is much less than its LC or RC serial counterpart. This means that serial regeneration can be performed dozens of times before parallel regeneration is necessary. Invest in proper monitoring equipment to take the guesswork out of the process.

Format conversion processes

Beyond equalization, the other main consideration is rate or format conversion between the various digital composite and component standards with their respective serial or parallel interfaces. This takes place in two basic steps: the encode or decode process and the rate conversion process. The rates to convert are 13.5MHz for component, 14.3MHz for NTSC composite and 17.7MHz for PAL. The format conversion process is straightforward. For component to composite, first rate convert from 13.5MHz to 14.3MHz (NTSC), then encode. The opposite is true for composite to component. Decode the composite signal to component, then follow with rate conversion and output as a component signal.

The encode/decode process and the rate conversion process are major contributors to the quality of the output. If either one is flawed, output quality suffers. Because of this, rate converters use extremely accurate algorithms to compute between the physical location of the source pixel data and the physical location of the destination pixel data. The hardware must produce accurate coefficients and minimize any rounding errors in the process. Imagine having to do this in real time with a PAL composite image with close to 710,000 pixels. ■

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Part 3

Management

Departmental motivation

Speed as a departmental culture

By Rick G. Morris

Joe was proud of all that he had accomplished in his short time as chief engineer. He was beginning to turn his department around. His staff was happier because they knew that their boss was interested in them. They had a concept of where they were going and how they were going to get there because Joe had implemented the vision statement and departmental goals. But there was still much to be done. The time to turn around broken ENG equipment was high, his overtime report was high, and his transmitter routine maintenance was not getting done on time. His department was gaining respect, but the other department heads still perceived engineering as a bottleneck in getting work done. It was time to consider his department's efficiency.

The importance of efficiency

Much has been made of the change in American business; how we have once again become perhaps the most productive work force due to global competition and how business has become lean.

The first industries that adapted to the new business realities were those with international or other direct competition that fluidly changes. Unfortunately, broadcasting has been one of the last industries to adapt because its competition tends to be more static. However, in times of a sustained down economy, followed by times of low inflation, each cost center has become magnified in importance. Companies are able to replace entire segments of their business with fast, efficient specialists through outsourcing. Even engineering and maintenance departments can be replaced on a contract basis. Some stations even contract out their management or are merged into duopolies to downsize.

Speed as a departmental culture

An observer of broadcasters said that in today's competitive marketplace speed is life to the media company. A CEO of a company with broadcast interests had promulgated the ideals of speed, simplicity and self-confidence for his employees. Why has the concept of speed impressed two such diverse people? Speed in corporate culture is part of economic and management efficiency and of employee empowerment. It is also a matter of survival on the corporate and on the departmental level.

The concept of speed involves providing employees with the necessary amount of empowerment needed to accomplish a task.

The concept of speed involves providing employees with the necessary amount of empowerment needed to accomplish a task. Empowerment begins with the lowest-level employee and is accomplished by giving employees the authority to do their job, removing barriers, and giving permission to enjoy creative interaction between departments with a minimum of structural bureaucracy.

To increase the speed in your department, review the current procedures your department follows to determine inefficiency. For example, purchases that are routine or budgeted for should be made by those responsible for their implementation and perhaps checked by finance. If it is not a budgeted purchase, it may require more significant scrutiny. If it is a budgeted purchase, you hired that person to do that job and too many checks can become inefficient. If they overspend, take corrective action at your monthly budget report time. But until they go astray, let them do their job unfettered.

Implementing speed as culture

Review your procedures, forms and reports. Most organizations have people doing unnecessary activities and moving unnecessary paperwork. Frequently, reports that were requested by people at one time are still being produced years after those who required them have left the company. Look at every form, report and procedure. Who requested it? What purpose does it serve? Who reads it? Why? Is there another report or procedure that accomplishes the same thing? Ask those who deal with your department how quickly they can get common tasks accomplished. Are there any structural impediments, such as not trusting your workers with the resources needed to get their job done? How many people are involved in each task? How many are necessary?

Get all employees involved. Examining paper and procedures must be made from the ground up and should include everything and everyone. Pay attention to the tasks that the employees mention as unnecessary, take too long or are burdened with procedure and approvals.

One company saved a million pages of paper by simplifying its maintenance procedure to one step by having the person who discovered a problem communicating the situation to the person who was responsible for fixing it.

Speed as motivator

The benefits of a culture of speed are significant. First, by giving employees the *responsibility* and *authority* to accomplish their work, you will increase their job satisfaction and reduce job frustration. Second, an employee who gets to accomplish more significant work will feel a greater sense of contribution and importance. Third, speed and efficiency in getting the work done will reduce employee stress. Finally, the trust you place in your employees in a speedy workplace will make them realize the success of the organization depends on them.

Management of your department and your own job will also benefit from the culture of speed. You will be able to do more work in a shorter time and your department will have a "can do" attitude. Also, a swiftly reacting department that accomplishes tasks on schedule will improve your reputation within the station. Once again, engineering will be the reliable department that does what they do well while making it look easy.

Morris is an assistant professor of Radio/TV/Film at Northwestern University. He is a former TV manager at the station and network levels.

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Part 3

Production

Microphone basics

Mixing microphones in the field

By Christopher Lyons

The portable audio mixer has traditionally been a key element in remote broadcast and field production of news, sports and other programming.

Today's audio mixers offer additional features and better audio performance compared to earlier models. As the complexity of audio production has increased, audio mixers have continued to fill the role of go-anywhere, do-anything tools.

Today's audio mixers offer significantly better performance than earlier models.

Stereo mixers for mono programs

Even if true stereo recording is not part of a particular production, an audio mixer with stereo capability can have many applications. One option is *split-track* or *dual-mono* mixing. This allows individual voices to be isolated on different tracks of tape – a popular technique among some news magazine crews. By keeping the interviewer's microphone feed separate from the guest's, noises, such as clothes rustling against a lapel microphone will only be recorded on that microphone's track. The offending mic's channel can be muted or attenuated during post-production, keeping the problem out of the final mix. The two voices can also be independently processed, if necessary, and voice levels can be more closely controlled and matched.

A similar technique isolates the feeds from two microphones when they are redundantly miking the same source (for example, a wireless lavalier microphone and a hard-wired boom microphone on a moving interview subject). Recording the two microphones' outputs on separate tape tracks keeps the boom microphone's signal free of any momentary interference or dropouts from the wireless microphone.

An audio mixer with two output channels can also be used to create a different *utility mix*, which includes additional audio sources that are not included in the recorded or broadcast program mix. For example, you could feed the mixer's left channel to tape/air while its right channel is used for a monitoring or communications feed, including both the on-air microphones and a director's communications microphone. In this case, on-air microphones are assigned to both left and right channels (or panned center), while the communications microphone is assigned (or panned) to the right channel only.

Another application of secondary mixing occurs when a PA system is involved. For example, while the broadcast feed may require the added ambience provided by an audience microphone, this arrangement may cause feedback if it is fed to the audience's PA system. In this case, create a separate mix for the PA system that does not include the feedback-prone crowd microphone. Talent and guest microphones feed both channels of the stereo mixer, while the crowd mic is assigned only to the channel that feeds the broadcast.

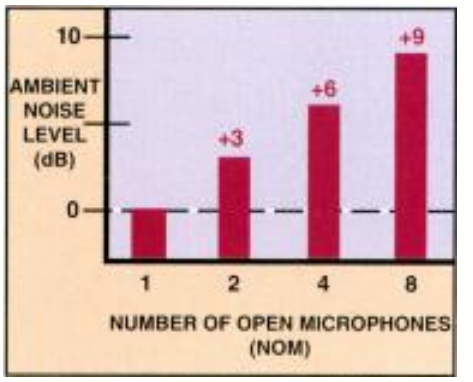

Figure 1. *The increase in ambient noise pickup caused by increasing the number of open microphones. Graph assumes all microphones are of equal sensitivity.*

Automatic mixers

A loud PA system combined with multiple open microphones may result in feedback even without the use of a separate crowd mic. In these cases, guest microphones must be turned down when not in use and turned up quickly when the guest wishes to speak. However, factors, such as poor sight lines, fast pacing, and the unscripted nature of many talk shows often conspire to make it nearly impossible for a human operator to react quickly enough to avoid cutting off someone's first words.

One solution is to use an automatic or *voice-activated* mixer, which can recognize a talker and turn on the appropriate microphone in just a few milliseconds. This offers multiple benefits. First, keeping the number of open microphones to a minimum provides the most gain before feedback from the PA system. To maintain a safety margin below the feedback point, some automatic mixers also decrease the master gain slightly as additional microphones are turned on. This eliminates the risk of feedback during heated exchanges involving simultaneous talkers.

Similarly, each additional open microphone picks up an additional measure of ambient noise and room reverberation. (See Figure 1.) With a live audience or in a non-studio location, the audible effect of these additional open microphones can be considerable. By minimizing the number of open microphones, an automatic mixer reduces the amount of ambient noise and room reverberation in the broadcast mix. This makes for a cleaner, more intelligible audio signal with a better "speech-to-noise" ratio. (See "Solving Multiple Open-Microphone Problems," January 1992.)

By taking full advantage of the flexibility and portability of today's microphone mixers and mixing techniques, audio engineers can make studio and field production easier, while delivering a better quality product to their customers — both producers and listeners. ■

➡ *For more information on portable microphone mixers, see pp. 55-56 of the 1994 BE Buyers Guide.*

Lyons is an applications specialist at Shure Brothers, Evanston, IL. Respond via the *BE* FAXback line at 913-967-1905.

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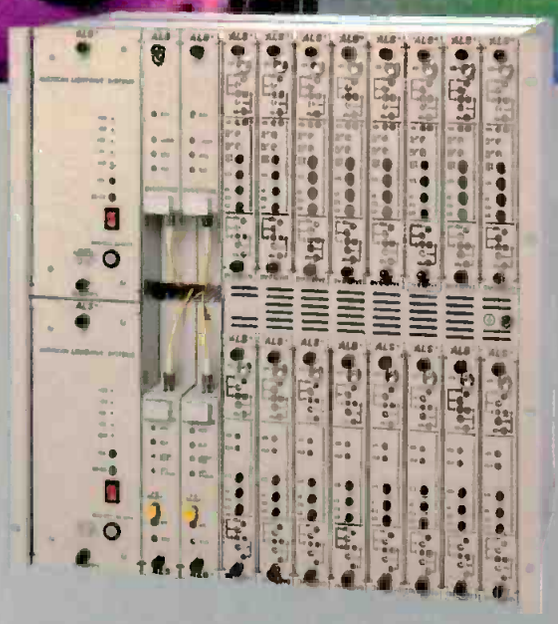

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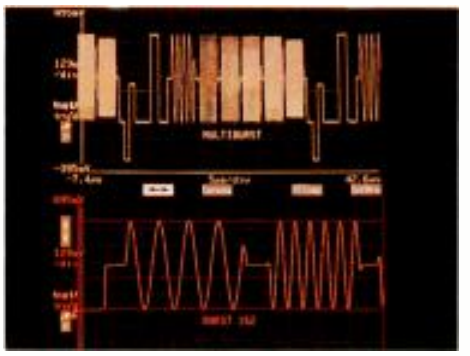
Part 3

Troubleshooting



Lightning and surge protection

Surge protection for technical equipment

By Michael F. Stringfellow, Ph.D

Even buildings with good lightning protection are vulnerable to lightning currents. Damage to sensitive electronic equipment cannot be mitigated simply by the installation of lightning rods.

Lightning injects transient currents into power and signal lines via direct and indirect means. Direct injection results from the flow of lightning through the building itself and some fraction of these currents will also flow in anything connected to the building. Roof-mounted electrical or communication equipment might also be struck by lightning, injecting severe currents directly into the building's wiring. The flow of large currents into the building's ground electrode raises the voltage of the whole building. This voltage stresses the insulation of interface equipment and serves to inject lightning currents in services entering the building from outside.

Indirect injection results from electromagnetic induction. The electrostatic, magnetic and RF fields transmitted by lightning discharges can induce large voltages and currents in unshielded wires.

Surge suppressors

Surge suppressors generally include at least one non-linear component, such as a gas tube, diode or varistor. These components are shunt-connected across the protected line, and when a transient voltage exceeds a threshold value, the resistance of the non-linear device drops. (See Figure 1.) This results in shunting of transient currents through the device and a lowering of transient voltage at that location. The unwanted surge current is reflected back to the source and away from the protected load.

A common myth is that surge suppressors *absorb* unwanted transient energy, and therefore, their "energy rating" is often used to select protection devices. In fact, the best suppressors have the *lowest* resistances when they operate and they actually absorb little energy. They would more aptly be called by their original name, *diverters*.

The level at which a transient is restricted is the *let-through* or *clamping voltage*, and as Figure 1 indicates, it depends on the magnitude of the surge. Non-linear devices cannot operate too close to the working voltage of the line. In practice, clamping voltages are often double the initial operating voltage of the circuit, but this is usually more than adequate to protect equipment.

Cascading or networking suppressors

The first location to shunt surge current is as close as possible to its source. For lightning and external sources, this is the point where the vulnerable service enters or leaves the building. Primary surge protection at the point of entrance is now a requirement of the U.S. National Electrical Code (Section 800-30) for any communication circuits exposed to lightning. Service entrance protection for AC power is not yet a code requirement but is recommended in several standards, including the new IEEE standard 1100-1992 (*Emerald Book*, "Powering and Grounding Sensitive Electronic Equipment").

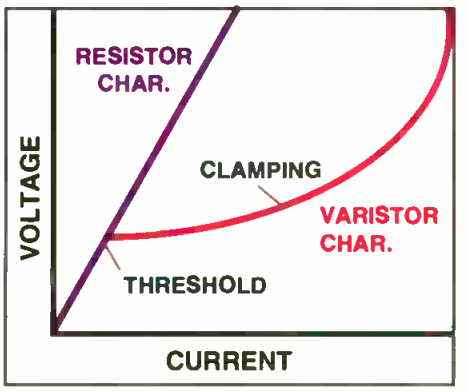


Figure 1. *Varistors are typical non-linear surge suppressor elements.*

Surge protection should also be applied at or close to sensitive electronic equipment, typically at the nearest distribution panel. Particularly hazardous for electronic equipment are differential voltages between AC power and signal lines, which can damage a device's communications interface and power supply. Suppressors protecting services and referenced to the same ground point are essential in these circumstances.

The use of two or more suppressors on a power or signal line is known as *cascading* or *networking*. The impedance of the line between stages generally results in the first suppressor encountered by a surge conducting a higher fraction of the surge current than those further down the line. This strategy is only effective if the clamping voltages of the cascaded devices are coordinated reasonably well.

Overall protection

Protection for broadcast facilities involves lightning protection, bonding/grounding for the structure, and surge suppressors on vulnerable lines. Cascaded suppressors offer the most cost-effective solution, especially in lightning-prone areas. The following steps can increase the reliability of lightning protection:

1. Install a lightning-protection system that diverts direct lightning strikes away from sensitive equipment, provides a low-impedance down-conductor path with bonding for isolated parts of the structure, and a grounding terminal that can discharge currents into the ground.

2. Install heavy-duty surge suppressors on any service entering or leaving the building. Do not ignore roof-mounted equipment and all communications, control and signal lines. Coaxial cables should have their shields grounded where they enter or leave the building.

3. Install medium-duty surge suppressors at distribution panels serving sensitive electronic equipment or in equipment racks, together with secondary signal line suppressors with grounds referenced to the local equipment chassis. Ground coaxial and signal line shields at each end.

Finally, provide a bond between all grounding systems (signal, AC power and lightning protection). Avoid isolated grounding schemes. ■

Stringfellow is chief scientist at EFI Electronics Corporation, Salt Lake City. Respond via the *BE* FAXback line at 913-967-1905.

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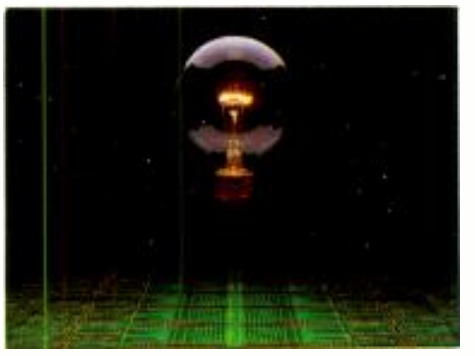
Technology News

Evolving CD standards



By Curtis Chan

How many forms can a CD take? If you answered at least seven, you are right. It makes you wonder if Philips and Sony (the companies that introduced the CD) knew of the many forms that the CD would take. Their introduction of the compact disc digital audio standard, commonly known as the *Red Book* standard, would eventually change not only the way in which we listen to music, but would become one of the major driving forces behind the multimedia revolution.

Red Book audio CD standard

The Red Book describes the audio CD found in today's music stores. It is also the foundation for other CD standards. The track type is defined as CD-Digital-Audio (CD-DA) for audio music. The Red Book specifies that audio is on the CD in one or more tracks. These tracks are subdivided into sectors containing 2,352 bytes of audio data in digital form. Also specified are two layers of error detection and error correction code. Ninety-eight control bytes are added to each sector that contain the timing information. These bytes are read by the CD player as song playing time.

Yellow Book-CD-ROM standard

The second phase of the CD industry started when Sony and Philips introduced the CD-ROM standard known as the *Yellow Book*. The Yellow Book further defines the standards set by the Red Book by adding two types of tracks commonly known as CD-ROM Mode 1 for computer data and CD-ROM Mode 2 for compressed audio, video or picture data. Because the CD-ROM Modes 1 and 2 use the Red Book standard as a foundation, the Red Book error detection and correction and control bytes are also used.

The difference between the modes is in a redefinition of how the 2,352 bytes of data are organized. Mode 1 uses an additional layer of error detection and correction (for computer data) while Mode 2 does not and has 14% more capacity for storage. Generally, Mode 2 discs are recorded in an XA format. Otherwise, they require custom software and interface to be decoded on a normal CD-ROM drive.

When a CD has data (CD-ROM) and audio (CD-DA) tracks, it is referred to as a Mixed Mode Disc. These are distributed by mail or at trade shows where companies are trying to get their message out via a mix of CD-ROM data and audio. Two common methods are used in this mode.

The Red Book is the foundation for other CD standards.

One reads the program and data into the computer and runs the program from the computer memory while using the CD-ROM drive as an audio player. The other method alternately reads in a portion of the program and data.

CD-ROM/XA

The third standard, called *CD-ROM/XA*, was issued by Philips, Microsoft and Sony. The new track type defined by this standard is CD-ROM Mode 2, XA format and is used for computer data, compressed audio data and video/picture data.

Because a CD-ROM/XA track may interleave Mode 2 compressed audio and Mode 2 data sectors, additional hardware is needed to separate them when playing the disc. There are two types: CD-ROM Mode 2, XA Format, Form 1 for computer data and Form 2 for compressed audio data and video/picture data. Using audio compression, 1.25 hours (stereo) at 16-bits/sample and 44.1kHz for CD-DA can be achieved; up to five hours stereo or 10 hours mono at 4 bits, 37.8kHz; and 10 hours stereo, 20 hours mono at 4 bits, 18.9kHz. Playing time is reduced when other data is added. In either case, there is approximately 660MB of storage per disc.

CD-I ready format

CD-I Ready disc is a standard audio disc with some additional features. Audio discs have a 2- to 3-second pre-gap of audio silence in front of track No. 1 that players skip over. A CD-I disc increases the track No. 1 pre-gap to at least 182 seconds and hides CD-I information in this area. The data can consist of lyrics, text, visual presentation, biographies and title information. CD-I also has three playback methods: 1) audio playback, 2) displaying information as the audio is playing, and 3) allowing compressed audio and data to be read from the hidden pre-gap at what appears to be the same time for playback.

CD-Bridge disc

The CD-Bridge Disc specification defines the way to add additional information in a CD-ROM/XA track to allow the track to be played on a CD-I player connected to a TV set or from a CD-ROM/XA player connected to a computer. A common example of a CD-Bridge Disc is the Kodak Photo-CD disc.

ISO 9660

Before ISO 9660, developers had to create their own file structures. This resulted in more time spent by the developer and confusion by the user. Often, users had to restart their computer when changing applications to load software for the new file structure. To resolve this dilemma, the ISO 9660 standard was drafted for CD-ROM. For computers reading ISO 9660 discs, a software extension must be loaded. ISO 9660 allows multiple types of computers to access the same files so that an IBM, Apple and UNIX computer can read the same disc.

Exceptions to the standard make many CD-ROMs not ISO 9660 compatible. These include the High Sierra discs that pertain to the period prior to ISO approval. The HFS by Apple is another, although Apple has written drivers to allow Macs to read ISO 9660, High Sierra and HFS. Finally, there are custom file formats with discs being written in file formats that have not been converted or are using other operating systems. ■

Chan is principal of Chan and Associates a marketing consulting service for audio, broadcast and post-production, Fullerton, CA.

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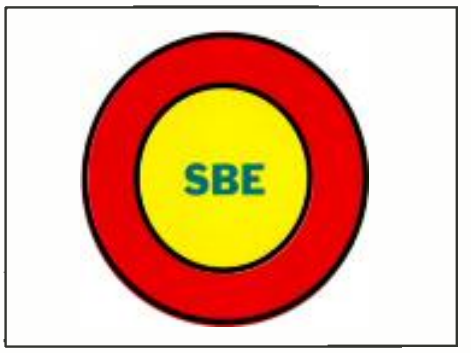
SBE Update

SBE certification update



By Jim Wulliman

With this issue, the SBE resumes a regular column in ***Broadcast Engineering*** *magazine. Our purpose is twofold: To bring useful information about the SBE to the readers, while at the same time identifying elements of emerging technologies most likely to have a significant impact upon our membership and the broadcast profession. The column will begin with a report on one of the most important services the SBE offers — the certification program.*

— Terry Baun, SBE vice president, and chair, Industry Relations Committee

The Program of Certification is a service of the SBE contributing to the advancement of broadcast engineering. It is one of many services the SBE offers to its membership and the broadcast industry.

SBE certification was conceived as a level of industry recognition superior to the FCC First Class License and was required in order for a person to advance to chief engineer at a radio or TV station. This idea evolved into the SBE Certification Program, which recognizes persons having at least 10 years of significant broadcast industry technical experience.

Certification by exam for the 5-year and 10-year experience level soon followed. When the FCC eliminated the First Class License, the SBE introduced the Technologist level of certification as the entry point to the certification process.

The SBE Certification Program is a valuable tool for station managers and chief engineers when they have to make personnel decisions.

The value of certification to members is made clear by *Broadcast Engineering* magazine's annual salary survey. (See the October 1993 for the latest information.) The survey shows that those who are certified generally receive higher salaries than those who are not certified.

Some companies offer a salary increase to their engineers when they become certified or advance to a higher level of certification. Others require a person to be SBE certified when hired or give them a reasonable amount of time to become certified during their employment.

Wulliman is director, Ennes Foundation, and chairman, SBE Certification Committee.

TEST DATE	TEST LOCATION	APPLICATION DEADLINE
March 22	NAB Convention, Las Vegas	Closed
June 3-13	Local chapters	April 15
Oct. 14	SBE Engineering Conference, LA	Aug. 13
Nov. 4-14	Local chapters	Sept. 9

Table 1. 1994 SBE certification test schedule.

New training course

In response to industry requests, the SBE Certification Committee has announced a new program: entry-level training and certification for radio operators. This Radio Operator Training Course and Examination was authored by John Barcroft, a radio chief engineer and San Diego chapter chair. The course will consist of a training manual, which includes exam questions coordinated with the text, and a written examination to be administered locally. The course will be available through the certification secretary at the SBE national office in Indianapolis.

The Radio Operator Training Course is designed to replace the former FCC Radiotelephone Third Class Operator License with the Broadcast Endorsement that was discontinued by the FCC in 1977. SBE will offer this course in response to an expressed industry need for a benchmark verifying that new operators receive proper training in the performance of their FCC-mandated duties.

Now available...

The SBE Radio Operators Certification Handbook. Order your copy from the SBE office or pick one up at the SBE booth at the NAB Convention. Cost is $35 including S&H. Credit card orders: 317-253-1640.

Supplemental information about the equipment in the station may be added to the basic material in the training manual to provide a training course customized for specific station operations. Radio station operators, as well as persons wishing to enter the broadcast industry, will find this training manual an excellent resource.

The Certification Committee plans to follow up the Radio Operator Training Course with a similar one for television and will continue to look into the need for additional certification specialties. Gerry Dalton, MIS director for SBE, is working on new software for generating our examinations that will allow us to select questions from various areas of specialization. This will permit the SBE to grant certification with special endorsements, such as satellite, video, computer editing, RF, contract engineering, management or other developments that may be important to the SBE membership.

The broadcast industry is undergoing many changes. People renewing their certification find that their "broadcast-related" experience has become a greater part of their job than in the past and call the national office to find out how this will affect their recertification. Continuing education, staying current and learning new skills for future positions in broadcast and related engineering, has always been a vital part of the SBE Certification Program renewal process.

SBE is responsive to the needs of its membership and the industry and will continue to develop the Certification Program and its associated educational opportunities to help members maintain and increase their skills in the broadening field of telecommunications.

The Certification Committee would like to hear your suggestions on how the SBE can help you learn skills and evaluate your understanding of the complex world of telecommunications. See the Editor's note for address information. ■

Editor's note: For more information, write to SBE at 8445 Keystone Crossing, Suite 140, Indianapolis, IN 46240; phone 317-253-1640; fax 317-253-0418; BBS 317-253-7555.

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Once you start
Engineering with Vision,
who knows what
you can achieve?

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Whatever decoder you may have used before, now it's time to make a clean break.

Until now, every time you decoded an image, it became degraded. It was unavoidable. Until now. Prism from Snell & Wilcox allows you to break away from the technology of the past. The Prism digital decoding system is a virtually transparent bridge for multi-format interchange. And with the ever-growing need in broadcast and post-production to move between composite-based material and component processing devices such as digital effects, computer graphics, still stores, and standards converters, Prism has broken the mould at just the right time.

Prism is a quantum leap in quality and stability terms when compared to conventional decoders. Its output is, quite simply, a true reference standard signal in both PAL and NTSC, which therefore offers you the outstanding advantage of total repeatability, even with the most difficult movement, noisy archive material or off-air signals.

Not surprisingly, to achieve such a breakthrough, merely adapting existing technology was never going to be enough. Prism takes a new and innovative approach. Conventional comb decoders are adaptive, using different filters for different areas of the picture and different degrees of motion. But this often creates visible artifacts and requires on-line decision making. Instead, Prism uses just one filter. But a uniquely elegant one.

Prism's single multi-tap, spatio-temporal filter eliminates the unpredictable and user-dependent effects of even the best traditional decoders. No need for special adjustments or adaptive threshold settings. Not only that, Prism incorporates a whole range of signal processing features that are usually expensive add-ons. The decoder of the future is here. What are you waiting for? Why not contact Snell & Wilcox at either one of the addresses below.

Prism Digital Decoder

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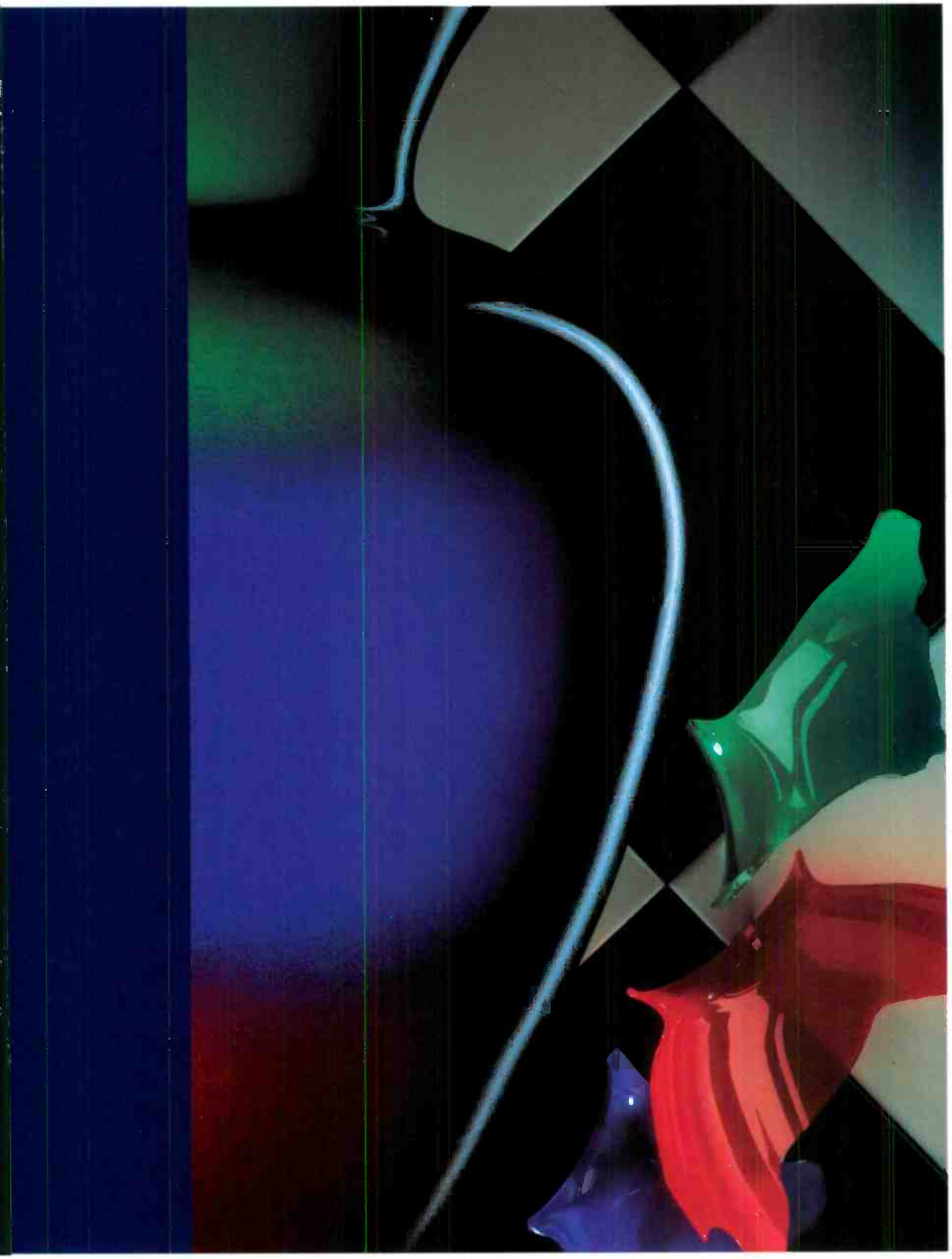

Durford Mill, Petersfield, Hampshire GU31 5AZ, UK. Tel: +44 (0) 730 821188. Fax: +44 (0) 730 821199.

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Standards conversion used to be mysterious, now it's miraculous.

Today, standards conversion is an integral part of the global TV market, but for most people it still remains a deep and complex mystery.

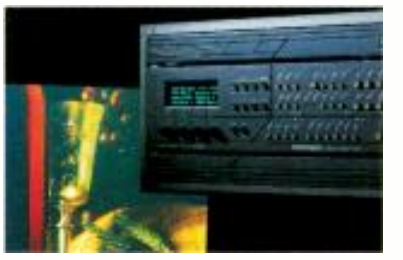
Programme makers now have the finest precision acquisition and display technologies at their disposal. So naturally they'd like their work to reach audiences, wherever in the world, in its original pristine condition. But wide variations in the quality of standards conversion around the world only too often end in disappointing results. Ideally conversion should be absolutely transparent. However the sheer mathematical limitations of conventional standards conversion technology mean this ideal has always appeared unattainable. The only way to go beyond current limits was to throw out the old thinking and start with a clean sheet of paper.

The Snell & Wilcox design team did just that with Alchemist. And the results it achieves truly justify the word "miracle." Alchemist is the most advanced standards converter ever built. With 8:8:8 input sampling, 12 bit digital internal processing and a range of other unique features, it comes closer than any other standards converter to perfect transparency. And when combined with the power of Ph:C Phase Correlation motion estimation, Alchemist makes even that goal a reality.

Ph:C is the only motion estimation technology to have been developed specifically for real-time broadcast T.V. application, so it's the only one capable of handling effortlessly any material thrown at it. Without supervision. Without worries. Even poor quality input (a headache for normal converters) undergoes a transformation which can only be described as miraculous.

But you know what they say about miracles, you have to see it for yourself in order to believe. To do so why don't you simply contact Snell & Wilcox right now at either one of the addresses below.

Alchemist with Ph:C



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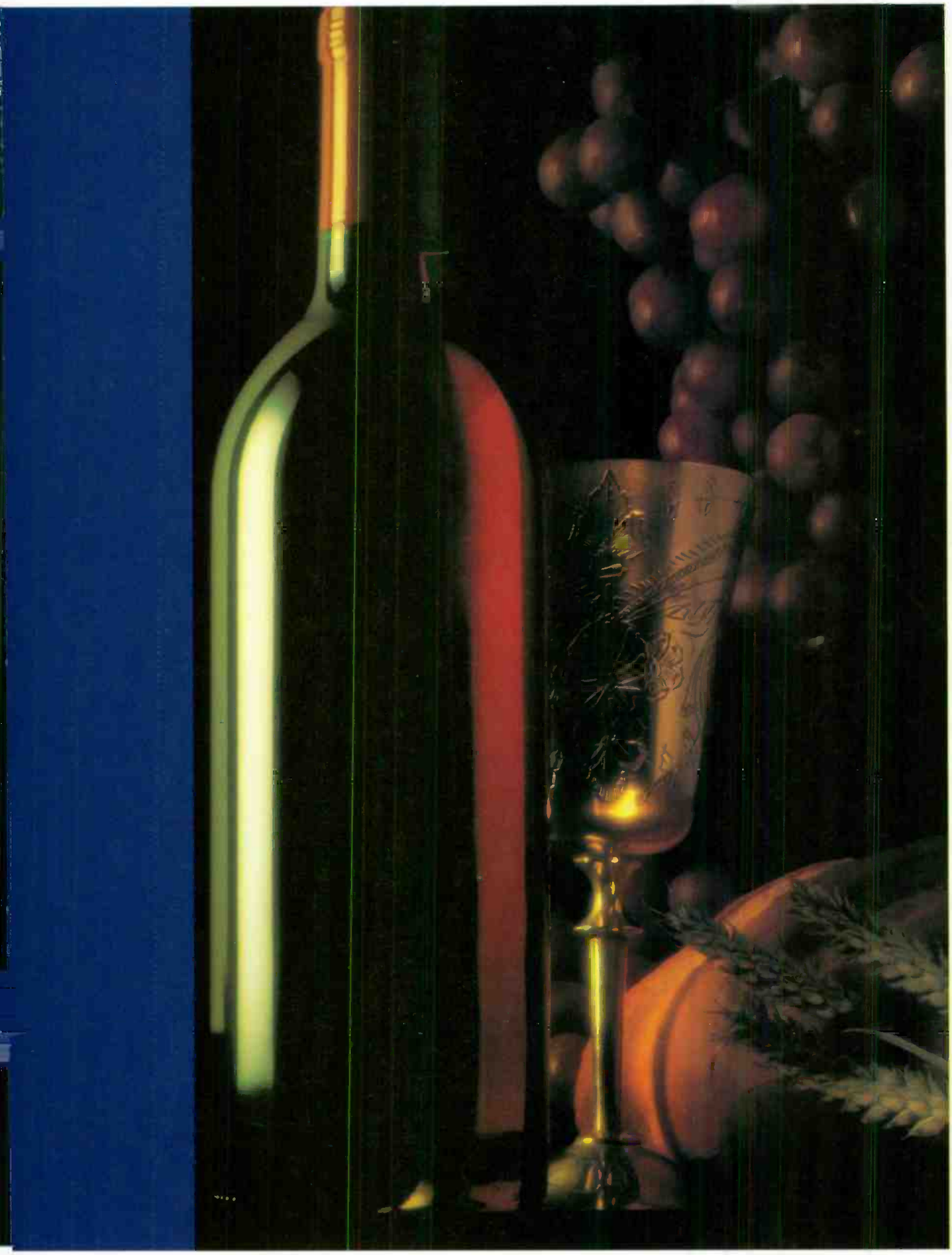

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HD5100 Upconverter

SNELL & WILCOX

Engineering with Vision

Archives, graphics, ENG. Now they can all stretch to HDTV.

For the programme maker, HDTV seems to offer limitless creative opportunities. Until you try to be creative, that is. If only you could use your DVE's box of tricks on that shot. If only you could use your minicams on that action sequence. If only you could insert that piece of conventionally-shot archive footage. Now, you can stop saying "if only". Because to do all this on HDTV, you only need one of these. The Snell & Wilcox HD5100 universal upconverter.

Now, the creative possibilities for the HDTV programme maker have been dramatically stretched to encompass all those tools and techniques available to producers of conventional material. And as you would expect from Snell & Wilcox, all the options of the multistandard environment are catered for. Any 525 or 625 input can be converted to all current HDTV standards. And provisions have even been made for future standards. Picture quality is exceptional. The HD5100 gets the absolute maximum possible out of the 525 or 625 line image and passes it all on to the High Definition picture. The secret lies in the technology. Its unique spatio-temporal filter was developed in partnership with the BBC. (This partnership has resulted in a range of similarly innovative technologies). So now you can stretch to embrace the 35mm picture quality of HDTV without putting the squeeze on your creativity. Why don't you contact Snell & Wilcox at either one of the addresses below.

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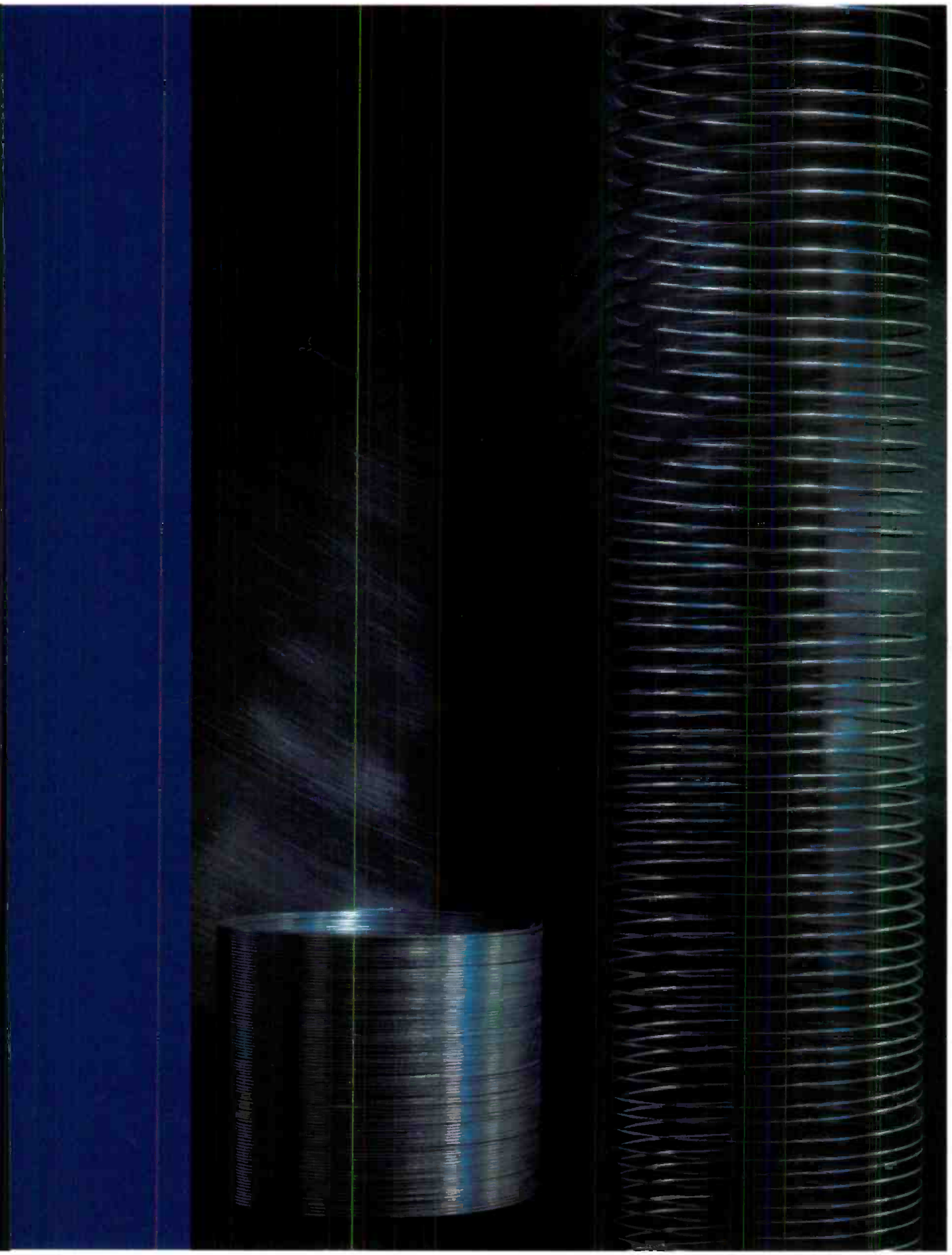

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Prism Precision Digital Decoder

HD3100 HDTV Downconverter

Alchemist with Ph:C

HD5100 HDTV Upconverter

Gazelle Slow Motion

DVS1000 Component Digital Switcher

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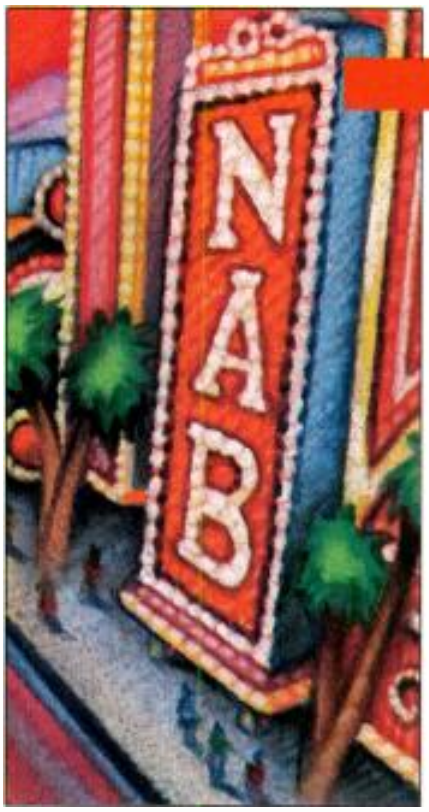
NAB Conference preview

The telecommunications industry is all on line at NAB '94 in Las Vegas.



By John Collinson

Broadcasting and its growing number of related fields will all be major players in the much touted "information superhighway," though the access routes to this thoroughfare may run through presently unfamiliar territory. This year's NAB Engineering Conference will cover the most up-to-the-minute information available on the course of telecommunications technology.

Like last year, the NAB HDTV World Production Conference and Multimedia World will be concurrent with the Broadcast Engineering conference. This year's event occurs March 19-24, about three weeks earlier than last year's. The broadcast engineering and HDTV production conferences will be at the Las Vegas Convention Center, while the Multimedia World will be held at the Las Vegas Hilton.

More than 500,000 square feet of exhibit space will be filled by more than 800 exhibitors. Expected attendance is in excess of 64,000.

Two special technical sessions will be held on Saturday, March 19, ahead of the main conferences. SMPTE will present "The SMPTE Post Experience," a full-day tutorial seminar providing a detailed tour of the world of post-production. The session is scheduled for 9:00 a.m. - 5:30 p.m.

IEEE will sponsor a half-day "Digital Transmission Tutorial" from 9:00 a.m. - 1:00 p.m. on Saturday, as well. This session will provide a detailed examination of digital transmission and modulation techniques, signal robustness in the digital domain, and test methods for digital transmission schemes.

A traditional highlight is the Ham Radio Reception, which will be held on Wednesday, March 23, at the Las Vegas Hilton. An SBE membership meeting will be held on Tuesday afternoon at the Convention Center.

Broadcast Engineering Conference highlights

Leading off this year's conference is a keynote address by Jules Cohen, P.E., on Sunday morning. The remainder of the day will include an intensive examination of HDTV, ranging from the latest updates on the work of the Grand Alliance to practical planning for transmission of over-the-air HDTV. Another afternoon session will cover graphics and non-linear editing.

Monday morning will begin with an all-industry keynote address by Reed Hundt, newly installed chairman of the FCC. Sessions will then take up more aspects of HDTV, broadcast engineering management and multichannel TV delivery systems. In the area of maintaining present facilities, other sessions will cover tower maintenance, contract engineering, RFR and legal issues.

Tuesday is the annual SBE Day, with the technical sessions presented by the Society of Broadcast Engineers. Featured topics include designing a serial digital TV facility, TV automation, the new EBS system, and a digital TV test and measurement workshop.

The engineering achievement awards lunch will be on Wednesday. Awards will go to Charles Morgan, senior vice president and vice president of engineering of Susquehanna Radio, and Thomas Vaughan, president of Pesa Microcommunications. Sessions on Wednesday include an FCC industrial technical panel, HDTV system testing, a video compression tutorial, HDTV frequency allocation issues, satellite and auxiliary services and data broadcasting for television.

Wrapping things up on Thursday are workshops on digital videotape and cameras.

Collinson is a satellite uplink engineer for Home Shopping Network, St. Petersburg, FL.

The Bottom Line

Change is in the wind. The broadcast industry as we know it may soon be radically altered. Many new services are under development, and their competitive impact will undoubtably be felt by the broadcast industry. To remain successful, tomorrow's broadcasters must be fully prepared to understand and manage these emerging technologies. Nowhere is this vital information more available in one place than at NAB '94.

See page 102 for the *BE* FASTtrack, your personal guide to NAB products and services.

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Broadcast engineering conference sessions (TV and Video)

Sunday, March 20

9:30 a.m. - noon: The Grand Alliance HDTV System
- System Overview
- Video Formats
- Video Compression
- Transport and Interoperability
- Transmission
- Audio

1:00 p.m. - 5:00 p.m.: HDTV Station Issues, Part I
- Structural Considerations for a Successful Transition to HDTV
- The Effect of Channel Assignment on the Transmitter and Receive Antenna for Equivalent HDTV/NTSC Coverage
- Absorptive Filters as an Integral Part of an HDTV Transmission System
- HDTV Coverage Optimization Using Advanced Coverage Prediction Techniques
- Managing Power-Line Harmonics in Advanced Broadcast Facility Design

1:00 p.m. - 5:00 p.m.: Graphics and Nonlinear Editing
- Tips, techniques and demonstrations from six presenters.

Monday, March 21

10:30 a.m. - noon: Managing in Broadcast Engineering
- Managing USTs, MSDs and other Federally Regulated Environmental Matters
- The Americans With Disabilities Act and Broadcast Facility Design

10:30 a.m. - noon: HDTV Station Issues, Part II: UHF Transmission
- Full Band Linearity Correction Requirements for ATV Transmitter Systems
- HD Television Broadcast with a Klystrode or IOT
- Keeping and Improving the NTSC Transmitter As You Transition to HDTV
- Digital Amplitude Modulation: UHF TV Transmitter Final Tests
- Pre-Correction Techniques Used in the ATTC 32 QAM Digital Transmitter

1:00 p.m. - 5:00 p.m.: Digital Modulation for TV Broadcasting
- The Grand Alliance Transmission System Profile
- The Japanese Advanced Television Transmission System
- Eurobits: Whither Digital Europe?
- Technical and Quality Issues for European Digital Television
- Evaluation of Multicarrier Transmission Systems for Advanced TV

1:00 p.m. - 5:00 p.m.: Multichannel TV Program Distribution Systems
- DirecTv: A Digital Multichannel Distribution System
- Large Scale Redundant Library Systems for Integrated Program and Spot Material
- Satellite Scheduling and Uplink Control for a Multiple Carrier per Transponder Operation
- Automating Multichannel Broadcasting
- ABVS: Technology Tests of Advanced Video Services
- Multichannel Transport of Video Signals in the Telecommunications Exchange

1:00 p.m. - 3:30 p.m.: Towers and Other Transmission Support Equipment
- Understanding and Preventing Guyed Tower Failures Due to Anchor Shaft Corrosion
- Controlling Corrosion on Broadcast Towers: A Subject You Can't Afford To Be Rusty On
- Inspection, Maintenance and Troubleshooting of UHF/VHF/FM Antennas, Transmission Lines and Waveguides
- Performance of a Transmission Line Having a Rigid Outer Conductor and a Corrugated Inner Conductor

3:30 p.m. - 5:00 p.m.: RFR Update
- A panel discussion of the latest information in the RFR arena.

Tuesday, March 22 (SBE Day)

9:00 a.m. - noon: Designing a Serial Digital TV Facility
- Test Methods for Analyzing Digital Video
- Public Television Expanding into the Digital World
- The Merging of Computer and Video: Using Ethernet and SCSI for Digital Video Input and Output
- Real-Time Random Access Without Compression: The Technology and Applications to Keep Production and Programming Elements Readily Available
- Building and Operating a Multiformat All-Digital TV Plant

1:00 p.m. - 5:00 p.m.: TV Automation
- Integrating Manual and Automated Master Control Operations
- The Impact of Data Storage Systems on TV Automation
- WBNS: Station Automation Experiences
- Total Station Automation for the '90s
- WFMZ: Station Automation Experiences
- Embedded Encoding for Positive Event Identification

1:00 p.m. - 3:30 p.m.: The New EBS System
- Testing New Technologies for Emergency Alerting Systems
- This is No Longer a Test
- Cable TV and the New EBS
- User-Friendly EBS
- All-Channel Alert: Emergency Preparedness in Canada
- A Participant's Report on the FCC Tests of New Emergency Broadcast Systems

1:00 p.m. - 5:00 p.m.: Digital TV Test and Measurement Workshop
- A workshop on equipment and methods for making digital TV measurements

Wednesday, March 23

9:00 a.m. - noon: Video Compression Tutorial
- Video Resizing — How to Make that Bigger/Smaller Image the Best it can be

9:00 a.m. - 10:30 a.m.: FCC-Industry Technical Panel
- A panel discussion featuring seven key members of the FCC and the broadcast engineering community

9:00 a.m. - 10:30 a.m.: HDTV System Testing
- Developing the Laboratory Test Plans for the Grand Alliance Advanced TV System
- Testing the Grand Alliance Advanced Television Transmission System
- Developing and Implementing the Test Plan for Field Testing the ATV Transmission System.

10:30 a.m. - noon: HDTV Frequency Allocation Issues
- Assessment of Cross-Polarization for Interference Reduction in Broadcast Services
- Spectrum Studies for Advanced Television Services in the U.S.
- A Status Report on the FCC's Frequency Allocation Program for ATV.

2:00 p.m. - 5:00 p.m.: Satellite and Auxiliary Services
- How the New FCC Ruling for Earth Station Antennas Will Impact Broadcasters
- Direct Broadcast Satellite Sound

2:00 p.m. - 5:00 p.m.: Data Broadcasting
- NTSC Digital Broadcast: Possible Applications of the Technology
- VBI Data Broadcasting: New Business Opportunities for Broadcasting Organizations
- Network Management and Performance Requirements of a Data Broadcasting Network
- Broadcast 2-Way Technology
- e-on Net: A Novel Interactive Video and Data System

ú Broadcasting Multimedia — A Complementary Service or the Mainstream of the Future?

Thursday, March 24

9:00 a.m. - noon: Camera Workshop
- A review of setup, adjustment, operation/ maintenance procedures for contemporary video cameras

9:00 a.m. - 10:30 a.m.: Digital Videotape Workshop No. 1
- Machines and methods to get the most out of digital storage technologies.

10:30 a.m. - noon: Digital Videotape Workshop No. 2
- Continuation of previous session

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SEE SCHMID AT NAB BOOTH # 1606-08

AT THIS YEAR'S WORLD CHAMPIONSHIPS ONE PERFORMANCE IS HEADS ABOVE THE REST.

At soccer's World Championship Tournament, held at sites across America for the first time in 1994, one of the most powerful performances is being turned in by one of the smallest performers — Schmid's SIAT-MAX Audio Test Generator.

Using the portable, hand-held SIAT-MAX unit at live broadcast sites, along with a Schmid measurement receiver at its control center, the European Broadcast Union can quickly, repeatedly check site-to-center audio links. In doing so, EBU can assure the quality of its transmissions under the most challenging, time-critical conditions.

Innovative audio testing applications like the EBU's are what SIAT-MAX — and Schmid's entire family of short interval audio testing products — are all about. Portability, speed, accuracy, ease-of-operation and low cost all add up to the best, fastest, most versatile audio test solutions on the market today.

Whether you need to conduct audio proofs from remote sites or conduct fully automated tests across your entire network... whether you need to troubleshoot in the field or test audio paths in-house ... Schmid has the products to give you peak audio performance. For more information or to arrange a free demo, call 800-438-3953 toll-free today.

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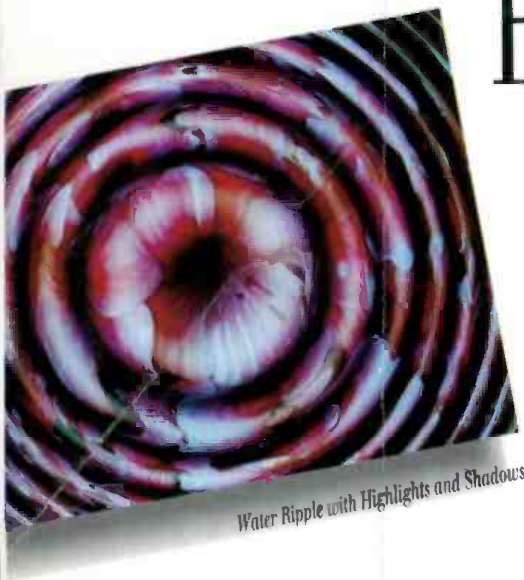

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Clearly it's not a Refractor curvilinear effect from Pinnacle. While others in our price range can only make waves we do it all. Harness the power of the Prizm Video WorkStation with Refractor.

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Broadcast Engineering Conference (TV & Video sessions) at a glance:

	Sunday, March 20	Monday, March 21	Tuesday, March 22	Wednesday, March 23	Thursday, March 24
A	Keynote Address	All-Industry Keynote Address	Designing a Serial Digital TV Facility	Video Compression Tutorial; HDTV System Testing; FCC Indust. Tech. Panel	Digital Videotape Workshop #1; Camera Workshop
M	The "Grand Alliance" HDTV System	Managing in B'cst. Engr.; HDTV Station Issues Pt. 2		HDTV Freq. Allocation	Digital Videotape Workshop #2
P	HDTV Station Issues, Part 1; Graphic Non-linear Editing	Digital Modulation for TV Broadcasting; Multichannel TV Delivery Systems; Towers & Transmission Support Equip.; RFR Update	Digital TV Test & Measurement Workshop; TV Automation; EBS	Engineering Achievement Awards Lunch; Satellite and Auxiliary Services; Data Broadcasting For TV	
M					

HDTV World Production Conference at a glance:

	Sunday, March 20	Monday, March 21	Tuesday, March 22	Wednesday, March 23	Thursday, March 24
A		All-Industry Keynote Address	HDTV Production Equipment: New Tools of a New Trade	HDTV and Wide-Screen Production Techniques: Putting the Tools to Use	Handling HDTV Signals in the Studio: Compressed or baseband?
M		Wide Screen & HDTV Prod.			
P		Keynote Address	HDTV Screenings: The Best From the U.S.	International Digital Program Exchange: Sharing the Wealth	
M		HDTV Production in Europe: Alive and Well		International HDTV Program Screenings: The Best from Around the World	

Multimedia World sessions at a glance:

	Sunday, March 20	Monday, March 21	Tuesday, March 22	Wednesday, March 23	Thursday, March 24
A		All-Industry Keynote Address	Keynote Address	Keynote Address	MM Networks; Platform Profile; Training; Intell. Property
M		Multimedia Viewpoints	Interactive Games; Platform Profiles; Interactive Multimedia	MM Title Developing; Platform Profiles; Adapting Existing Material	MM Networks; Platform Profile; Interact. Scripting; Compatibility
P	Title Planning; MM Boot Camp; International Issues	What are the Multimedia Markets?	MM in Post Prod.; Platform Profiles; Licensing Agreements	In-House MM for Training; Platform Profiles; MM for Large Audiences	
M	Title Planning; MM Boot Camp; International Issues	Target Market Analysis: Educ. & Tng.; Games; Publishing	Info Svcs. Using MM; Platform Profiles; Interact. Broadcasting	Educational Titles; Platform Profiles; Interactive Marketing & Promotions	

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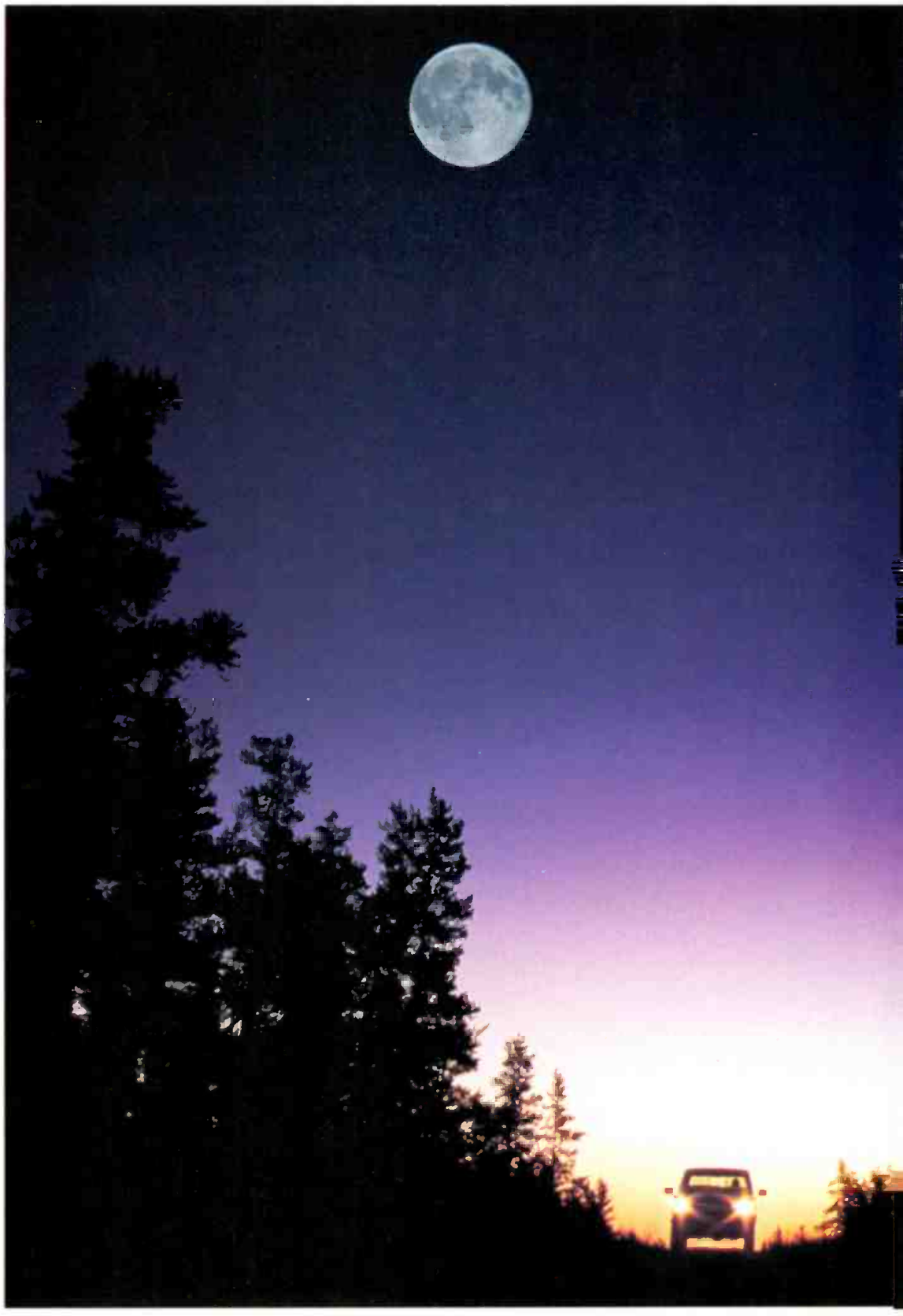

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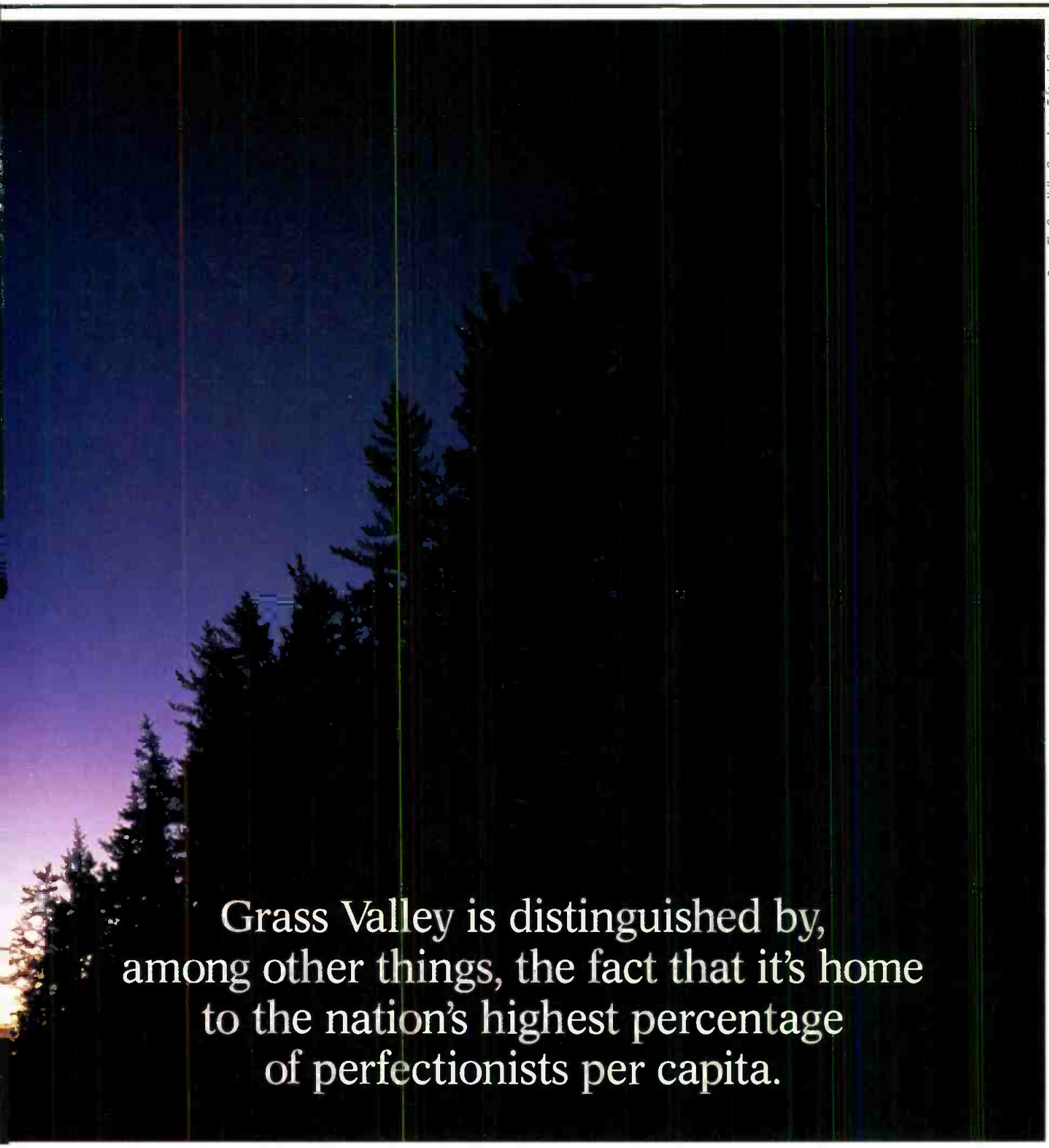

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FacilityShowcase

Photo credit: USA Network control room. Photography provided by A.F. Associates

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The March issue of *Broadcast Engineering* magazine has always been my favorite issue of the year. First, it's always the largest issue of the year, which makes it an editorial challenge. Second, it's the NAB issue, which allows us to cover the industry's largest show. Finally, the March issue contains the Facility Showcase, one of my favorite features.

The Facility Showcase coverage is one of the most colorful and graphically interesting packages of the year. Best of all, this feature lineup allows us to provide the reader with an inside look a some of the hottest cable, post and TV facilities in the country, along with tips on how they were built.

An example of successful design and construction is shown with the photo on these two pages. Shown here is the USA Network control room in Jersey City, NJ. The new facility allows one of the nation's fastest growing cable networks to efficiently bring their audiences a wide variety of programming with the latest technology. Anytime a network, broadcaster or post house reaffirms its commitment to the audience or customer through top-notch technology, everyone wins.

Such is the case with the customers and viewers of the companies portrayed in this year's Facility Showcase. Whether it's a public TV/radio station converting an old warehouse or a post-production facility renovating an historic landmark, the viewer and customer were the beneficiaries of these efforts.

Like the facilities described here, to be successful, you need to consider first your customers' or viewers' needs. Only then will you be ready to begin the design process.

You too can turn your station or post-house into a top-notch facility, but learn first from these professionals. What follows are examples of how other successful companies completed the task.

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- "KQED: Building for Durable Change" 51
- "Building the First DBS Facility: DirecTv" 58
- "Building on Fisherman's Wharf: Realtime Video" 66
- "Editel: Los Angeles" 78

Brad Dick

Brad Dick, editor

interface bridge (both available sepa-

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Since its inception as the nation's first advertiser-supported basic cable network in 1980, USA Networks has aggressively fulfilled its mandate to create a cable network providing a wide variety of programming for all family members.

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In 1992, we launched the Sci-Fi Channel, now in 15 million homes nationally, and in April, 1994 we will launch USA Network for Latin America. The Sci-Fi Channel formula blends classic favorites and contemporary off-network sci-fi shows. Its movies are theatrical blockbusters and original productions that are part of our "Planetary Premieres" series.

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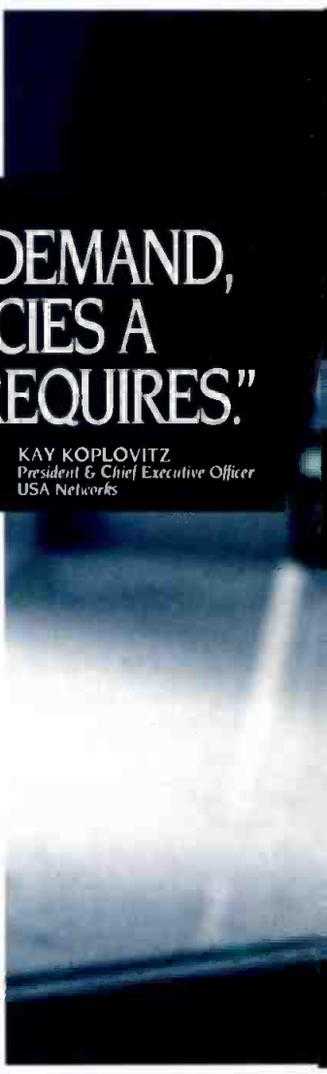

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Kay Koplovitz is founder, president and chief executive officer of USA Networks. She continues to be one of America's most influential corporate executives, charting new territory and keeping her network in the vanguard of the television industry.

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Continued from page 40

became clear. This article will discuss some of the problems, solutions and observations made during the design, construction and operation of Television City's first multiplexed digital edit room.

Edit 12 required only a minimum of sound-defining devices to provide a good stereo image.

Facility design

The space allocated by Television City for the construction of new digital edit rooms measured 37 feet long by 28 feet wide. It was divided into two separate 342-square foot edit rooms. The remaining space was used as a common equipment room servicing both edit rooms. (See Figure 1.) The ceiling of the allocated space had been acoustically designed for a previous technical facility and was a determining factor in the layout. By taking advantage of the existing ceiling's corner rise, Edit 12 required only a minimum of sound-defining devices to provide a good stereo image. To provide sound isolation between the three rooms, the design specified high-loss frame walls with neoprene gaskets.

Typical system diagram

The simplified block diagram of a serial D-2, multiplexed editing system is shown in Figure 2. The diagram illustrates a 2-machine editing system; additional D-2 VTRs would connect in the same configuration. The router, added later, is shown between the dotted lines.

The digital audio and digital video outputs of each D-2 are internally multiplexed by an optional VTR board. After multiplexing, each VTR output is then sent via coax to an external *demultiplexer.* The demux splits the digital bitstream apart, sending audio to the audio mixer and video to the video switcher. After processing by the audio mixer, program audio is then sent to be externally multiplexed with the program video. After *muxing*, the digital bitstream is distributed to the multiplexed input of each VTR.

Audio breakaway is a concern with multiplexed serial digital routers.

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The program path length of the audio mixer is less than one line of video and causes no problem during muxing or demuxing.

At this point you might be wondering, why multiplex at all? Muxing and demuxing allows a single-level serial router to route 4-channel audio, video and VITC, all gen-locked on a single coax. Television City is presently installing a new serial routing switcher. When this router comes on line, Edit 12 will be connected as shown.

Audio breakaway is a concern with multiplexed serial digital routers. To solve this problem during an edit session, the audio mixer can be used to perform the breakaway. In a dubbing situation, other methods could be used to achieve the desired breakaway. One method would be to integrate a breakaway station into the serial router.

The editor controls the VTRs using the standard RS-422 control cables. An external preview selector is not needed in this system; it has been replaced by the video switcher's internal aux bus. The aux bus, in communication with the edit controller, provides high-quality digital preview.

Optional auto-timed, analog inputs were used for analog integration. These inputs are available on the serial D-2 video switcher and the digital audio mixer. The DVE has not been digitally integrated with the suite and makes full use of the auto-timed analog I/Os. Because the DVE is parallel D-1 and the suite is serial D-2, high-quality rate-conversion equipment is required to make the connection. During construction, the cost of reliable conversion equipment did not justify the increase in video quality that would result. When it becomes cost-effective, the DVE will be digitally installed.

The test stations have two main purposes: check the digital integrity of the serial bit path and to check picture content, video levels, SC/H phase and overall picture quality.

Serial test stations

Two serial digital test stations are included in the design. Both consist of a vectorscope, a waveform monitor and a 13-inch color picture monitor. The first, located in the equipment racks, is fed digitally with multiplexed program and switcher aux bus 5. The waveform monitor has an internal, 10-bit, D-to-A converter. The DAC output is used to feed the analog vectorscope. The second serial digital test station is configured in the same manner and is located inside the edit room.

The test stations have two main purposes: to check the digital integrity of the serial bit path and to check picture content, video levels, SC/H phase and overall picture quality. The digital integrity of the bitstream can be checked with the waveform monitor's on-screen displays. Indicators are given for error data handling and audio-channel validity. A digitized picture of the serial EYE pattern also can be displayed. An equalization button on the waveform monitor allows observation of the eye pattern in the equalized and unequalized modes.

The test stations are not used for input timing adjustments — quite different from

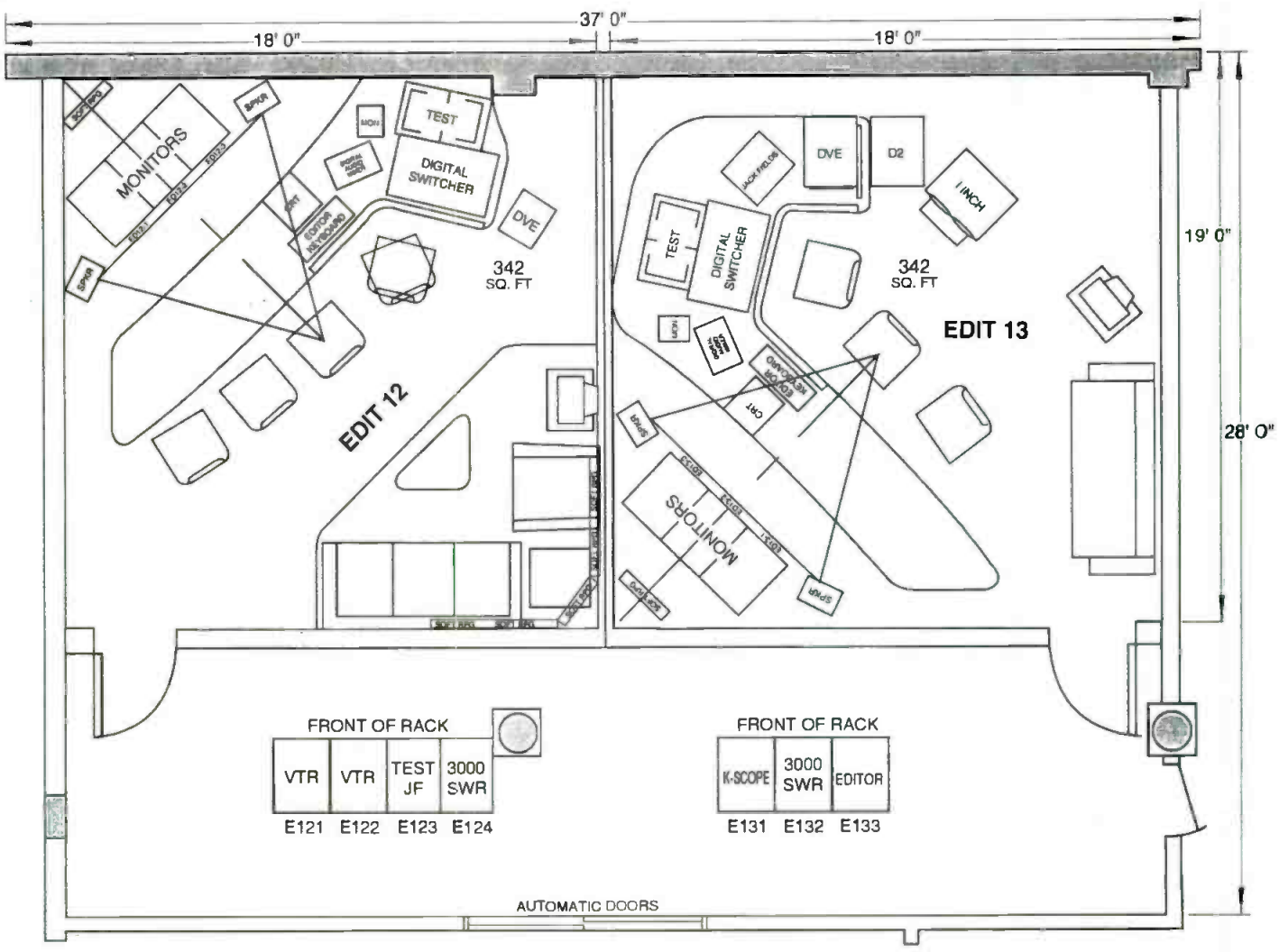

Figure 1. *Floor plan of the area allocated for the two editing rooms and equipment.*

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an analog edit room, where the test station is sometimes called a timing station. Except for the optional RGB chroma-key inputs, all switcher inputs are auto-timed. The capture range of the auto-timing feature is ±17.8μs for digital and analog inputs. For coax cables with propagation factors of 66%, 1μs equals 648 feet. Multiplying ±17.8 x 648 gives a possible coax cable length of ±11,534 feet.

The video switcher also has an output delay of 1.18 lines or 75μs, as shown in Figure 3. Because of the auto-timing inputs and the fixed output delay, any source selected on aux bus 5 will appear timed. If actual input timing must be checked, serial digital jacks are available. At some future date, a software upgrade for the video switcher might allow the auto-timing inputs to be switched off. Aux bus 5 could then be used for timing purposes.

Because of the 75μs delay (11.5μs more than a line), the test station and all picture monitors on the output side of the switcher are not referenced externally. If they were, the waveform monitor's backporch clamp would be performed 11.5μs into a line instead of during the backporch. This discrepancy would appear as shifted video on the waveform monitor display. External reference is connected to both test stations, but it is normally not selected. It is important to note that, because of the video switcher's 75μs program path delay, external re-entry cannot be accomplished without a framestore device. However, once the router is installed, the framestore will be bypassed unless it is used for switcher re-entry.

Racks in the equipment room that contain tape machines and electronics used for Edit 12.

The SC/H phase of any new switcher sources should be checked.

The SC/H phase of any new switcher sources should be checked. The video switcher attempts to correct all SC/H phase errors. This is a useful switcher feature but care should be taken in its use. The auto-timing inputs will correct SC/H phase errors within ±170°. The video switcher makes the correction by repositioning the video with respect to

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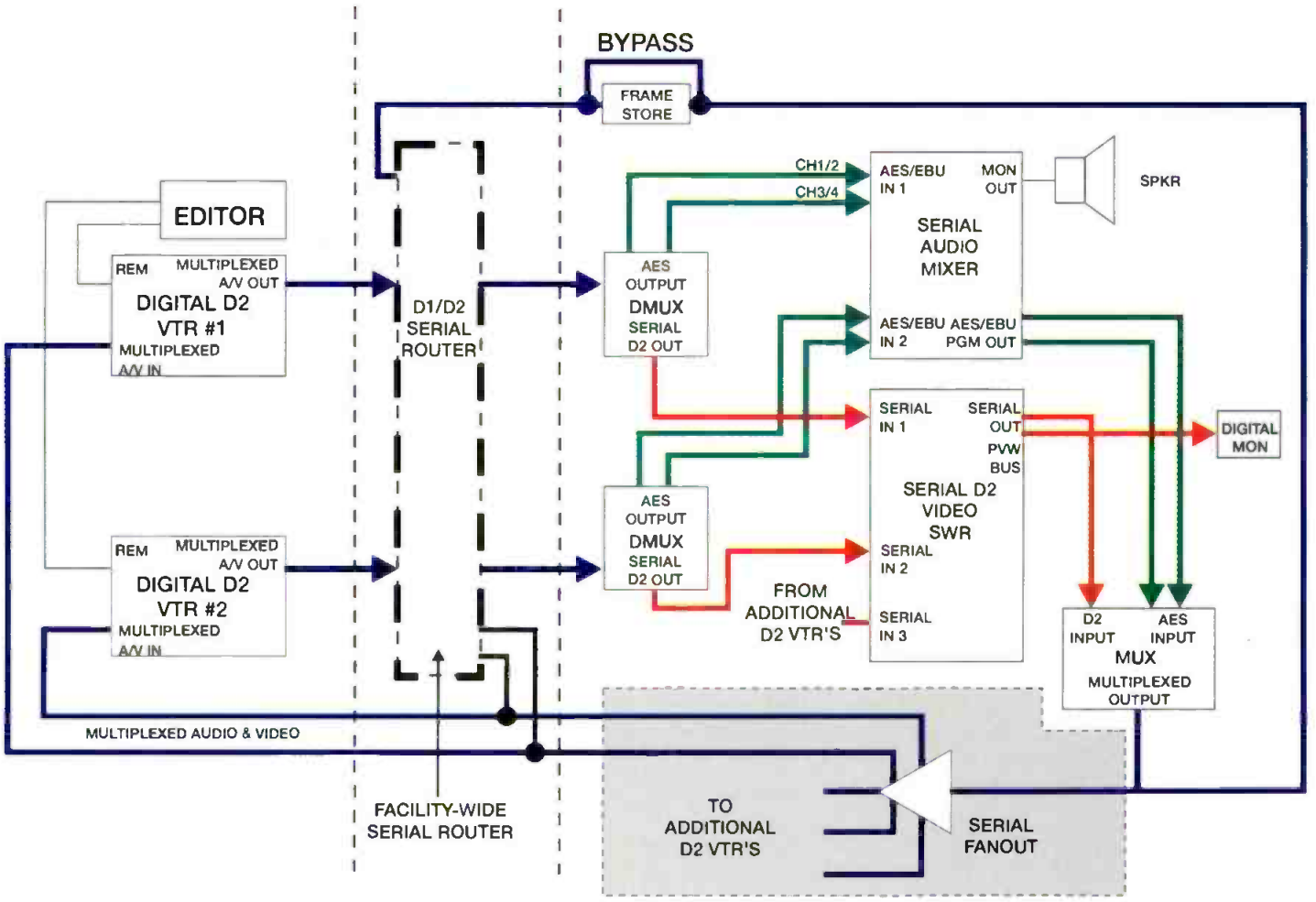

Figure 2. *Simplified block diagram of a multiplexed edit suite. Serial fanout (shaded) was used before installation of a facility-wide serial digital router. Framestore bypass is used whenever switcher output is not used for switcher re-entry.*

sync. Because of this horizontal repositioning, consistent SC/H phase of recorded material and playback sources is essential. If the SC/H phase of each source VTR is not consistently maintained, horizontal shift problems will occur during match-frame editing. All switcher inputs should be periodically checked for zero SC/H phase.

The vectorscope is used to check absolute and relative SC/H phase. To check relative SC/H, the vectorscope is externally referenced and the signal under test must be patched into the digital test station. The auto-timing feature does not allow aux bus 5 to be used as a source selector during SC/H measurements.

Sync generators

Edit 12 has two sync generators, a master generator for the VTRs and a secondary generator for the audio and video switchers. The master sync generator is locked to the facility's color black and feeds each VTR as well as the secondary sync generator. The master generator also feeds the edit controller with sync and color-frame ID pulses. The secondary sync generator feeds the audio switcher, the video switcher and the DVE. This configuration allows the video switcher to be independently adjustable from the source inputs. Unlike most analog production switchers, the video switcher does not generate color black for external use. The color black it does generate is used only for program output.

A switcher-dedicated sync generator is a desirable feature.

A switcher-dedicated sync generator is a desirable feature because the video switcher's internal timing is not user-adjustable. In this configuration, the secondary sync generator provides flexibility. In the case of RGB chroma-key inputs, which are not auto-timed, the secondary sync generator could be used to accommodate them or it could be used to allow more timing flexibility in a networked DVE configuration.

Monitor router

The editing room includes a 20 x 10 analog video router. This router's main purpose is to route the character outputs of each VTR to the edit room's monitor wall. The character outputs provide an analog video signal keyed with time code. A control panel for the 20 x 10 is located in the monitor turret at the technical director's position.

Although Television City presently uses longitudinal time code, it is hoped that either VITC or a new form of multiplexed longitudinal time code will become standard. True digital time code would allow a new type of digital picture monitor to extract the time code and display it. This ability would make serial digital edit-room design even more efficient, eliminating the need for a separate time-code or character router.

Construction

The design, construction and integration of Edit 12 was completed in four weeks, a relatively short time span considering that both facility and electronic construction were required. The multiplexed serial design saved many hours of documenting, wiring and integrating.

In the past, Television City edit rooms have required more than 40 drawings for proper documentation. Edit 12 required only nine drawings. Unlike other CBS edit rooms, Edit 12 uses no audio or video

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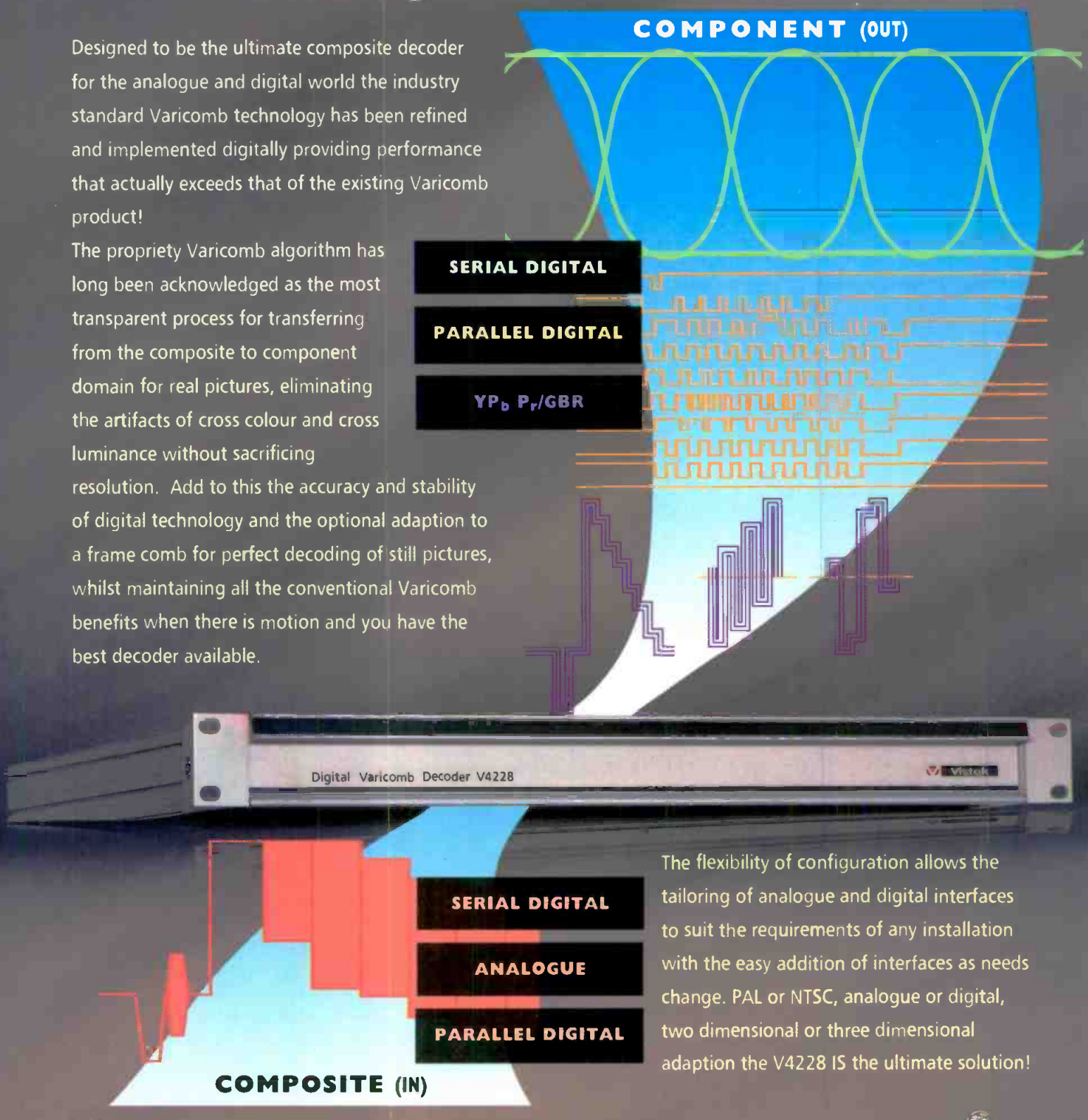

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connection blocks; in a serial digital design, audio and video blocks serve no purpose. If used, they can introduce reflections or errors into the high-speed datastream. Multiplexed digital audio, carried simultaneously with video, also reduces documentation and wiring complexity.

The Edit 12 audio/video block diagram was drawn with AutoCAD on a single sheet of D-size paper. Although the drawing is intended to be viewed as a complete picture, layering was used to separate the audio, video and pulse systems.

The maintenance department has often indicated that the block diagram, complete with all layers, is effective and easy to use. All system connections can be seen in one glance. The engineering construction group built Edit 12 using only three drawings: the A/V block diagram, the serial video jack field and the serial audio jack field. As audio and video become recognized as digital data and not as individual systems, these documentation methods might become more common.

Timing problems in a serial D-2 edit room are generally associated with equipment, not cable length.

Edit 12 uses NEC-rated Belden 8281B for serial video and multiplexed A/V. As mentioned, timed cables are not required in a serial digital edit room design. Timing problems in a serial D-2 edit room are generally associated with equipment, not cable length. Coax cables were cut to similar lengths but were not timed, which resulted in a considerable cost savings. To reduce coaxial cable reflections, only one 75Ω self-normalling jack pair is used between a source and its destination.

Although serial digital equipment is presently more expensive than parallel or analog equipment, increased hardware cost can be accommodated.

Trompeter 120Ω twin-ax was used for balanced serial audio. Concentric 120Ω tip jacks were used at the inputs and outputs of the audio mixer. The twin-ax cable and concentric jack field proved easy to wire and use. The jack field connects to the twin ax cables using concentric BNCs. This type of BNC/twin-ax connection provides full EMI shielding and allows the use of balanced audio. Presently there is talk in the industry of standardizing the digital audio connector to a 75Ω BNC. It is the author's opinion that this standard will work well when BNCs are available on all equipment. The methods and materials that are used in Edit 12 have merit, however, and should be considered.

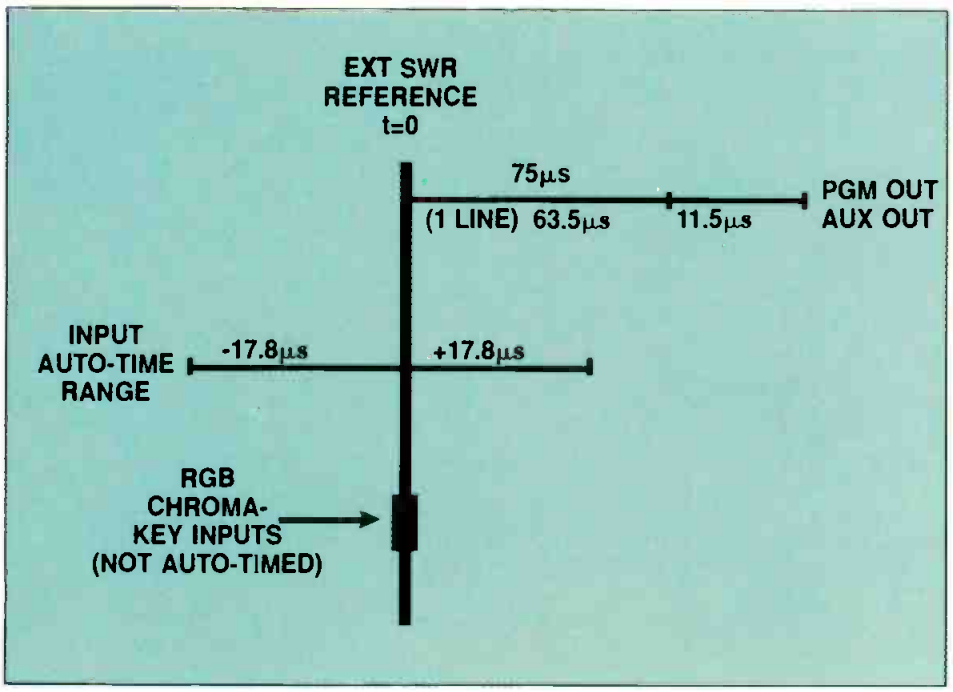

Figure 3. GVG switcher I/O timing relative to an external reference. (Not to scale.)

The design team

Client: CBS Operations and Administration
Charles Cappleman, Vice President

Occupant: *The Young and the Restless*

System Integrator: CBS West Coast Engineering
George Benkowsky, Director

Project Manager/CBS West Coast Engineering System Designer: Craig Harrison

Facility Design: CBS West Coast Engineering
George Benkowsky, Director
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Fernando Quizon

Facility Construction: CBS TV City Facilities
Manfred Fiebig
Gary Gillett

Documentation: CBS West Coast Engineering
Robert Delgadillo
Roberto Gonzales

Interior Design: CBS Facilities
Linda Russ

Conclusion

Although serial digital equipment is presently more expensive than parallel or analog equipment, increased hardware cost can be accommodated through simplified system design and construction techniques inherent in a multiplexed serial digital project. The multiplexing performed in Edit 12 is truly transparent to the user and dramatically simplifies the system design. The long-term savings in a serial digital project are even more compelling because reduced maintenance costs and simplified operation are compounded over the life of the project.

Since the completion of Edit 12 in December 1992, CBS Television City has built two more multiplexed edit rooms and has integrated the rooms with a 96x128 serial digital router.

Editor's note: This article was taken from a paper presented at the NAB Broadcast Engineering proceedings, April 1993. ■

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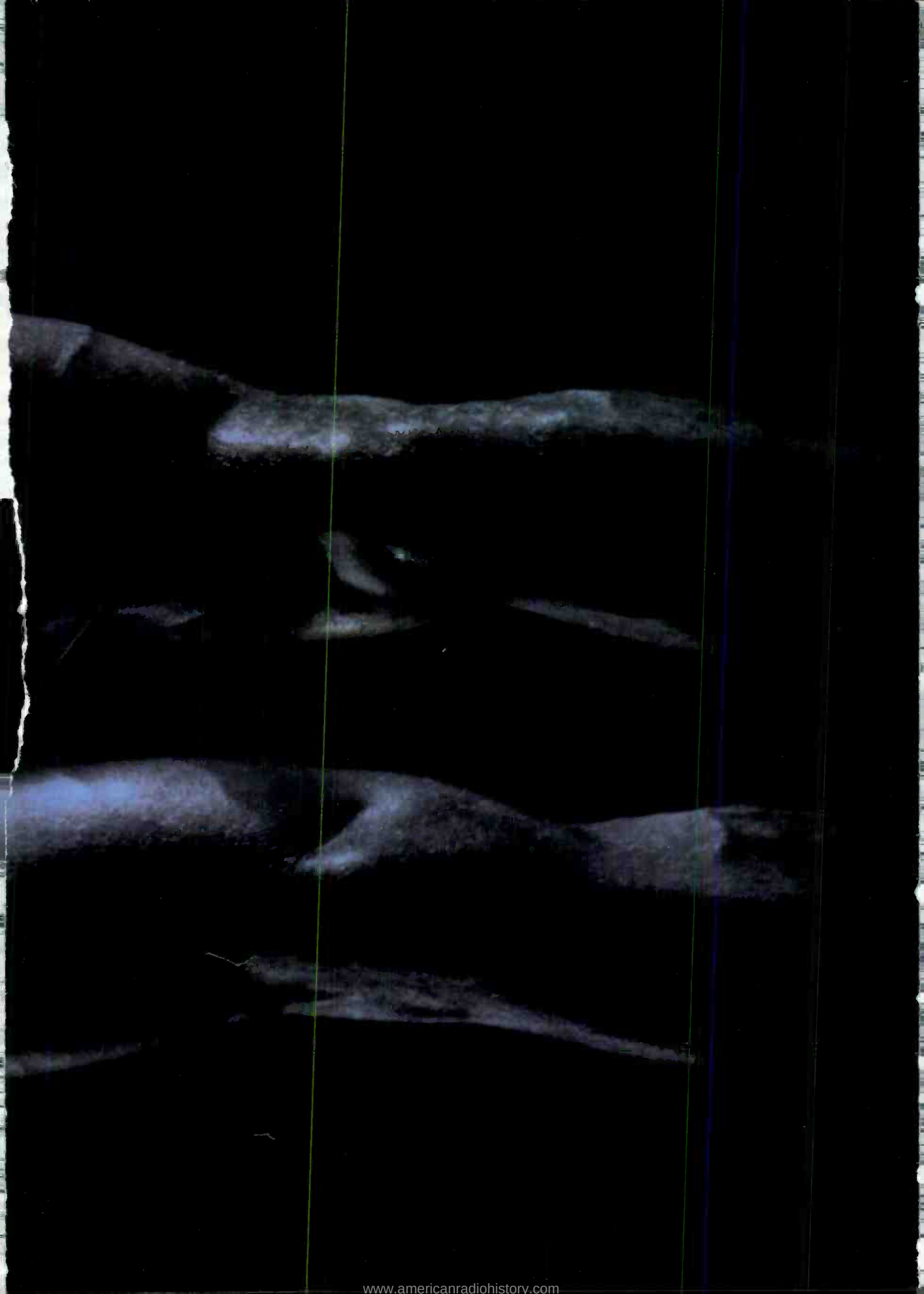

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KUDO$

kū 'dos, Gr. *kü 'dos*, *n.*

credit, fame, renown, prestige.

[Gr, *kȳdos*, **glory**.]*

*"Chambers 20th Century Dictionary"

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KQED: Building for durable change

Designing a facility that can handle the changes ahead is a challenge.

By John Aalto, P.E. and Kevin Schaeffer, AIA

Public broadcasting is often cited for the creativity, the commitment to excellence, and the high ideals of the men and women who make their careers there. Behind this admiration are the challenges public broadcasters face, however: sometimes fickle public support, lean budgets and daunting mission statements. Although public broadcasting is often thought of as a place of idealism, when it comes to engineering, the public broadcast facility is often characterized by a cold, hard realism.

KQED-TV/FM, San Francisco, is a case in point. Early in 1990, KQED had an opportunity to relocate its TV and FM radio plant from aging facilities scattered among several buildings to a new location — a 52,000-square-foot warehouse with good amenities where the operations could be housed under one roof. This meant there would be opportunities to modernize, consolidate and improve technical performance standards, as well as enhance the overall operational environment.

KQED's new on-air control room was the first new area to begin operation during the phased relocation.

By the end of 1990, KQED management and engineering had set its goals and objectives for the move and hired San Francisco architects Gensler and Associates to design the new space. National TeleConsultants (NTC) of Glendale, CA, was hired to work with Gensler on the planning of technical space. NTC also provided engineering design consulting

Aalto is senior project director for National TeleConsultants, Glendale, CA. Schaeffer is a senior associate at Gensler and Associates, Architects, San Francisco. Respond via the *BE* FAXback line at 913-967-1905.

Photos by Chas McGrath.

The Bottom Line

In public broadcasting, funding for new facilities is always hard to come by. When dollars do become available, chances are good that budgets are tight and that further facility funds won't be allocated again anytime soon. Therefore, the new facility's design must be highly functional to withstand the test of time. This requirement calls for a flexible, efficient and adaptable approach — sensible elements in any facility's plans.

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and project site management, using a KQED-hired team of installation to augment the station's own staff.

A blending of old and new

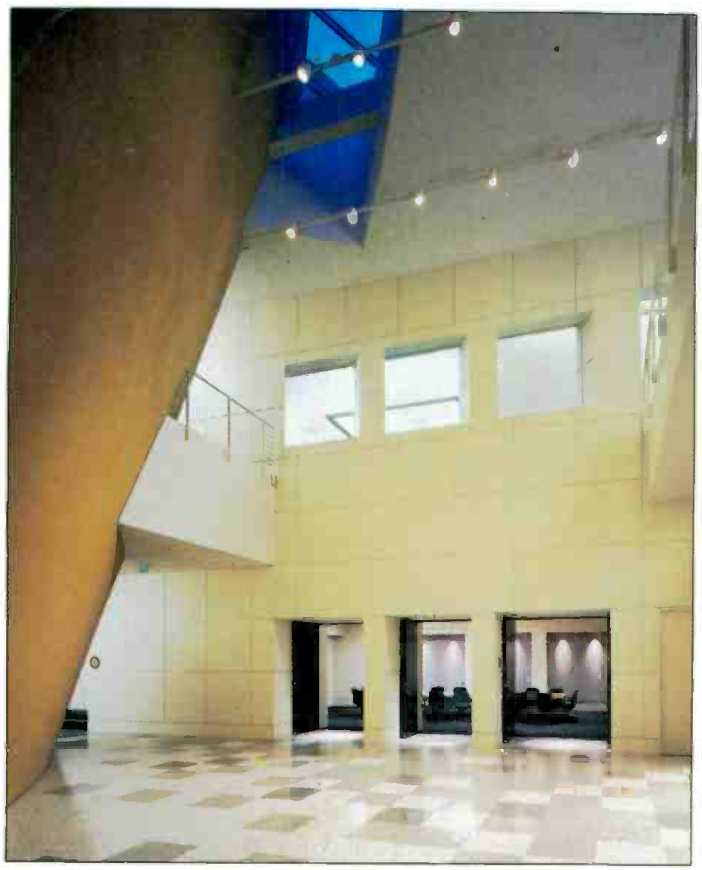
Public broadcasters' view tends to be longer than that of their commercial broadcast colleagues, a fact that is often reflected in their technical facilities. KQED management and engineering wanted to retain much of their existing TV and radio equipment for use in the new facility, but they also wanted a facility that would provide for future capabilities.

The theme that emerged in the plans of the station, architects and NTC was one of a flexible, forward-looking technical core that permitted the easiest, most practical evolution of equipment possible. Any technical facility lives in a hammock strung between the past and the future, and its designers must try to make the users as safe and comfortable in that hammock as they can.

Any technical facility lives in a hammock strung between the past and the future...

In KQED's case, significant expansion of the central TV routing switcher is possible with the future addition of electronics cards and DAs. Expansion router frames, jackfields and the associated wiring are already in place. Space also has been reserved to accommodate growth in the area of digital video effects and related systems.

Jack-row, DA-tray and other equipment placement and numbering schemes were also planned with easy expansion and change in mind. KQED also chose a flexible, state-of-the-art machine control system that is readily software-modified for changing and expanding needs. Audio and video tie-lines serve occasional-use production areas, such as the Green Room, Atrium, Board Room and similar areas.



The atrium of the KQED facility produces dramatic visual effects with its unusual angular treatment. The conference room at the rear is wired as source or destination for audio and video signals.

Design team

Client: KQED
Tony Tiano, president

Architect: Gensler and Associates
Kevin Schaeffer, AIA

Broadcast systems designers: National TeleConsultants
John Aalto, P.E.

Systems installation management: National TeleConsultants
Michael Pusateri, project manager

KQED project team: Gene Zastrow
Larry Reid
Fred Crock

Acoustical consultants: Charles Salter & Associates, San Francisco
David Schwind

Structural engineers: Stephen Tipping & Associates

Mechanical/electrical engineers: Syska and Hennessy

...and its designers must make the users as safe and comfortable in that hammock as they can.

Close proximity to the telephone room allows expanded use of digital common carrier circuits, provided to the building on both copper and fiber-optic lines. Numerous roof-top tie lines and conduits allow expanded satellite and microwave applications.

Consolidation of assets between radio and TV

A flexible, expandable copper infrastructure was conceived for radio by Fred Crock, KQED-FM chief engineer and a veteran of commercial and public radio. Crock and Gene Zastrow (then KQED executive vice president and director of engineering) knew that change was likely to be the only constant encountered in the life of the new facility. As with the TV side, the radio operations required an accessible, large-capacity wireway system interconnecting all control rooms and studios, and a distribution backbone consisting of a central routing switcher and signal distribution system. In addition, a large number of dedicated and spare signal conductors between the central wire room and each control room were provided. This allows extensive future changes to inter-room wiring without disrupting the dense jackfields and DA wiring in the racks.

Although they are hundreds of cable feet away from the main TV-system router and are completely separate in operation, KQED-FM and TV share the same ethernet-linked, computerized routing system. Multiple audio and video paths also run between the operations. This setup

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allows FM to control selected TV switcher outputs and vice versa, should special situations require it.

Electrical and mechanical systems

Primary electrical service is provided at 3,000A, 277/480V, 3-phase. Shielded technical power transformers are used to step down to 208/120V, 3-phase. Radio has 75kVA available, and 225kVA goes to television. All technical power feeders include oversized neutrals (2 AWG sizes) and separate branch-circuit neutrals to accommodate high third-order harmonic currents. A 300kW emergency diesel generator (277/480V) supports technical operations and emergency lighting in the event of power failure.

The radio and TV technical areas are served by a 350-ton mechanical HVAC unit, and the TV studios are served by a separate 300-ton unit in a redundant crossover system. One unusual design feature is the bilevel air distribution in Studio A. Supply air is provided just above the TV lighting zone, and the 72°F floor return re-enters the studio above the primary supply. It is either exhausted or returned depending on this top-level temperature and outside conditions.

KQED's Studio A, a 4,000-square-foot studio for large productions, features a unique bilevel air-distribution system and a fully motorized lighting batten system.

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Beauty is often in the details

The facility design includes special task lighting and dimming, including an electrical and acoustical dimmer and filament noise control. Humidity control and air filtration per SMPTE videotape standards are provided for all technical areas. Temporary cableways are fitted in the TV studios for special telecommunications needs during fund-raising telethons. Rack installations include seismic bracing using custom steel bases that anchor the racks to the slab. The technical grounding systems for radio and television are based on a comprehensive consideration of audio, video and safety issues.

Important requirements for future growth and change in the building architecture and engineering included extensive use of access flooring, sufficient power and HVAC capacity, and some technical expansion space (including an HDTV room, a second TV master control and shop space).

The theme was one of a flexible technical core that permitted the easiest evolution of equipment.

On-site project management

The first access to the site for installation of technical equipment occurred in July 1991. All daily installation work was planned by NTC and KQED supervisors, who helped coordinate the efforts of the KQED staff and the team of professional installation personnel hired by KQED. By January 1992, final installation was completed.

As with any project of this scale, numerous operational goals could not be achieved with off-the-shelf

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5. Which transmitter has the component accessibility and ease of service you'll like most 10 years after the purchase is made?	☐	☐
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7. Who has the most on-the-air experience and the broadest line of UHF TV transmitters?	☐	☐
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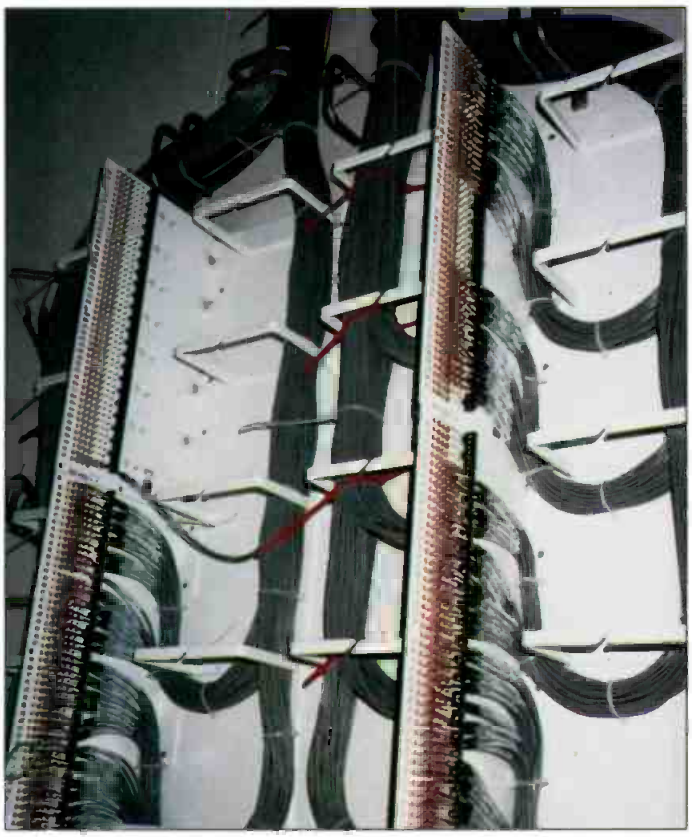
hardware. As needed, NTC custom-manufactured control panels, circuits and other assemblies for KQED's requirements.

The 190 CAD drawings that fully document the designs were as important for initial installation as they will be for future modifications. They include detail of the 9,000 audio, video and control cables for the facility. A cable-run database of almost 200 pages was created with proprietary wiring management software.

KQED-TV also reused cameras, a production switcher, all VTRs, an audio console and an intercom system — all taken from active service in the old building and reinstalled in the new one. For additional economy, serviceable audio and video jackfields and racks were also reused. KQED-FM also reused a substantial amount of equipment.

Backbone equipment in radio and television (including the routing and source-distribution systems) were replaced, and new TV post-production switchers, a new TV master control switcher, and KQED-FM's new master control mixing console were added. Thus, the core of the plant is new and is expected to provide between one and two decades of service.Change was likely to be the only constant encountered in the life of the new facility. ■

A cable-run database of almost 200 pages was created with proprietary wiring management software.



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Building the first DBS facility: DirecTv

A new kind of facility is the head-end of the information skyway.

By Curtis Chan

The Bottom Line

The first true DBS TV service to U.S. homes is about to begin, originating from a brand-new, purpose-built uplink outside Denver. The facility includes several innovative features, including all-digital video operation, multichannel/multirate data reduction and multilevel automation, generating more than 200 independent, conditionally accessed program channels. The design of the unique facility and its systems was a cooperative effort of many diverse players.

The launch and commissioning of the first Hughes Galaxy 601 direct broadcast satellite (DBS-1) last December signaled the beginning of a new era in entertainment distribution. This new direct-to-home digital satellite service will beam more than 150 channels of audio and video programming to 18-inch satellite dishes installed in homes across the 48 contiguous United States. The proponents of the system expect to acquire approximately 10 million subscribers by the year 2000 at rates comparable or lower than cable.

Two service providers will offer these DBS program streams when service begins in April 1994: Hughes' DirecTv and Hubbard Broadcasting's United States Satellite Broadcasting (USSB). (See "DBS — Tomorrow's Opportunity," July 1993.) The two services will share the use of DBS-1, which will carry approximately 60 channels of DirecTv programming and 25 to 30 channels of programming from USSB. A second satellite (DBS-2), scheduled for launch in mid-1994, will be used exclusively by DirecTv for an additional 80 to 90 channels of programming. Both satellites will be co-located in geosynchronous orbit at approximately 101°W.

A critical element of these systems is the program origination function. At uplink facilities, program streams are created, data-reduced (using MPEG-2), multiplexed, encrypted, channel-coded with error-correction data and modulated for uplinking at 17.2GHz to 17.7GHz via 13m antennas.

USSB's programming will originate from an uplink facility now under construction in Oakdale, MN. DirecTv's much larger operation is centered at the nearly completed Castle Rock Broadcast Center (CRBC) in Castle Rock, CO, located about 30 miles south of Denver.

Castle Rock Broadcast Center

The CRBC is unique in several ways. When it is fully implemented, it will be the first fully serial digital transmission facility capable of broadcasting more than 200 simultaneous channels of programming. The 55,000-square-foot facility houses a large amount of advanced technology, including state-of-the-art broadcast equipment, automated video processing, conditional access, billing and logging management. In addition, there are three 1.5MW emergency generators with attached noise-suppression systems, a redundant electrical system with full UPS

The proponents of the system expect to acquire approximately 10 million subscribers by the year 2000.

Chan is principal of Chan & Associates, a marketing consulting service for audio, broadcast and post-production in Fullerton, CA. Respond via the *BE* FAXback line at 913-967-1905.

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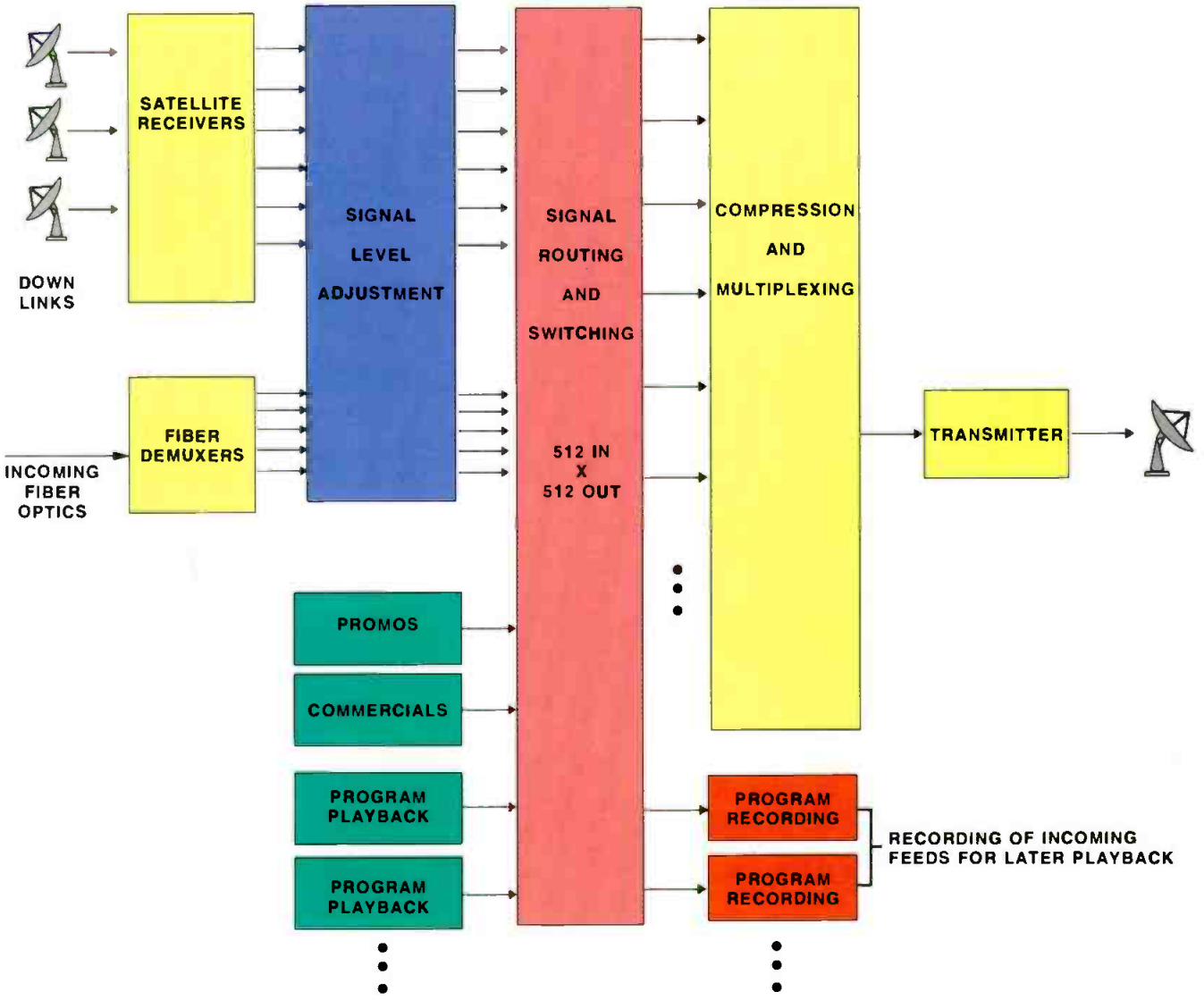

Figure 1. *Signal routing for DirecTv program transmissions, incorporating both incoming real-time turnaround feeds (from other networks or sources) and on-site tape playback.*

capability, computerized support-system monitoring and a 100,000-gallon fire-suppression system.

The Castle Rock site was chosen because it was an existing uplink facility, acquired by Hughes when it purchased the SBS fleet of satellites from MCI. The facility's 6,000-foot elevation minimizes the amount of rainfall and, therefore, mitigates the rain fade to which Ku-band signals are particularly vulnerable. The terrain around the site also provides a natural bowl that serves to shield it from terrestrial interference.

The design philosophy of the CRBC is based on a product-in/product-out style with a minimum of insertions. Programming comes into the facility in the multiformat Program Receiving area. This area can receive programming from a variety of mediums, including off the (terrestrial) air, via satellite, from incoming fiber-optic paths or from tape playback. From this incoming hub, program materials are sent to Quality Assurance, where the programs are screened and dubbed. The compiled program materials are then sent to the Media Library, which in turn feeds them to the Playback and Record System (PARS) for playback to the uplink. An edit room is used for creating break materials, such as promos and bumpers.

At the center of the operation is the Broadcast Operation Control Center consisting of four large operator stations, two supervisor stations and a monitoring wall. The common link between all of these systems is an intelligent routing and distribution system designed by Sony. Within it is a sophisticated monitoring system that can detect anomalies along the entire production path up to the uplink.

DirecTv's operation is centered at the nearly completed Castle Rock Broadcast Center in Castle Rock, CO.

The broadcast system

The broadcast production system was also developed and integrated by Sony, which designed a complete turnkey facility for CRBC based upon Digital Betacam. Digital Betacam was chosen for its backward compatibility with analog Betacam, its high-quality 4:2:2 format at reasonable cost and its compact size. Complete redundancy is provided to maintain uninterrupted service.

The all-serial digital facility starts with the six quality assurance and formatting rooms, where programs supplied to DirecTv in recorded form are transferred to Digital Betacam. Other program materials (typically short-form) supplied via incoming feeds (satellite and fiber) are signal-adjusted and sent to the digital routing switcher, which directs these signals to Digital Betacam recorders as well.

The routing system includes five digital video switchers based on a number of

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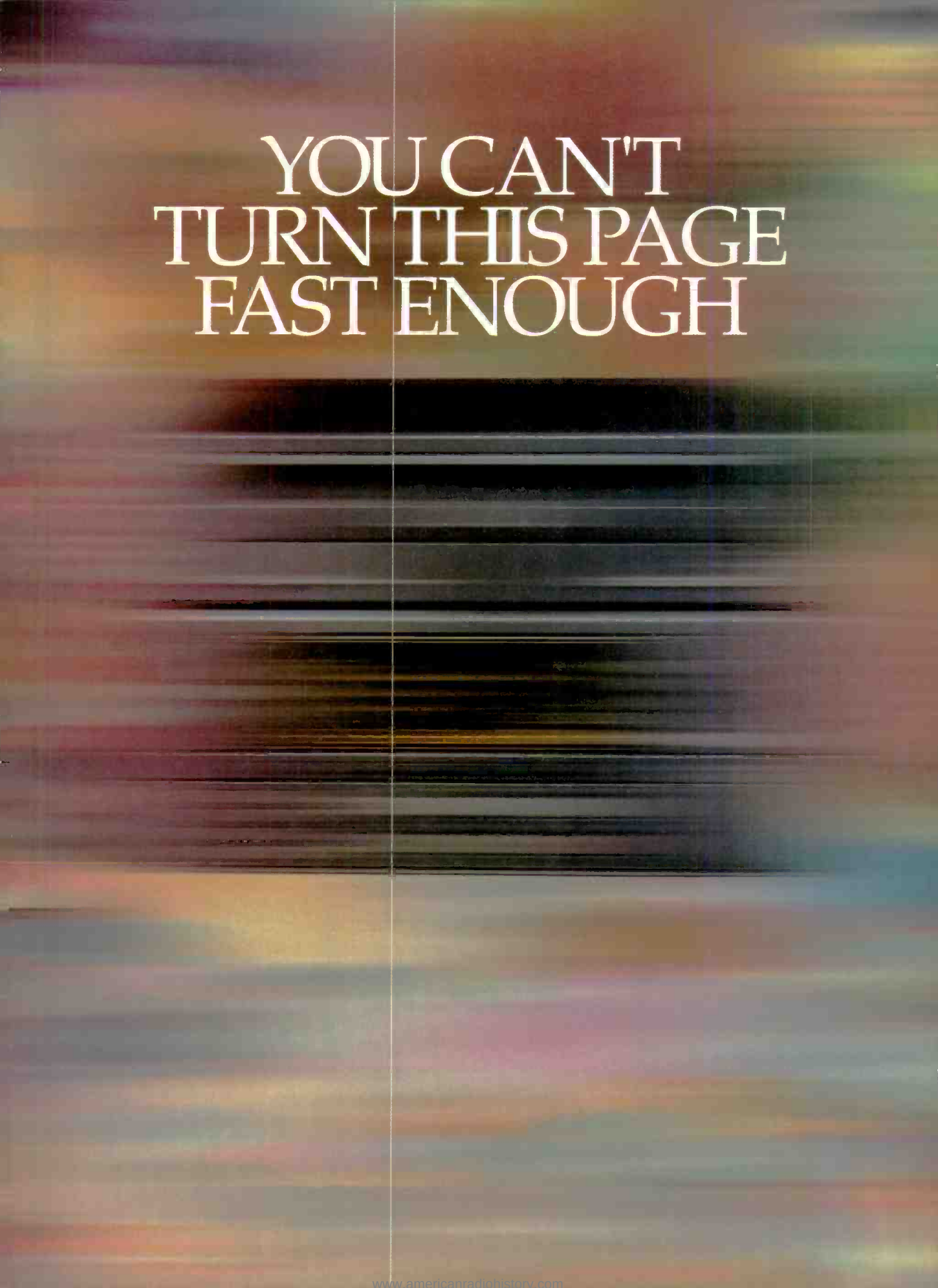

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virtual matrices working in tandem to provide the equivalent of 1,000 inputs by 1,000 outputs. The main router is a Sony-developed 512 x 512 serial digital router housed in 40 racks. Complementing this are matrices from other vendors, including analog NTSC matrices for cross-switching, TV monitoring and other functions. The router accommodates serial digital component video, two channels of AES/EBU digital audio, RS-422 and NTSC. Custom operating software can control up to 300 channels of programming.

After initial recording or dubbing, the Digital Betacam tapes are transferred to the Media Library, where two 1,000-cassette Sony Library Management Systems (LMS 4000s) are used for compilation of commercial insertions and other breaks. An edit room used for local production of insertions houses a DVS-8000 switcher, BVE 2000 editor, Digital Betacam decks and digital audio board. Finally, programs ready for air reside in the PARS, which comprises 56 Flexicart robotic videotape playback systems, within which more than 300 Digital Betacam VTRs are used to bring programs to air.

CRBC will be the first fully serial digital transmission facility capable of more than 200 simultaneous channels.

Keeping track of all the operations is the job of the Broadcast Operation Control Center, which consists of four operator stations, two supervisor stations and a large monitoring wall. The heart of this center is a sophisticated automation system, which helps to compile tapes, automates the dubbing process, formats tapes and monitors all specific functions in the plant. Every input and output, all processing functions and signal chains up to the transmission point can be monitored for any discrepancy. The automation system also houses a large media manager for identifying all tapes in the plant through the use of barcodes.

The programs are then fed to a data-reduction and multiplexing system using 56 separate MPEG-2 systems and sophisticated conditional-access encryption systems. The resulting signals are then fed to any of four 13m uplink antennas.

The facility also includes 54 high-power amplifiers (HPAs), six 6.1m and two 4.6m receive-only antennas and more than 300 satellite receivers.

The complete DirecTv system design is a model of integration for future delivery systems, with numerous, synergistic contributions from different specialist companies. The project has involved a collaborative technical evolution on many fronts, from the Hollywood movie community at the source end to consumer electronics manufacturers at the home receiver end. In addition to Sony's work at the CRBC, Thomson Consumer Electronics (TCE) is manufacturing the consumer set-top receiver/decoder and receive dishes under the RCA brand name. (This hardware is marketed as the Digital Satellite System or DSS. After an initial period of TCE exclusivity, other companies may also produce DSS products. Sony has already announced such plans.) News Datacom, a division of Rupert Murdoch's News Corporation, will develop and manage the smart-card system built into the DSS receiver. Digital Equipment Corporation (DEC) will operate and manage the DirecTv national billing center; DBS Systems will provide billing software; the National Rural Telecommunications Cooperative (NRTC) will provide rural sales distribution. Matrixx Marketing, a division of Cincinnati Bell, will operate the DirecTv national customer service and telephone marketing center.

The project has involved a collaborative technical evolution on many fronts.

DirecTv and its Castle Rock Broadcast Center have provided the industry with its first look at what might become a standard among future facilities: The management and delivery of multichannel, conditionally accessed, data-reduced digital programming to a new generation of consumers.

Design team

Client: DirecTv, David Baylor, Project Manager

Architectural/Facility design & integration mgmt.: Hughes Communications, Technology and Implementation Division, Ronald Allen and Jeff Chandler

Architect: The Crosby Group, Roger Crosby and Tim Green

General contractor: Pinkard Construction, Jim Pinkard, Jr.

Video/Automation systems & integration: Sony, Systems Integration Division, Peter Ludé and Charles Steinberg

Downlink systems: Engineering and Technical Services (ETS), R.A. Tony Grimes

Uplink systems: Satellite Transmission Systems (STS), Roger Parsons

DirecTv uplink facility in Castle Rock, CO, showing surrounding protective terrain. Four large dishes at left carry main uplink transmissions; the other smaller dishes at center rear receive incoming feeds. The building in the right foreground houses emergency generators. The building at left rear and its surrounding dishes are the control center for the Hughes fleet of communications satellites.

Acknowledgment: Thanks to Bill Butterworth, senior vice president of DirecTv, and Peter Ludé, vice president of Sony Systems Integration Division, for their contributions to this article. ■

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Building on Fisherman's Wharf: Realtime Video

It takes more than luck to transform an historic building into a modern production facility.

By Will Hoover

The Bottom Line

As with any building project's success, building a successful post-production facility requires careful planning and close attention to details. The staff at Realtime Video was up to this test as they transformed an historic San Francisco building into a state-of-the-art production house in record time.

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The colorful Northeast Waterfront historic district of San Francisco is known widely for cuisine and shopping. What isn't so well known is that the area also is home to some of the city's most notable media and advertising companies. For Realtime Video's president Will Hoover, a trained architect highly sensitive to folklore and aesthetics, the combination of an attractive and historic setting, combined with a pool of nearby clients, made the San Francisco Waterfront district an especially appropriate setting for the new home of his growing production and post-production facility.

Careful layout of operator-intensive controls, as shown here, makes this on-line suite convenient and ergonomically friendly.

Evolutionary process

The story of Realtime's multimillion-dollar move to 60 Broadway is a study in research, preparation and collaboration among his design team, the architectural firm of Whisler-Patri and the general contractor, Plant Construction. The result was the total subbasement-to-rafters renovation of an historic, 2-story 12,000-square-foot brick building, a process completed in only 3½ months.

Realtime Video was formed in 1975 in the considerably smaller confines of an old house (circa 1852) atop Telegraph Hill. The company name came from the computing industry's newly emerging concept of real time, in which computers control processes as they happen. In those early years, Realtime specialized in video production services, providing camera packages to a commercial and corporate client base.

Early on, Hoover considered adding on-line and graphics services, but his indus-

Hoover is president of Realtime Video, San Francisco.

Continued on page 70

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BR-S522U Feeder/Player

The latest addition to the 22 Series, the 522 is a cost-effective feeder/player that has been specifically designed for use with the 822 editing recorder. For maximum cost-effectiveness, the 522 is a playback-only unit. It boasts the renowned JVC picture quality, and high-performance edit/feeding capabilities. Durable and sophisticated in design, the 522 is ideal for video professionals working in high-end applications such as local broadcasting and post-production. For the price conscious buyer, the 522 lets you cut costs without ever cutting corners.

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try savvy invited caution. In those early days, video production was straightforward2 and profitable, but post-production seemed fraught with difficulties, including substantial capital investment and labor costs. Although the concept of supplying post-production services seemed inevitable to him, he wisely decided to wait until client demand made it an absolute necessity.

By 1981, it was clear to Hoover that that point had arrived. Realtime then moved to a larger, 7,000-square-foot location and expanded into on-line and graphics capabilities. Ten short years later, continued growth required the search for yet a larger location.

This time, the goal was to build a full-fledged post house with the capability to serve all segments of the Northern California video market. This capability would include a facility to service a broad range of accounts, from ad agencies doing commercials to corporate, broadcast and independent production companies. The facility also wanted to be able to serve effects producers and editorial companies. This aggressive goal forced the Realtime staff to consider carefully all aspects of the building project, beginning with the location.

Finding a new home

To accomplish these goals, the facility needed twice the floor space then available. The expanded capabilities also created the need for a large electrical service and sufficient on-site client parking.

After the primary technical criteria were developed, location became the issue. A wide variety of options were available, but Hoover wanted to locate the new facility in the North Waterfront district. The reason was more than a good office view. Such a location would ensure that Realtime would be in the center of ad-agency activity.

The selected site was an expansive 2-story brick structure, parts of which predate the 1906 earthquake. The building was originally a warehouse in the heart of the Waterfront. At the time of its purchase, the building housed a collection of small agency-related creative shops for copy and art. Despite the buildings charm and location, the interior required total renovation to meet the firm's sophisticated creative, technical and operational demands.

Historic landmark

Renovation of old buildings is a sensitive issue in many cities, including San Francisco. Hoover recognized this important issue and was determined not only to respect the building's historic significance, but to capitalize on its charm.

The architectural firm of Whisler-Patri is long-established in San Francisco and highly experienced in working with the city's planning historic commissions — another important factor in the firm's selection. The possibility of discovering historic relics was a definite consideration in the reconstruction. For example, sunken Clipper ships have been found in the ground beneath some redeveloped buildings of the Waterfront district. This section of Broadway, and other streets that parallel it, were originally piers.

Whisler-Patri's chief architect for the project, Kevin Dill, was knowledgeable in dealing with red tape related to such discoveries. He also understood the myriad ways a project can be delayed by committee and bureaucracy and he had considerable experience in keeping projects on schedule.

Elliott Grimshaw, project manager for Plant Construction, originally proposed a 7-month construction schedule. Facing a considerable tighter deadline, Hoover suggested completion in less than half that time. Although the goal was aggressive, Hoover thought that, by carefully preplanning and scheduling the building trades to work in the space simultaneously, they could meet the goal.

Creating an open-air look requires more than high ceilings. Shown here is the lobby staircase leading to the second floor offices and creative suites.

Design considerations

The overall design process was begun by Steve Maggioncalda, vice president of technical operations, even before the building purchase was finalized. To speed the process, the planning for space and adjacency requirements for the interior was completed in advance. These plans incorporated important line-of-sight relationships, acoustic requirements, equipment interconnections, power requirements, transit and movement within the facility, plans for future growth and the implementation of new technology.

The goal was to shorten the construction phase by carefully completing the overall design with sufficient accuracy so that on-site changes would be kept to a minimum. Using a PC equipped with CAD-design software, Maggioncalda precisely developed room designs that would accommodate immediate and future needs. The plans were sufficiently detailed that even wiring harnesses were specified at this phase. By the time the purchase was finalized, the Realtime staff was ready to provide design drafts to the architect. This technique eliminated much of the early learning process an architect would have to understand the client's design goals.

Construction

Because mistakes can happen, especially with such an escalated time frame, Hoover, production manager Dennis Minnick and the Realtime design group inspected the site twice each day, morning and evening. In one case, an evening meeting with the architect resulted in a change in the plans. Unfortunately, when the Realtime staff arrived the next day, they discovered the building contractor was already pouring concrete — in the wrong location. The changes hadn't reached the contractor. This further em-

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phasized the need for personal attention to every detail in the project.

One of the early challenges centered on the facility's HVAC requirements. The temperature-sensitive master control equipment called for a large air-conditioning system. However, the rest of the building required a much smaller load. To keep the MCR equipment properly cooled, Maggioncalda worked with the contractor to create an innovative and highly efficient 2-tiered cooling-vent system.

One of the early challenges centered on the facility's HVAC requirements.

A lower tier of ductwork, built into the floor at the concrete-pouring state, distributes cold air directly into the base of the equipment racks. An upper tier of ductwork cools the top and front. The return ducts are located above and behind the racks. This localized air flow cools the MCR equipment so efficiently that it requires half the tonnage used in comparably sized facilities. This design also keeps the staff environment at a comfortable level while producing less noise than other designs.

Two separate troughs were installed below the racks, one for the HVAC, the other one for wiring. In the wiring troughs, each cable is segregated by type: time code, data, video and audio. The power cables are also separated from signal cables to prevent hum-induction problems.

Another advantage of the ceiling-mounted and below-floor ducts and wiring troughs was that all operational and city code requirements were met, avoiding the problems often encountered with computer floors.

Building for the future

Planning for the use of serial digital video was done from the outset. Belden 8281 cable was used throughout the facility, ensuring that all signal paths would have sufficient bandwidth for today's and tomorrow's needs.

The internal wiring network uses ADC patch points and a BTS Venus routing switcher. The switcher handles all analog composite, serial digital composite D-2 at 143Mbps and serial digital component D-1 at 270Mbps. The system is also capable of handling 16x9 digital signals at 360Mbps.

Design team

Client: Realtime Video, Will Hoover, president
Anna Chao Hoover, chief operating officer
Steve Maggioncalda, vice president/technical operations
Dennis Minnick, production manager

Architect: Whisler-Patri
Kevin Dill, chief architect

General contractor: Plant Construction, Elliott Grimshaw, construction manager

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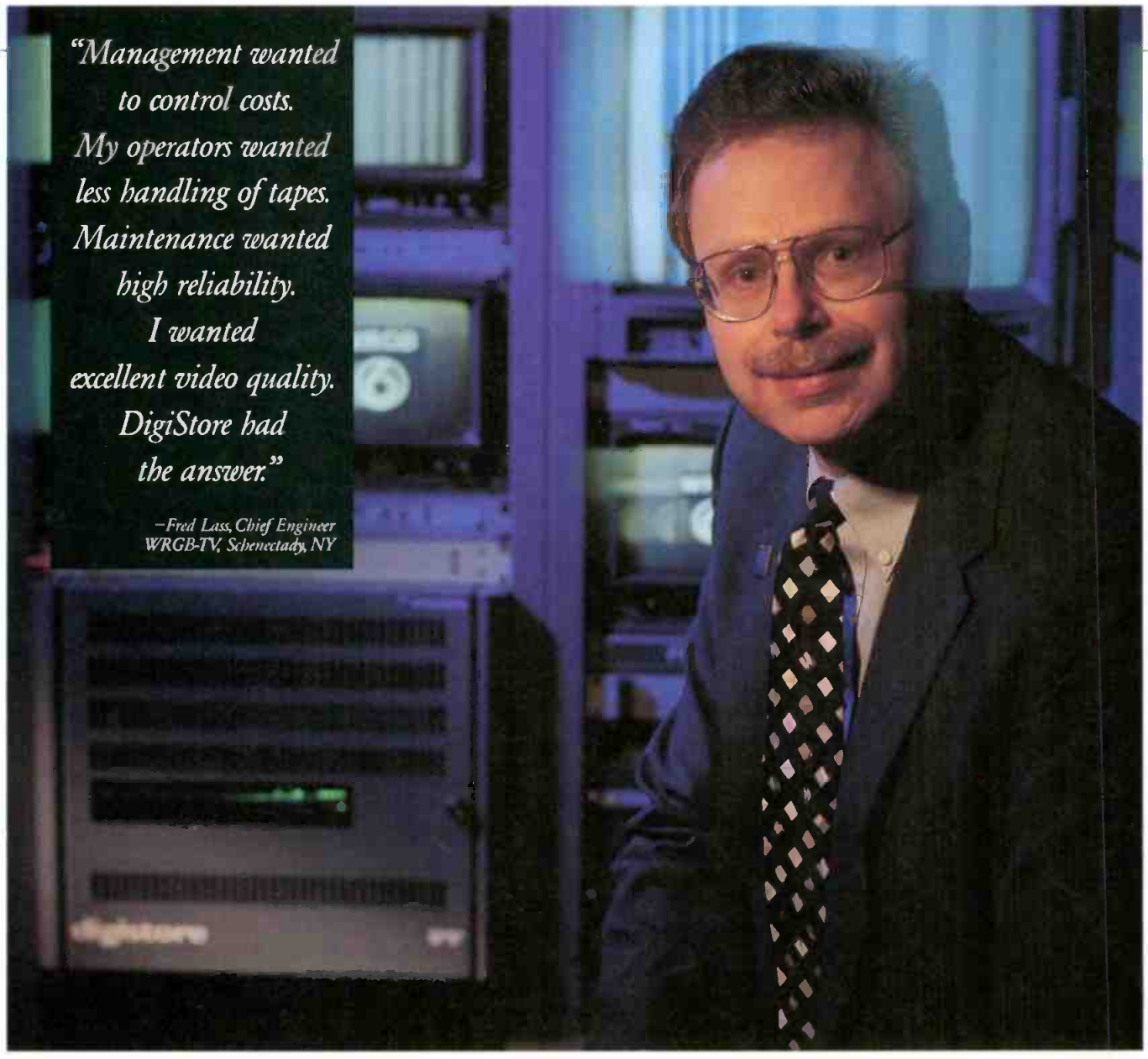

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Wiring for the second floor required a similar approach to that used in the first floor. Two large wiring trays running the entire length of the building were installed in the first floor ceiling. This design ensures the capability of future expansion anywhere on the second floor and provides easy interconnection between MCR and any suite or client lounge.

Two first floor on-line rooms connect to MCR wiring troughs via a total of six 6-inch PVC tubes, which were run through the newly poured concrete floor. Other rooms on the second floor connect to MCR via wiring troughs accessed by 6" x 6" metal hatches in each room.

Computer and telephone capability

Centrex telephone lines and computer local area network (LAN) lines are distributed through the facility walls, an installation accomplished when the facility was stripped bare. Centrex-type equipment was selected for two reasons: 1) Centrex lines receive first priority for repair; and 2) their higher bandwidth permits them to be used for computer data. These circuits can also be upgraded to fiber in the future.

To further guarantee sufficient communication capability, 100, rather than 25, telephone lines were installed from the street into the building. Given the overall installation costs, the extra 75 lines cost relatively little. However, such expansion later would be costly.

Deadline pressures often require unusual solutions, such as sufficient space to relax. Shown here is the kitchen and dining area, which includes arcade games for creative minds that haven't had enough computer interfacing.

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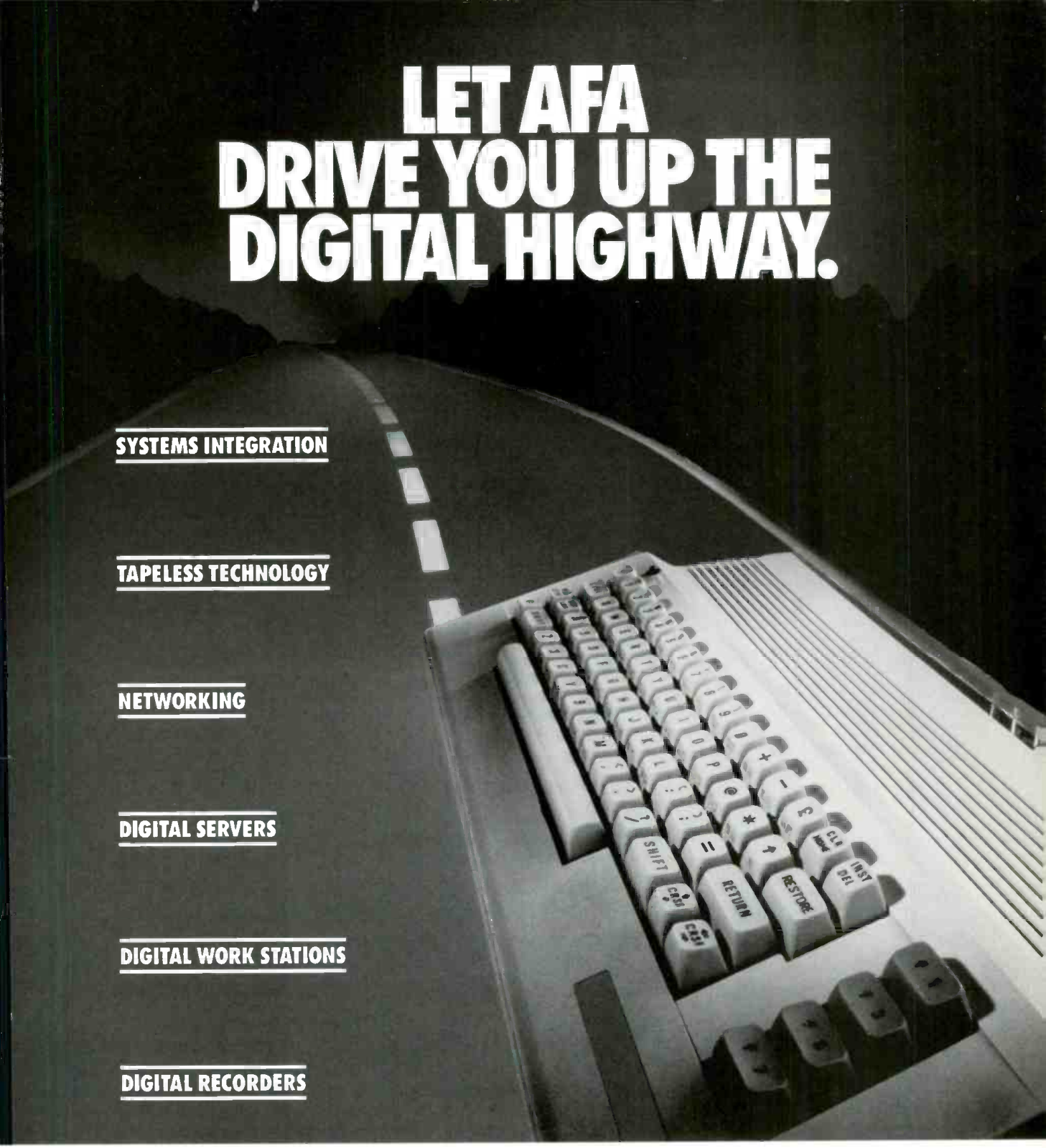

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A level-4 ethernet LAN connects most rooms together into a network. Running four pair of wires to each computer location will facilitate future expansion. If this extra capability weren't built in, later expansion would be labor-intensive and expensive. Building in extra capability during the first construction phase is usually a wise move.

A highly detailed, zero-timed cable diagram was developed by Maggioncalda.

Using the CAD program, the technical team designed the entire distribution and interconnection system for the myriad of cables to the facility's video, audio and graphics equipment.

Installation began by marking the parking lot with specific cable lengths. Cables were then laid along these marks and cut, and the connectors were installed and tagged using the CAD-printed labels. This technique allowed less technical staff to assist in the cable preparation. The result was highly accurate cable lengths, all properly labeled, available before the rooms were even completed.

Functional touches

Realtime's 2-story facility suggests a separation between art and technology. The second floor provides an airy, loft-like environment. It features a spacious dining area and decorative art. Other spaces on the second floor include suites for the Quantel Henry, Aurora, Avid I and Mac graphics systems.

An innovative Macgrfx system is built around a number of Quadras equipped with D-1 I/O capability, etherneted and tied to MCR, Henry and Aurora. It provides machine control with complete gen-lock capability for on-line use. Etherneting allows multiprocessor rendering. The Macgrfx also provides clients with the option of adding their own creative input by bringing in elements they have generated themselves. A Video Explorer provides a direct digital interface with the Henry and the BTS D-1 router and enables files to easily be transferred to any tape format.

Even small points received careful attention. Today's editing systems and computers require the use of a mouse to control program functions. Operators often find the typical 7" x 8" mouse pad restricting. To increase operator speed and comfort, large mouse pads are integrated into the Avid system countertops. The pads surround the keyboard on both sides, making it equally convenient for left- and right-handed operators.

Client comforts

Post facilities recognize the importance of client comfort. To be sure these needs were met, Realtime surveyed their clients to see what they wanted. Their desires resulted in some surprises and some unique spaces in the facility.

The master control room incorporates several unique features, including a highly efficient HVAC system and direct signal routing to all edit suites.

For instance, because large numbers of people are often involved in the creative process, the Avid rooms are as spacious as on-line suites. Even the seating in all suites was considered. Although leather couches had been planned for client areas, in part because of the warm, rich look they provide, a survey showed that clients actually preferred cloth. The solution was to use a rich ultrasuede fabric, which has the classic look of leather but feels much more comfortable and inviting.

Clients and staff have access to an expansive lounge with several discreet areas dedicated as client workstations. These rooms are large, and most have windows. A full kitchen, pool table, a growing computer arcade and other games ease the pressure of long sessions.

Staff needs

The staff's needs also received careful attention. The operations and administrative groups were given ample work space in private offices on the second floor. The technical staff occupies spacious work areas, located primarily on the first floor. The 800-square-foot MCR provides a dedicated full-rack workstation for each creative operation. Centered in the room is an oversized countertop to accommodate work needs and to provide extensive storage for tapes, carts and other materials.

The on-line, Avid and Henry suites average 400 square feet each and have custom consoles to provide the editor/artist with easy control of all equipment. Just as important, they are designed to provide for the most efficient monitoring and interaction with clients in the creative process. Client seating allows for a short line-of-sight (not more than 13 feet) to a critical monitor. There is no need for clients to crowd around the operator just to see what's going on. Everyone, including those on the couches, can easily see the entire process.

Cooperative process

A primary ingredient to such a successful project is a dedicated and creative staff. Because Realtime had to operate at its old location while the new one was built, everyone had to work together to cover all the bases. The situation required the staff to attend to construction needs while also handling full production schedules. Although the task was formidable, a motivated and involved team definitely made the difference.

The result of this effort can be measured in the pride of the staff and the quality of the product. At Realtime Video, both elements are first class. ■

Realtime's 2-story facility suggests a separation between art and technology.

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Editel: Los Angeles

Building a digital complex at a 20-year-old address.

By E.L. Grant

The Bottom Line

Renovating an older facility is never an easy task. Decisions made over the years, many of which were correct at the time, are not always correct in hindsight. Over time, even carefully managed facilities can take on a kludge appearance. At some point, those involved are faced with the decision to start over. Whether that means moving to a new facility or undertaking a ground-up design of the current facility depends on many factors. Here are some of the factors that influenced Editel/LA's decision.

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Editel/LA, an integral part of Hollywood's commercial post-production community, has been built over a period of 20 years. Like many other facilities, new equipment has been added with dedicated machine rooms according to available space. These additions have led to the present complement of five edit suites, four telecines and four graphics rooms, with individual machine rooms scattered throughout the facility. In today's multiformat post-production environment, it is imperative to have total flexibility for greater use of equipment. Stand-alone rooms are giving way to integrated technology, shared equipment and centralized digital centers.

In the spring of 1992, Editel was purchased by Unitel. With the purchase came a clear commitment to graphics and special effects. A team of key Editel executives began to map out a major facility upgrade. They quickly reached the conclusion that a new, centrally located machine room and a digital routing system were prerequisites for future growth, and that total facility reconstruction was the only logical way to accomplish those goals.

Choosing specific technology is relatively easy. Finding a way to tie it all together, renovate, rewire, install massive new air conditioning and fully integrate the entire physical plant into a single cohesive environment during business hours, while continuing to service a busy and demanding clientele — that was an entirely different matter.

The D-2 digital edit bay. The doorway on the right leads to the tech room.

Their mandate: Implement the best technological and aesthetic solutions available, write a plan integrating several new suites, and tie the facility together with a powerful new digital routing system.

Editel is currently halfway through a projected 1½-year renovation, which in-

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cludes a total redesign of all edit and telecine suites. By this time next year, clients will walk into a brand new and substantially digital Editel. There will be new component and composite suites and a new digital machine room complete with a 128 x 128 serial digital router for video, audio and control, completely integrating the post-production services.

When construction is completed in the spring of 1995, a new entrance way will open into a large, vaulted lobby with a 20-foot-high ceiling. By design, the new digital technology will be at the front of the building. Clients will be immediately confronted by the component and composite edit suites, Ursa, Henry, the Digital Center and two rooms available for future technologies.

Why not just move to a new building? That is an obvious alternative to the massive and complex project of rebuilding a facility in its original home during operating hours. In fact, an extensive search for a new site was conducted, and the decision to move was about to be made when the design team remembered the three most important rules in real estate: location, location, location.

The facility is extraordinarily well-situated in terms of client accessibility. If you were to sit down with a map of Hollywood and carefully plot out client locations, it would show that Editel is in the absolute optimum position. This factor, coupled with the expense of moving, the problems of major disruptions and the potential multimillion-dollar loss in business led to the decision to buy the current building and renovate.

The redesign team

Mike Orton was already in place as director of engineering and was familiar with the physical plant. Orton has a keen sense of where new technology is headed and how it can impact on Editel's position in the marketplace.

The search for an administration/finance director to manage the day-to-day activities of the plant upgrade led to Bill Scott. In addition to fiscal and management abilities, Scott had supervised several major leasehold improvement projects at previous posts.

Point man for Editel's physical and aesthetic redesign and renovation was architect Gary Heathecote of Heathecote Associates (LA). With credentials primarily in residential and avant-garde restaurant design, he had brought a fresh perspective to his initial and highly successful Editel Ursa suite assignment in 1991. Because the Ursa suite is a room that hosts 12- to 16-hour days of intense work, a soft, comfortable environment was created. Opening up the space gave it a living room feel rather than a cockpit feel. Another goal was to bring color into a previously dull environment. This was done by maintaining a monochromatic approach for the front of the room to keep it from interfering with the monitors. Brighter colors were applied to the back of the suite as a welcome visual break. Rounding off walls and raising the ceilings eliminated the feeling of confinement.

The design team

Client: Editel/LA
Ralph Horan, president
Bill Scott, director of administration/finance
Mike Orton, director of engineering
Rich Alcala, chief engineer
Claudia Baker, vice president of operations

Architect: Heathecote Associates (LA)
Gary Heathecote, architect/designer

Contractor: Heartwood Builders
Dave Brooks, general contractor

The Henry suite. Note the open ceiling and lighting grid.

The same creative attitude was applied to the current renovation. For this major upgrade, the desire was to break the mold. The building is made from unreinforced masonry and was constructed in 1927 with huge bow-string trusses like a barrel-shaped vault. The plan was to take advantage of its height and expand the open, high-ceiling approach that had been so successfully received in the Ursa suite.

The Editel team was so enthusiastic about this concept that they agreed to give up valuable space on the second floor to raise the ceiling as much as 18 feet. The result was a 2-story-high, awning-like ceiling over a gently curved hallway.

Central digital room

Over the past several years, extensive digital technology was added, but space limitations forced the location of Harry, Henry and Ursa and their respective machine rooms in three different areas. This temporary solution did not represent optimum efficiency or provide the flexibility necessary for future growth.

The need for centralization was a prime concern. For example, because of Harry's location, it would have been necessary to buy another D-1 machine when the Henry was purchased. It became apparent that if the two suites were closer together and properly routed, they could share an existing D-1 machine. Rather than spend $140,000 on a new machine, the facility could apply that money to the infrastructure.

The primary challenge was to accomplish the upgrade without shutting down. The first objective was to find a centrally located position for the new digital machine room. Focusing on a previously unused building in the Editel complex, the design team mapped out an area around the existing Ursa suite. A large L-shaped digital machine room was positioned in one quadrant; the component edit suite was planned to be directly across the hall adjacent to Ursa. The Harry and Henry suites

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were moved to this new digital environment, and with room designated for expansion into emerging technologies, a true digital center was established.

The digital machine room was conceived as a functional environment that would enable operators to deal with multiple levels of digital operational video, digital audio, and control through a new Pro-Bel HD serial digital router with a system 3 controller. It is transparent and programmable and it offers ease of operation.

Editel's telecine Ursa suite bay. The telecine is located through the doorway on the right.

Edit bays

Refurbishing the four edit bays involved extensive cosmetic changes and the addition of new equipment. Edit 4 was the starting point. After rebuilding, a Grass Valley 3000 composite digital switcher was installed. Other major components included an Axial 2020 on-line editor and a new Graham-Patten D/Esam 800 digital 4-channel audio board.

Some genuinely imaginative concepts were devised for the edit bays. Switchers traditionally have been placed adjacent to edit controllers in a straight line, requiring the editor to roll back and forth between stations. It was proposed that the switcher be placed at a 90° angle to the edit controller to get it closer to the editor. An innovative, precisely molded console was designed to accommodate this idea.

The console design was a huge hit with everyone. Because it plays such a pivotal role in the edit bay, everyone who would be working there had an opportunity to contribute to its design. Members of the design team made several visits to the cabinetmaker's studio, where a full-scale mockup was built for evaluation. There, the design team provided valuable input that resulted in a console everyone is proud of, and one which has been adopted for the new component digital suite as well.

The component suite

The component digital suite houses a formidable array of new technology. Features include a Grass Valley 4000 component

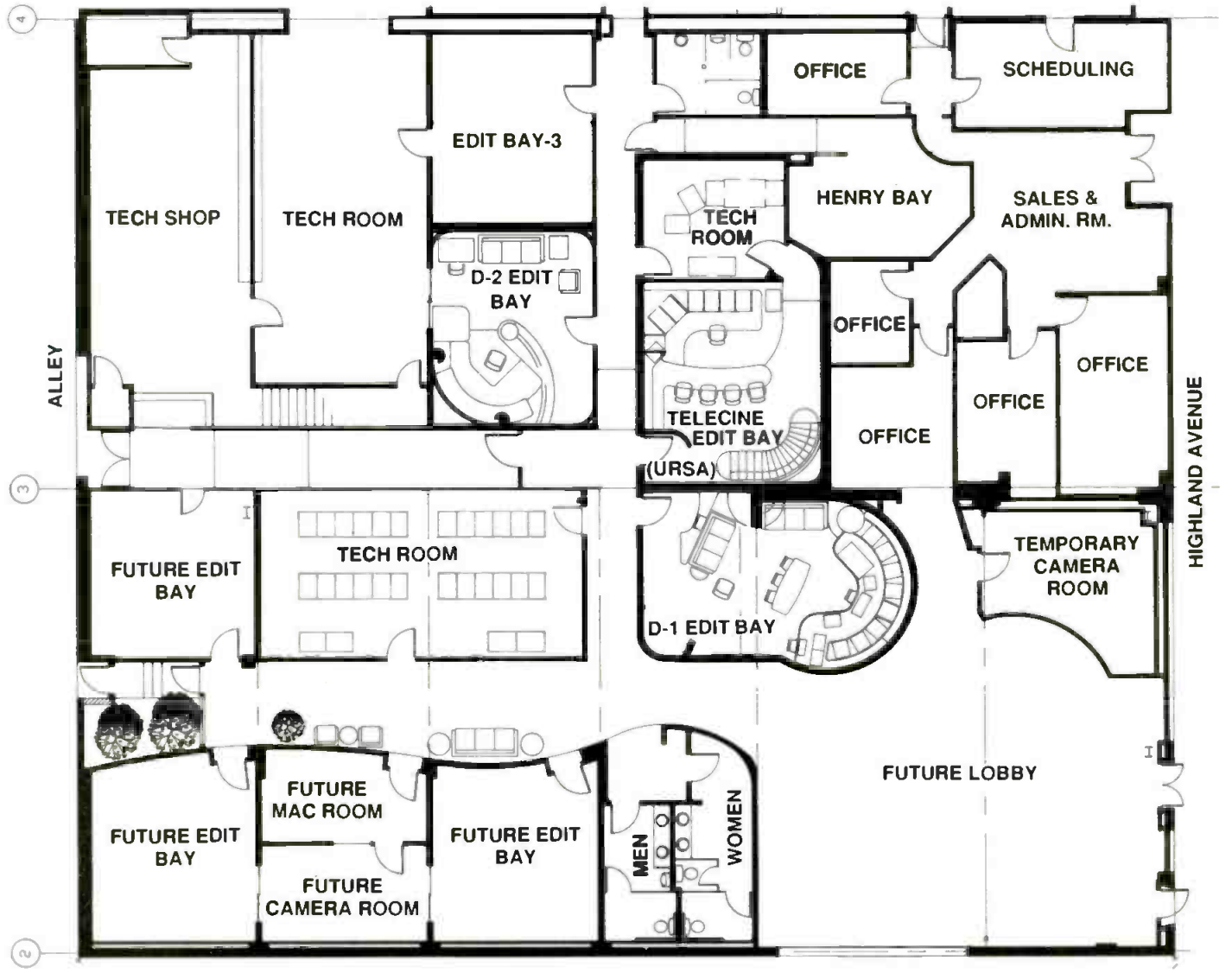

Figure 1. *Floor plan for Editel LA. Drawing courtesy of Gary Heathcote, AIA.*

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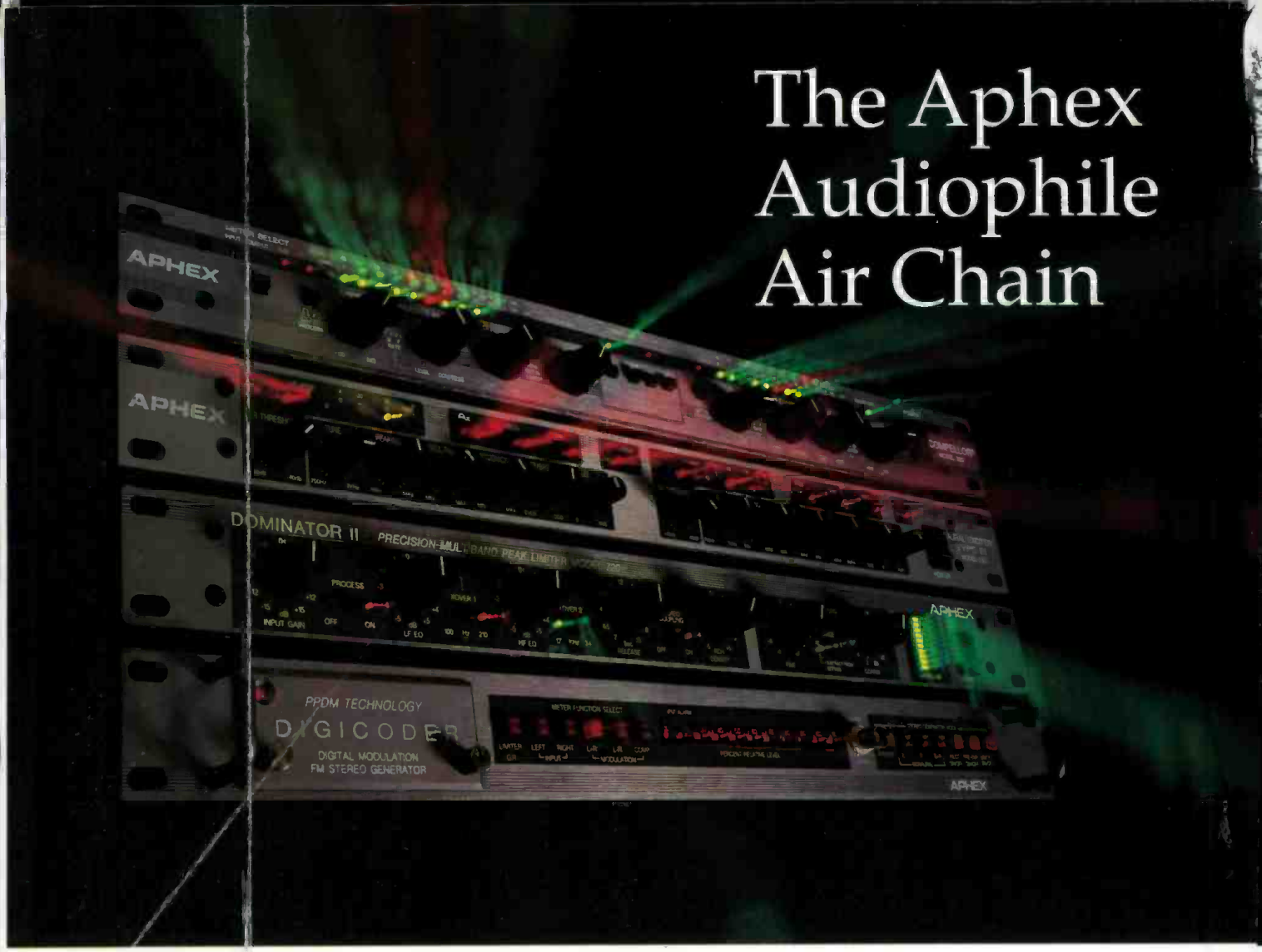

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The shortest distance between two booths is the *BE* FASTtrack.

Finding the products you need at a convention as large as NAB is difficult at best. First, the companies are not arranged by product type, but by a seniority and size process. Second, because many companies offer a variety of products and services, it would be impossible to group them by product category. Finally, most of us don't have time to visit all the booths just to find that perfect piece of equipment, even if we knew what products every company was exhibiting.

Recognizing this dilemma, the editors of *BE* devised a better plan. The result was the ***BE* FASTtrack**.

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The ***BE* FASTtrack** provides you with a shortcut to locating the companies that provide the products and services you're looking for. Instead of arranging companies by name in alphabetical order, the ***BE* FASTtrack** groups companies first by product type, then by booth number.

The result is a list of all companies providing products and services in any of 24 categories, broken down by booth number. This allows you to select the type of product needed and immediately know what companies provide that type of product. Then, using the ***BE* FASTtrack** listing, you can take the shortest path (**FASTtrack**) between booths.

The result should be a more efficient use of your time. The time saved can be used to see more equipment or, if no one is looking, to relax and enjoy the other attractions Las Vegas has to offer.

Audio mixers – portable

AEQ	2300
Mark IV/E-V	2412
RAM Broadcast	3002
Logitek	3215
Henry Engineering	3700
Audio Services Corporation	4506
Wheatstone Broadcast Group	5108
Radio Design Labs	5406
Euphonix	5418
Sony Electronics/Business & Prof.	11711
Shure Brothers	11901
Audio Technica US	12506
SESCOM	13601
ATI Audio Technologies	13603
Yamaha Music	13840
TASCAM	15669
Soundcraft	15713
Audio Developments	16125
Neve/AMS (See Siemens Audio)	16623
Micron Audio Products	17151
AMEK Consoles/TAC	19166
Fostex	19185
JLCooper Electronics	19563

Audio Mixers – studio, on-air, recording

Otari	1209
Studer ReVox	1213
ART/Applied Research & Technology	1706
Hallikainen & Friends	1712
Fidelipac	1920
LPB	1924
Neotek	2226
AEQ	2300
Auditronics	2302
Mark IV/E-V	2412
RAM Broadcast	3002
Radio Systems	3012
Logitek	3215
Broadcast Electronics	3424
Pacific Recorders & Engineering	3612
Arrakis Systems	3912
Autogram	4520
Trident Audio	5106
Wheatstone Broadcast Group	5108
Euphonix	5418
AEV Snc di Vaccari GEC	5424
Harrison by GLW	11317
Graham-Patten Systems	11551
Whirlwind/US Audio	11627
Sony Electronics/Business & Prof.	11711
Ward-Beck Systems	12501
ATI Audio Technologies	13603
Yamaha Music	13840
TASCAM	15669
Soundcraft	15713
Siemens Audio Inc.	16623
Neve/AMS (See Siemens Audio)	16623
Dan Dugan Sound Design	17147
Ramsa Audio/Panasonic	18001
FOR-A	18013
Dorrough Electronics	18815
Solid State Logic	19158
AMEK Consoles/TAC	19166
Fostex	19185
GML Inc.	19459
TOA Electronics/Digital Mixing Sys.	19471
Group One Ltd.	19569

Audio processing(compression, limiting, expansion, equalizing, noise reduction); Telephone hybrids, telco-related products, bandwidth extenders, audio codecs

Studer ReVox	1213
Studer Digitec	1213
HHB Communications Ltd.	1403
Lester Audio Laboratories	1613
Dolby Labs	1620
ART/Applied Research & Technology	1706
Harris Allied Broadcast Div.	2218
Inovonics	2306
Mark IV/E-V	2412
Lexicon	2524
Gentner Communications	2612
AKG Acoustics	2806
Orban/AKG Acoustics	2806
dbx/AKG Acoustics	2806
Circuit Research Labs	3015
Roland Corporation	3406
Aphex Systems	3924
Bradley Broadcast Sales	4002
Audio Processing Technology Ltd.	4306
Penny & Giles	4526
AKAI/IMC	4602
Symetrix	4622
Eventide	4809
Wheatstone Broadcast Group	5108
Intraplex	5118
Telos Systems	5200
AEV Snc di Vaccari GEC	5424
Modulation Sciences	11102
Sony Electronics/Business & Prof.	11711
Comrex	12206
SESCOM	13601
Hotronic	13614
Studio Technologies	13618
Manhattan Production Music	13635
TASCAM	15669
UREI	15713
JBL Professional	15713
Audio Developments	16125
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Siemens Audio Inc.	16623
Yamashita Engineering Mfgr/YEM	17744
Link Electronics	17981
Evertz Microsystems	18276
Dorrough Electronics	18815
Solid State Logic	19158
Apogee Electronics	19181
GML Inc.	19459
FM Systems	19528
BGW Systems	19560
Group One Ltd.	19569
ASC Audio Video Corporation	19573
NVISION	20081

Recording and playback equipment (tape, hard drive, CD)

Digidesign	1002
Otari	1209
Studer ReVox	1213
Studer Digitec	1213
International Tapetronics/ITC	1218
HHB Communications Ltd.	1403
TM Century	1526
Sprague Magnetics	1612
Sonic Solutions	1700
ART/Applied Research & Technology	1706
Crouse-Kimzey Company	1708

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Radio Systems	3012	Nagra-Plus SA	11906	PEP	19101
Roland Corporation	3406	Multidyne Electronics	11948	Solid State Logic	19158
Broadcast Electronics	3424	Barco-EMT	12429	Fostex	19185
Pacific Recorders & Engineering	3612	McCurdy Radio Industries	13111	ASC Audio Video Corporation	19573
Henry Engineering	3700	Yamaha Music	13840	Accurate Sound Corporation	
Sandar Electronics	3703	TASCAM	15669		
Audi-Cord	3926	ASACA ShibaSoku	16619		
DENON	4303	Neve/AMS (See Siemens Audio)	16623		
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Videoquip Research	5112
Radio Design Labs	5406
360 Systems	5420
Benchmark Media Systems	11059
Image Video	11311
Vistek Electronics	11543
Multidyne Electronics	11948
Barco-EMT	12429
BARCO Industries	12429
Lighthouse Digital Systems	12438
ESE	12808
Adrienne Electronics	12847
JEM-FAB	12849
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Di-Tech	13103
McCurdy Radio Industries	13111
Omicron Video	13141
Television Equipment Associates	13411
SESCOM	13601
ATI Audio Technologies	13603
Studio Technologies	13618
DYNAIR Electronics	13806
Datatek	13814
Nova Systems	13843
Leitch Video (M213)	15746
HEDCO div. of Leitch	15746
Videotek	16127
IRIS Technologies	16376
ASACA ShibaSoku	16619
Siemens Audio Inc.	16623
Broadcast Video Systems/BVS	16736
Grass Valley Group (M1633)	16933
ADC Telecommunications	17172
Pro-Bel Ltd.	17350
Yamashita Engineering Mfgr/YEM	17744
OpAmp Labs	17778
Link Electronics	17981
BTS Broadcast Television Systems	18023
Utah Scientific	18032
AVP Manufacturing	18780
BAL Components	19113
Pesa Switching Systems	19401
PESA-Chyron Group	19401
Avitel Electronics	19478
AAVS US/Sencore	19483
Clark Wire & Cable	19537
Wohler Technologies	19539
IRT Electronics Pty. Ltd.	19839
NVISION	20081
ARTI/Advanced Remote Tech.	M1214
AAVS Advanced Audio Visual Sys.	19483

Digital workstations

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Henry Engineering	3700
Dalet Digital Media System	3803
Computer Concepts	3908
Arrakis Systems	3912
ComStream Corporation	4000
Eventide	4809
Broadcast Supply Worldwide/BSW	4820
ENCO Systems	5121
Sony Electronics/Business & Prof.	11711
Yamaha Music	13840
Neve/AMS (See Siemens Audio)	16623
Siemens Audio Inc.	16623
AVID Technology	17111
Fairlight ESP	18076
Solid State Logic	19158
Augan Instruments	

Microphones, accessories – (lavalier, wireless, hand-held, pre-amps, mounting devices, mult-boxes); Speakers, monitors, amplifiers; Headsets, headphones.

Studer ReVox	1213
HHB Communications Ltd.	1403
Bec Technologies	1502
Bryston	1609
Sanken/Audio Intervisual Design	2002
Mark IV/E-V	2412
AKG Acoustics	2806
RCI Systems Inc.	3702
Crown International	4400
Audio Services Corporation	4506
Murry Rosenblum Sound Assoc.	5115
Professional Sound Corp.	5124
ComTek	11114
beyerdynamic	11315
Nady Systems	11327
Swintek Enterprises	11705
Sony Electronics/Business & Prof.	11711
Shure Brothers	11901
Sennheiser Electric	12136
Countryman Associates	12202
Samson Technologies	12436
Audio Technica US	12506
R-Columbia Products	13145
SESCOM	13601
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Wireworks	13607
Studio Technologies	13618
Karl Heitz	13631
Systems Wireless	13636
JBL Professional	15713
Electro-Voice	15716
Vega Wireless	15716
Hamlet Video International	16349
Siemens Audio Inc.	16623
Telex Communications/Pro A-V	17115
Micron Audio Products	17151
Ramsa Audio/Panasonic	18001
JVC Professional Products	18046
Wohler Technologies	19539
Lectrosonics	20019
Neumann USA	
Stanton Magnetics	

Automation systems – radio, radio business

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Sono-Mag	1324
CBSI Custom Business Systems	1624
Clark & Associates	1715
Gefen Systems	2803
Circuit Research Labs	3015
Henry Engineering	3700
Computer Concepts	3908
Schafer World Communications	4022
Radio Computing Services	5202
Prophet Systems	5221
Smarts Broadcast Systems	5224
Alamar USA	11933
Computer Engineering Associates	12259
McCurdy Radio Industries	13111
Videomedia	15722
Adtec Productions	16478
Louth Automation	17348
AAVS Advanced Audio Visual Sys.	19483

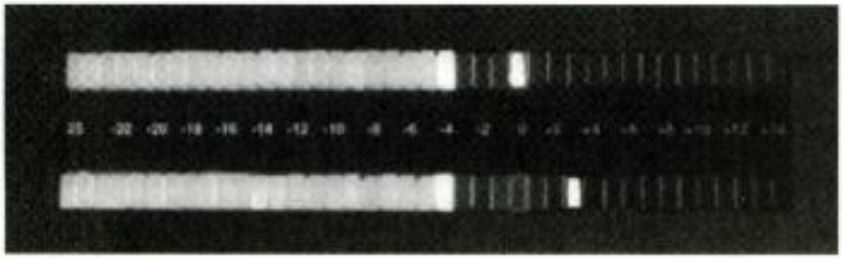
Automation systems – video, TV, newsrooms, TV business

Media Touch Systems	1006
Tapscan	1325
TM Century	1526
CBSI Custom Business Systems	1624
Register Data Systems	4508
Media Computing	11106
Sony Electronics/Business & Prof.	11711
Tel-test	11908
Alamar USA	11933
Computer Engineering Associates	12259
Enterprise Systems	12562
FloriCal Systems	12829
Jefferson Pilot Data/JDS	13811
Videomedia	15722
Columbine Systems	15733
Unique Business Systems	16473
Adtec Productions	16478
ASACA ShibaSoku	16619
Louth Automation	17348
Panasonic	18001
BTS Broadcast Television Systems	18023
Dynatech NewStar	18032
Utah Scientific	18032
Softech Systems Inc.	18483
Nesbit Systems Inc.	18780
Odetics Broadcast	18932
Matco Mfg & Test	19213
BASYS	19247
News Technology Corp.	19437
AAVS US/Sencore	19483
Leightronix	19534
ASC Audio Video Corporation	19573
NewsMaker Systems	20053
Data Center Management	20055
Video Communications	
AAVS Advanced Audio Visual Sys.	19483

Cameras, lens systems, camera optical filters, matte boxes, viewfinder shades

Sony Electronics/Business & Prof.	11711
Toshiba Corporation	11841
BURLE INDUSTRIES	11962
BAF Communication	15174
Miller Fluid Heads (USA) Inc.	15729
Canon USA/Broadcast Optics	15738
Thomcast	16113
Concept W Systems	16253
Philips Components	16628

SERIAL SOUND?



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Band Pro Film/Video 16646
EEV 16663
Fujinon 16958
Arriflex 17169
Hitachi Denshi 17546
Angenieux Corporation 17615
Panasonic 18001
FOR-A 18013
BTS Broadcast Television Systems 18023
JVC Professional Products 18046
Innovision Optics 18169
Nikon Electronic Imaging 18178
Ikegami Electronics 19319
Century Precision Optics 19764

Camera support products, pedestals, tripods, pan/tilt heads, robotic equipment and controls

Cinema Products 11633
Quickset 12508
The M S Russin Group, Ltd. 13413
Karl Heitz 13631
Chapman/Leonard Studio Eqpt. 13833
Shotmaker Dollies/Camera Platforms 15177
Shotmaker Dollies & Cranes 15177
Miller Fluid Heads (USA) Inc. 15729
K&H Products 16465
Band Pro Film/Video 16646
Bogen Photo 16666
Vinten Broadcast 17107
TSM/Total Spectrum Manufacturing 17107
Arriflex 17169
Radamec EPO Ltd. 17353
AF Associates 17353
egripment 18072
Micron Tool & Manufacturing 18581
O'Connor Engineering Labs 18854
Sachtler 18938
Telemetrics 18951
Cinekinetic 19128
Stanton-Video Services Unltd. 19739
CSI Camera Support International 20139

Character generators, production titlers, prompters, captioning equipment

Clark & Associates 1715
Questar Systems (Farpoint Systems) 10061
Abekas Video Systems 11953
Horita 12751
Cue Tech Teleprompting 12762
Shereff Systems 15764
Sigma Electronics 16260
QSI Systems 16333
Hamlet Video International 16349
Norpak 16369
Knox Video 16433
Burst Electronics 16471
Magic Teleprompting Inc 16483
ASACA ShibaSoku 16619
Listec Video 16633
Grass Valley Group (M1633) 16933
Computer Prompt. & Captioning Co. 16943
SoftTouch 16943
Quantel 17126
Video Data Systems 17984
Texscan MSI 17985
BTS Broadcast Television Systems 18023
Quanta 18032
Tekskil Industries 18272
Brek Conner Group 18454
Discreet Logic Inc. 18563
Q-TV 18854
Comprompter 19164
Pesa Chyron Group (M1114) 19401
Chyron (See Pesa Chyron) (M1114) 19401
PESA-Chyron Group 19401
Telescript 19442
Image Logic Corp. 19566
Mainframe Computer Graphics 19769
Vertigo Technology M1309
Vertigo M1309

Desktop video equipment

Gefen Systems 2803
Matrox Electronic Systems 10650
TrueVision/RasterOps (M1415) 11559
Toshiba Corporation 11841
Nova Systems 13843
TouchVision Systems 16066
Comprehensive Video Supply 16346
Knox Video 16433
Burst Electronics 16471
Data Translation 16615
Grass Valley Group (M1633) 16933
Pinnacle Systems 17569
Microtime 17622
FOR-A 18013
BTS Broadcast Television Systems 18023
Minerva Systems 19076
Chyron (See Pesa Chyron) (M1114) 19401
Pesa Chyron Group (M1114) 19401
ASC Audio Video Corporation 19573
ImMIX 19746
FAST Electronics 19766
Intelligent Resources 19969
Advanced Digital Imaging 20142
Hewlett-Packard/Video Comm. Div. M 117
Optimage Interactive Services M 414
Desktop Video World M 518
Dubner International M1121

Graphics and animation systems; Software for Mac/PC, dedicated computer systems

Matrox Electronic Systems 10650
TrueVision/RasterOps (M1415) 11559
Information Int'l/DMG 11629
Advanced Designs 11706
Toshiba Corporation 11841
Kavouras 13129
NDG Phoenix 13606
Progressive Image Technology 13829
Electric Image 16109
Comprehensive Video Supply 16346
Softimage 16675
Magni Systems 16684
Grass Valley Group (M1633) 16933
Quantel 17126
Pinnacle Systems 17569
Parallax Graphics Systems 17575
ColorGraphics Systems 18032
Alden Electronics 18614
Bencher 19111
Accu-Weather 19208
Chyron (See Pesa Chyron) (M1114) 19401
Aurora Systems (See Pesa Chyron) 19401
Pesa Chyron Group (M1114) 19401
Getris Images 19743
Mainframe Computer Graphics 19769
Wavefront Technologies (M833) 19830
Intelligent Resources 19969
Flight Data Center 20186
Hewlett-Packard/Video Comm. Div. M 117
Extron Electronics M 319
Autodesk M 901
Alias Research M 913
Silicon Graphics M1102

High-definition TV equipment, line doublers, all non-RF HDTV products

Astrodesign/Mira Vision 10153
Sony Electronics/Business & Prof. 11711
Toshiba Corporation 11841
Faroudja Laboratories 13101
Systems Wireless 13636
Thomcast 16113
ASACA ShibaSoku 16619
Eastman Kodak Company 16963
BTS Broadcast Television Systems 18023
Ikegami Electronics 19319
Pesa Chyron Group (M1114) 19401
Snell & Wilcox 19746

Intercom/IFB products

Wheatstone Broadcast Group 5108
Anchor/ROH 11601
Swintek Enterprises 11705
Ward-Beck Systems 12501
McCurdy Radio Industries 13111
Vega Wireless 15716
SoftTouch 16943
Telex Communications/Pro A-V 17115
Clear-Com Intercoms 18015

Lighting equipment, instruments, lamps; Light modification filters, reflectors; Lighting controls, dimmers

NRG Research 10259
Great American Market 13121
Anton/Bauer 13123
Frezzolini Electronics 13422
L E Nelson Sales 13616
Strand Lighting 13818
Chapman/Leonard Studio Eqpt. 13833
The F J Westcott Company 15481
DeSisti Lighting/DESMAR 15681
ETC-Electronic Theatre Controls 15743
American Studio Equipment 16078
Sinar Bron 16365
Lightmaker Company 16381
Tiffen Manufacturing 16636
Mole-Richardson 16640
Lowel-Light 16649
Matthews Studio Equipment 16653
Cinemills 16658
LTM Corp of America 17046
Dedotec USA 17148
Ushio America 17578
Chimera 17584
Lee Filters 17619
Colortran 17659
Balcar/TEKNO 17978
VIDESSENCE 18054
Leonetti Company 18082
Broadcast Marketing Int'l Ltd. 19328
Electronics Diversified Inc. 20083

Multimedia products

TrueVision/RasterOps (M1415) 11559
Videomedia 15722
Data Translation 16615
Minerva Systems 19076
Pesa Chyron Group (M1114) 19401
Chyron (See Pesa Chyron) (M1114) 19401
FAST Electronics 19766
Intelligent Resources 19969
AMX Corporation 20021
Advanced Digital Imaging 20142
Target Vision M 101
Adda Technology M 313
Optimage Interactive Services M 414
Autodesk M 901
Engineering Animation M 907
Mira Imaging M 929
Crystal Graphics M1609
Adobe Systems/APD M1615
Ampro M1621
Color Computer Systems M1627

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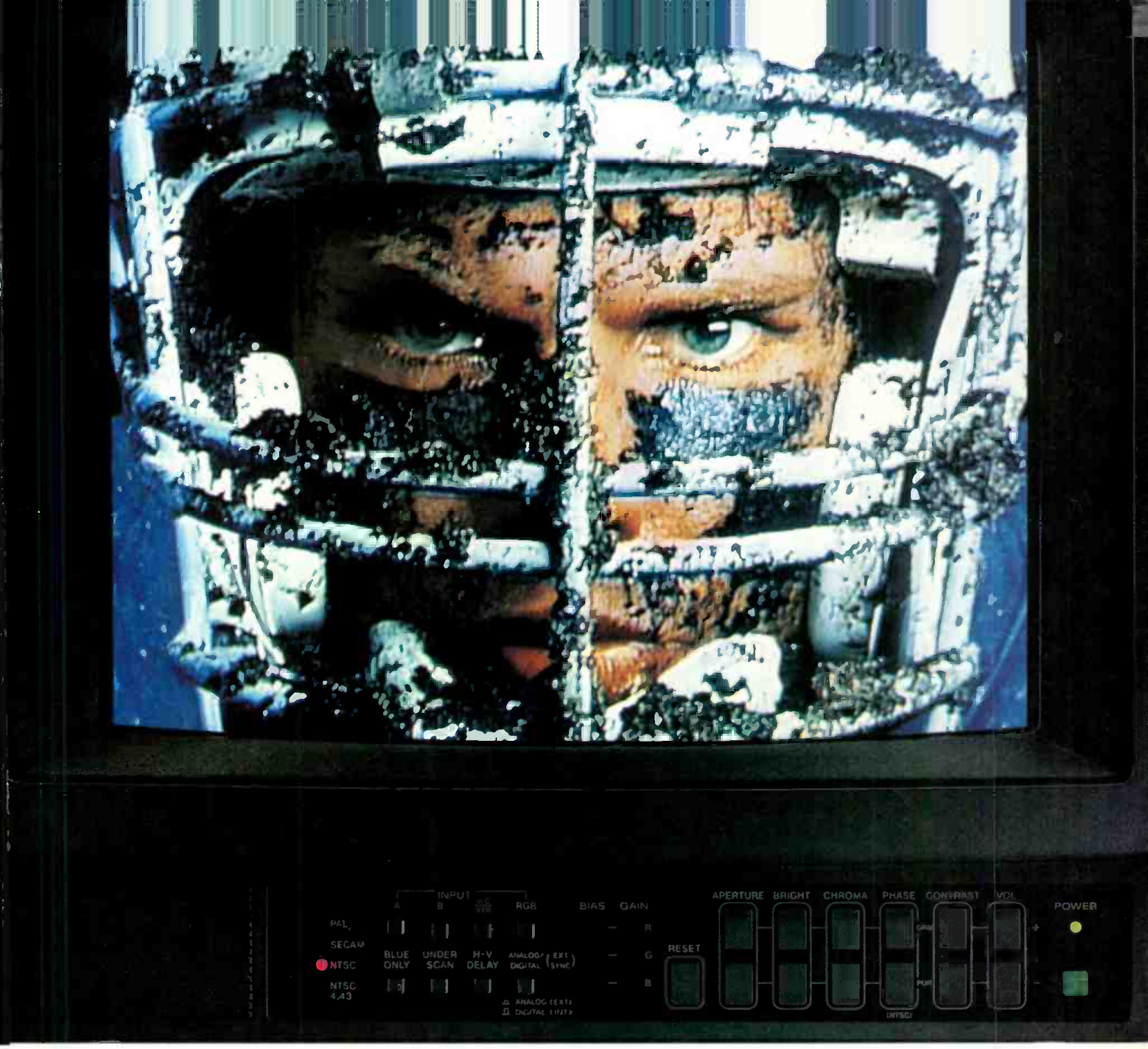

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[1]User selectable. [2]150 MB Bernoulli Disk. [3]SMPTE/EBU Time Code board and Digitol I/O available 1994. Stated specifications are with Dolby AC-2 operation.

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Continued from page 108

Communication Specialties M1711
Apple Computer M1731

Production and master control switchers

Image Video 11311
Vistek Electronics 11543
Sony Electronics/Business & Prof. 11711
Tel-test 11908
Abekas Video Systems 11953
J-Lab 12438
Echolab 13424
Beaveronics 13611
Ross Video 15704
Thomcast 16113
Videotek 16127
Grass Valley Group (M1633) 16933
Ampex Corporation 17101
Panasonic 18001
FOR-A 18013
VGV Incorporated 18017
BTS Broadcast Television Systems 18023
ALTA Group/Dynatech 18032
Utah Scientific 18032
Alpha Image 18032
Telemetrics 18951
Snell & Wilcox 19746

Routing and distribution switchers, video DAs, pulse DAs, video delays

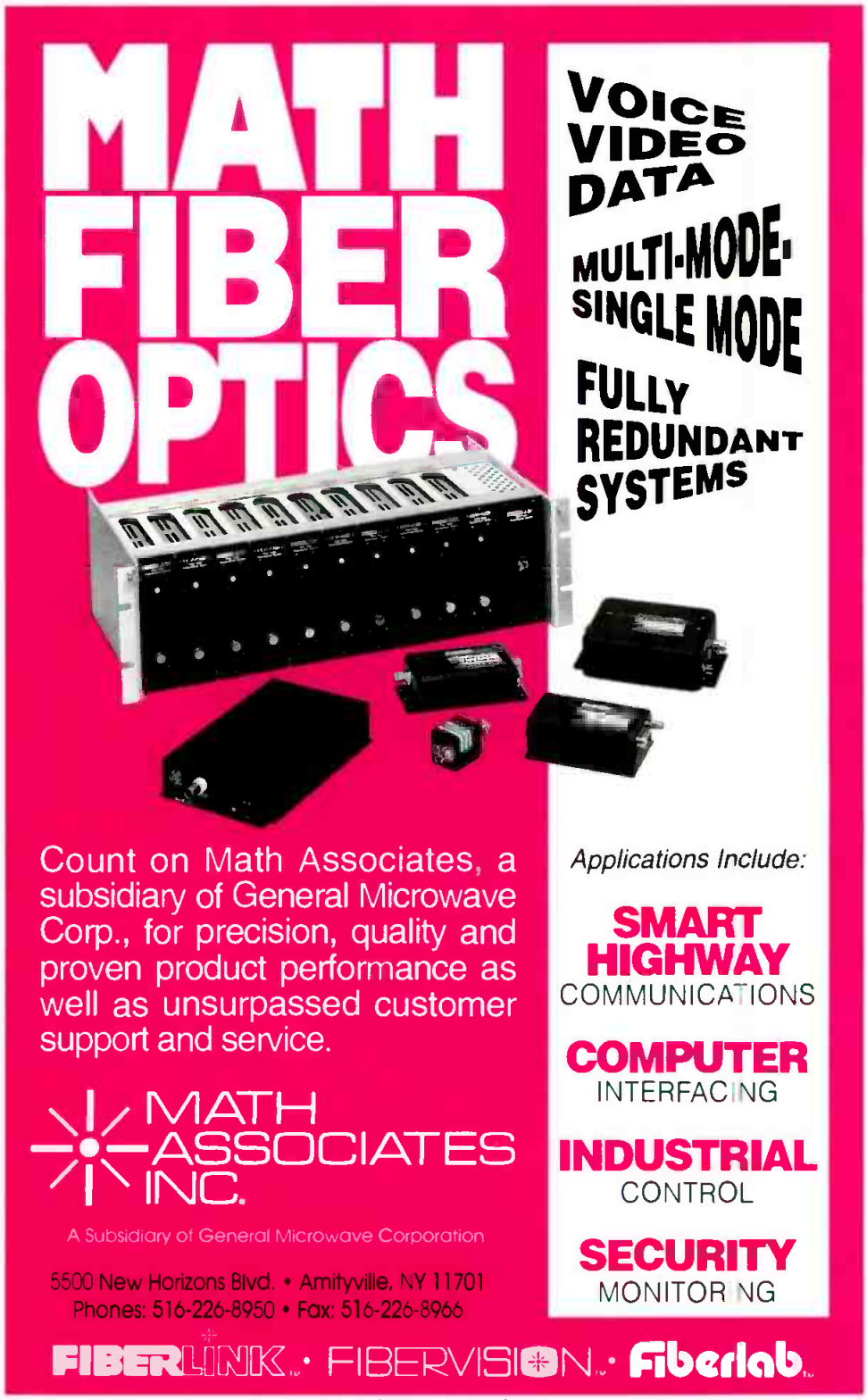
Videoquip Research 5112
Video Accessory 11127
Image Video 11311
Vistek Electronics 11543
Sony Electronics/Business & Prof. 11711
Multidyne Electronics 11948
BARCO Industries 12429
Lighthouse Digital Systems 12438
ESE 12808
Adrienne Electronics 12847
JEM-FAB 12849
Di-Tech 13103
Omicron Video 13141
Television Equipment Associates 13411
DYNAIR Electronics 13806
Datatek 13814
Nova Systems 13843
HEDCO div. of Leitch 15746
Leitch Video (M213) 15746
Videotek 16127
Sigma Electronics 16260
IRIS Technologies 16376
Knox Video 16433
Burst Electronics 16471
ASACA ShibaSoku 16619
Broadcast Video Systems/BVS 16736
Kings Electronics 16831
Grass Valley Group (M1633) 16933
ADC Telecommunications 17172
Pro-Bel Ltd. 17350
Broadcast Electronic Services 17375
Sierra Video Systems 17443
Yamashita Engineering Mfgr/YEM 17744
OpAmp Labs 17778
Link Electronics 17981
BTS Broadcast Television Systems 18023
Utah Scientific 18032
Alpha Image 18032
AVP Manufacturing 18780
BAL Components 19113
PESA-Chyron Group 19401
Pesa Switching Systems 19401
Avitel Electronics 19478
AAVS US/Sencore 19483
Clark Wire & Cable 19537

Extron Electronics M 319
ARTI/Advanced Remote Tech. M1214
Communication Specialties M1711
AAVS Advanced Audio Visual Sys. 19483

Standards converters; Scan, format, A-D/D-A converters; Encoders, decoders

Video International Development 11321
Vistek Electronics 11543
Abekas Video Systems 11953
Chromatek Inc. 12462
JEM-FAB 12849
ACCOM 13056
Faroudja Laboratories 13101

Quality Video Supply 13347
Progressive Image Technology 13829
Leitch Video (M213) 15746
Thomcast 16113
Miranda Technologies 16255
James Grunder & Associates 16349
Digital Vision 17143
Prime Image 17184
NTL 17346
Yamashita Engineering Mfgr/YEM 17744
FOR-A 18013
Microvideo Ltd. 18781
BAL Components 19113
Intelvideo 19207



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SOLUTION: AMP-1A/VTR
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PROBLEM 3:
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Interlace Engineering Corp. 19574
CEL(See Snell & Wilcox) 19746
Snell & Wilcox 19746
Extron Electronics M 319
Communication Specialties M1711

Time base correctors, frame synchronizers

Sony Electronics/Business & Prof. 11711
Digital Processing Systems 11930
Ensemble Designs 13353
Hotronic 13614
Merlin Engineering Works 13836
Nova Systems 13843
Leitch Video (M213) 15746
Videotek 16127
James Grunder & Associates 16349
Ampex Corporation 17101
Tektronix 17119
Digital Vision 17143
Prime Image 17184
Microtime 17622
FOR-A 18013
BAL Components 19113
Zaxcom 19742
Snell & Wilcox 19746

Video accessories

Astrodesign/Mira Vision 10153
Raytheon Co. 11356
Pandora International 11506
Vistek Electronics 11543
Digital Processing Systems 11930
J-Lab 12438
Rank Cintel 12441
ESE 12808
ACCOM 13056
Faroudja Laboratories 13101
Quality Video Supply 13347
Ensemble Designs 13353
Options International 13359
Nytone Electronics 13406
Hotronic 13614
Research Technology Int'l/RTI 13646
Merlin Engineering Works 13836
Leitch Video (M213) 15746
Thomcast 16113
Videotek 16127
Miranda Technologies 16255
EEG Enterprises 16324
Comprehensive Video Supply 16346
ASACA ShibaSoku 16619
Broadcast Video Systems/BVS 16736
Ultimatte Corporation 16869
Digital Vision 17143
Prime Image 17184
NTL 17346
Sierra Video Systems 17443
Macrovision 17581
daVinci 18032
Alpha Image 18032
Evertz Microsystems 18276
Allen Avionics 19113
Intelvideo 19207
Allen Osborne Associates 19573
Snell & Wilcox 19746
CEL(See Snell & Wilcox) 19746
Sprocket Video Technologies 20016
Hewlett-Packard/Video Comm. Div. M 117
Video Associates Labs M 925
Folsom Research M1120
Gray Engineering Labs

Video editing control systems; Time-code equipment

TimeLine 1702
Matrox Electronic Systems 10650
Sony Electronics/Business & Prof. 11711
Fast Forward Video 11949
Horita 12751
Adrienne Electronics 12847
ACCOM 13056
Ensemble Designs 13353
VideoLab Para Technologies 13629
Editing Technologies Corporation 15466
Videomedia 15722
TouchVision Systems 16066
Comprehensive Video Supply 16346
DNF Industries 16375
Amtel Systems 16642
Montage Group 16660
Ultimatte Corporation 16869
Grass Valley Group (M1633) 16933
SoftTouch 16943
Ampex Corporation 17101
AVID Technology 17111
Broadcast Electronic Services 17375
Panasonic 18001
FOR-A 18013
BTS Broadcast Television Systems 18023
Calaway Editing 18032
EMC/Dynatech Video Group 18032
JVC Professional Products 18046
Evertz Microsystems 18276
United Media 18576
Steenbeck 18814
PEP 19101
Sundance Technology Group 19105
Broadcast Marketing Int'l Ltd. 19328
CMX (See Pesa Chyron) 19401
TAO/Technical Aesthetics Oper. 19438
Image Logic Corp. 19566
ASC Audio Video Corporation 19573
O.L.E Limited 19934
Lightworks 19934
Strassner Editing Systems 19978
Lyon Lamb Video Animation M 813
Dubner International M1121
RGB Computer & Video M1403
Paltex
Gray Engineering Labs

Video presentation equipment; Monitors, videowalls, projectors, screens

Sumitomo Electric 10060
IDS/SAIC 10150
Vistek Electronics 11543
Sony Electronics/Business & Prof. 11711
Toshiba Corporation 11841
BARCO Industries 12429
DYNAIR Electronics 13806
Electrosonic Systems 15685
Videotek 16127
Display Devices 16472
ASACA ShibaSoku 16619
Panasonic 18001
FOR-A 18013
BTS Broadcast Television Systems 18023
JVC Professional Products 18046
Hoodman 18615
Ikegami Electronics 19319
PESA-Chyron Group 19401
AAVS US/Sencore 19483
Management Graphics 19786
Synelec M 201
Mitsubishi PED M1129
Electrohome M1429
AAVS Advanced Audio Visual Sys. 19483

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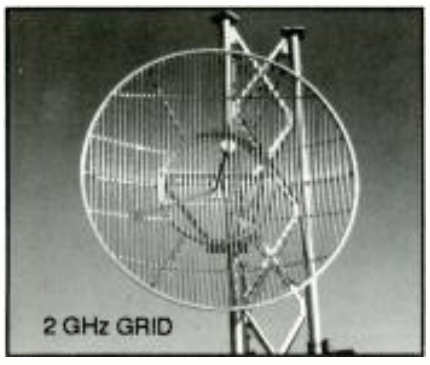

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Video recorders – all videotape formats, magnetic and optical disk, solid-state

DVS Digital Video Systems	10354
CMC Technology	11608
Sony Electronics/Business & Prof.	11711
Toshiba Corporation	11841
Abekas Video Systems	11953
Samson Technologies	12436
Hotronic	13614
Leitch Video (M213)	15746
Thomcast	16113
DNF Industries	16375
Knox Video	16433
ASACA ShibaSoku	16619
Ampex Corporation	17101
Tektronix	17119
Quantel	17126
Pioneer New Media Technologies	17182
Prime Image	17184
AF Associates	17353
Hitachi Denshi	17546
Pinnacle Systems	17569
Macrovision	17581
Video Data Systems	17984
Panasonic	18001
FOR-A	18013
Videomagnetics Inc.	18014
BTS Broadcast Television Systems	18023
JVC Professional Products	18046
Optical Disc Corporation	18949
ASC Audio Video Corporation	19573
Snell & Wilcox	19746
FAST Electronics	19766
Hewlett-Packard/Video Comm. Div.	M 117
Mitsubishi PED	M1129
New EVS	

Video duplicators

Sony Electronics/Business & Prof.	11711
Dwight Cavendish	16072
Panasonic	18001
JVC Professional Products	18046

Video special effects – DVEs, chroma keyers, linear keyers

Sony Electronics/Business & Prof.	11711
Abekas Video Systems	11953
Echolab	13424
Ross Video	15704
Broadcast Video Systems/BVS	16736
Ultimatte Corporation	16869
Grass Valley Group (M1633)	16933
Ampex Corporation	17101
Quantel	17126
Pinnacle Systems	17569
Microtime	17622
FOR-A	18013
Evertz Microsystems	18276
Pesa Chyron Group (M1114)	19401
KUB Systems Inc.	19564
CEL(See Snell & Wilcox)	19746
Snell & Wilcox	19746
FAST Electronics	19766
Wavefront Technologies (M833)	19830

Microwave equipment – STL/TSL, ENG, MDS, MMDS, ITFS, ICR

Dolby Labs	1620
TFT Inc.	1908
Utility Tower	2326
Moseley Associates	2824
Marti Electronics	3918
QEI	4218
Insulated Wire/Microwave Products	4916
Intraplex	5118
Wegener Communications	5414
Conifer Corporation	11301
RF Technology	11303
COMWAVE/Comm. Microwave	11329
NUCOMM	11333
AVCOM of VA	11607
Toshiba Corporation	11841
ITS/Information Transmission	11951
Broadcast Microwave Services	12301
N Systems/NSI	13133
Troll Technology	13801
Microwave Radio	13801
Italiana Ponti Radio SRL	15182
Andrew Corporation	15674
Scala Electronic	15726
Cablewave Systems/RF Systems	15753
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Varian Microwave Equipment	16101
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Ikegami Electronics	19319
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Technosystem SpA	19575
AML Inc.	20039
Aydin Corporation-HPA/Magnetics	20042

Satellite transmission and reception equipment; Satellite program transmission services

LNR Communications	1306
Norsat International Inc.	1503
ComStream Corporation	4000
Wegener Communications	5414
Conifer Corporation	11301
Comsat Systems	13051
Comtech Antenna Systems	13402
Miralite Communications	13447
Antenna Technology	13644
Scientific Atlanta	13825
BAF Communication	15174
Vertex Communications	15369
Andrew Corporation	15674
Radiation Systems/Mark Antennas	15766
IDB Communications	16064
Standard Communication	16075
Varian Traveling Wave Tube Div.	16101
Varian Microwave Equipment	16101
Sure Shot Teleproductions	16624
NTL	17346
Dawn Satellite Inc.	17779
GTE Spacenet	18946
Advent Communications	19255
MCL/Inc.	19558
Alpha Lyracom/Panamsat	19781

Radio, TV transmitters, translators, antennas; Towers, guys, tower lights; Waveguide, RF feedline

Elenos	1024
TTC (Larcan-TTC)	15708
Flash Technology	1618
Hallikainen & Friends	1712
Central Tower	1906
Nautel	1912
Jampro Antennas	1915
LPB	1924
Econco Broadcast Service	2208
Magnum Tower	2209
Harris Allied Broadcast Div.	2218
Utility Tower	2326
BEXT	2414
GEC-Marconi Comm. Systems	2526
Gentner Communications	2612
TWR Lighting	2704
CTE International	3000

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Belden has BIG NEWS for the broadcast industry

Belden is on the air with the industry's largest portfolio of new broadcast cables.

More than 60% of the products listed in Belden's Audio/Video Catalog didn't even exist just a few years ago! Belden's Audio/Video Catalog provides specifications for the industry's most complete line of cabling products, including digital audio multi-conductor cables, microphone cables, digital video coaxial cables, video triaxial cables, audio & video composite cables, bundled coaxial composite cables, and fiber optic cables.

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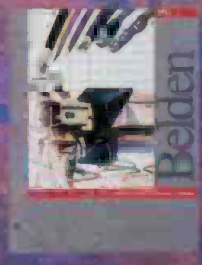
During the past few years, Belden has introduced more product innovations for more broadcast cabling applications than any other cable company. This commitment to innovation and technical excellence is the reason Belden remains the broadcast industry's No. 1 cabling choice, worldwide. It's a position we've worked hard to earn and will fight hard to keep with new products, new options and even higher levels of excellence in the future.



For a copy of Belden's Audio/Video Catalog plus updates on our latest product innovations, contact your local Belden distributor or call: 1-800-BELDEN-4.

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Electronics Research	3212
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Richardson Electronics	12901
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Scala Electronic	15726
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LDL Communications/Larcan	15758
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SWR Inc.	16043
Varian Canada Microwave Products	16101
Varian Power Grid/X-ray Tube Div.	16101
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Thomcast France	16113
Thomcast	16113
Sira Sistemi Radio s.r.l.	16258
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Will-Burt	19203
PESA Micro Communications	19401
ITELCO spa	19414
MCL/Inc.	19558
Allen Osborne Associates	19573
Technosystem SpA	19575
Kline Towers	19755
Aydin Corporation-HPA/Magnetics	20042
Shively Labs	4224

Power products – batteries, chargers, UPS, power converters, power protection, lightning protection products

Cortana Corporation	3704
Superior Electric	4914
Professional Sound Corp.	5124
NRG Research	10259
Alexander Batteries	11113
Christie Electric	11709
Anton/Bauer	13123
Lightning Eliminators & Consultants	13401
PAG Ltd.	13422
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Control Concepts/Leibert	16336
Perrott - The Battery People	16339
Band Pro Film/Video	16646
Pro Battery	18414
Paco Electronics USA	19115
Cine 60	19117
ENG Mobile Systems	19143
Schwalm/Power Technologies	19562

Consultants – engineering, system integration, facilities design, engineering software

EDX Engineering	1327
National Supervisory Network	1426
Dataworld	1918
Gefen Systems	2803
Communications Data Services	4019
Rules Service Company	4627
Doug Vernier Broadcast Technologies	5152
GE Support/RCA Broadcast	11128
Raytheon Co.	11356
Lakeside Associates	11549
Television Engineering	13117
Focal Press	13404
NDG Phoenix	13606
Antenna Technology	13644
BAF Communication	15174
Rees Associates	16631
AF Associates	17353
Nesbit Systems Inc.	18780
DSI Communications	18817
Kent Green Video Group	19081
Doty Moore Services	19180

Dealers, distributors, equipment brokers

HHB Communications Ltd.	1403
Crouse-Kimzey Company	1708
Yale Electronics	1714
Harris Allied Broadcast Div.	2218
Broadcasters General Store	2506
RAM Broadcast	3002
RCI Systems Inc.	3702
Bradley Broadcast Sales	4002
Broadcast Supply Worldwide/BSW	4820
Radio Express	4903
Professional Sound Corp.	5124
Media Concepts	11647
GEPCO International	13351
B&H Photo	13428
System Associates	13432
Nemal Electronics International	13619
Systems Wireless	13636
Antenna Technology	13644
BAF Communication	15174
Comprehensive Video Supply	16346
Equipment Broker (The)	16385
BCS Broadcast Store	17112
Dawn Satellite Inc.	17779
H L Dalis	18070
AVP Manufacturing	18780
Elantec Inc.	19463
Group One Ltd.	19569
ASC Audio Video Corporation	19573

Fiber-optic equipment, fiber materials, terminal equipment

Lester Audio Laboratories	1613
Lightwave Systems	1613
Telecast Fiber Systems	12747
CCOR/Comlux	13356
Mohawk/CDT Broadcast Cables	13431
ADC Telecommunications	17172
Meret Optical	17278
Fiber Options	18084
Ortel	18181
IRT Electronics Pty Ltd	19839

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EVOLUTION

CNN, Washington, D.C. Bureau

STUDIO 2000 Lighting Systems

On September 22, 1988, KCRA-TV (NBC-Sacramento) went on the air with the world's first VIDESSENCE Sustained RGB Lighting system. What followed is now history. The VIDESSENCE product line has since evolved into a complete energy-efficient replacement technology for incandescent lighting in the media.

On April 15, 1993, KVBC-TV (NBC-Las Vegas) converted its large-zone VIDESSENCE system to a small-zone VIDESSENCE SOFTSPOT STUDIO 2000 System. This system placed each newscast member in his/her own "pool" of light.

On January 17, 1994, KOIN-TV (CBS-Portland, Oregon) went on the air using the first VIDESSENCE MODULAR STUDIO 2000 Lighting System. This system produces one large zone of light for all the talent areas. While this controlled zone is large in size, there is a wide array of effects and styles within each facial zone.

On March 21, 1994 (NAB, Las Vegas), VIDESSENCE will release the complete potential of STUDIO 2000 Lighting Systems.

KTNV-TV, ABC, Las Vegas

KVBC-TV, NBC, Las Vegas

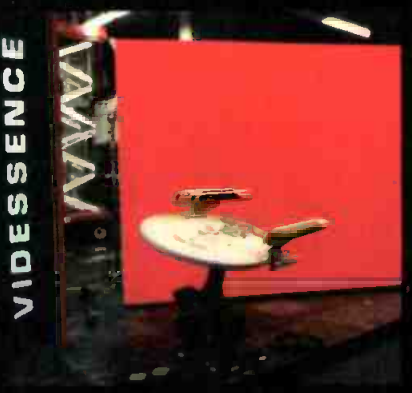
VIDESSENCE Sustained RGB Lighting Systems effectively replace incandescent lighting systems in television studios and video production centers around the world. These systems:

- eliminate 80-90% of the electricity needed for lighting and air conditioning in most studios
- operate without any refocusing or maintenance requirements for 3-5 years
- produce dynamic artistic results with mechanical and optical control devices
- can be configured to match your expense-to-feature needs
- provide a cooler, more comfortable environment for talent.

VIDESSENCE Lighting Systems make a daily contribution to profits in most installations while supporting the highest technical and artistic standards.

Special Effects Lighting

VIDESSENCE Sustained RGB Lighting makes it easier to set up composite image and chroma-key production areas. The effect of the VIDESSENCE VID-KEY System can be seen regularly on over 150 broadcasts worldwide, and many of Hollywood's out-of-this-world special effects are created with VIDESSENCE lighting equipment.



The versatility of our VID-STICKS products makes them well-suited for miniature, table-top, small-set-piece accent lighting, rear-transparancy lighting, down-lighting, and just about any other "gadget" application.

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Location Lighting Products

VID-LITES and VID-STICKS products bring an array of instruments to the location and production industry. These fixtures produce the same results as incandescent fixtures, but with a long list of advantages and resulting benefits. VIDESSENCE fixtures require a fraction of the power needed by incandescent lights, and VIDESSENCE lights operate at a much cooler level. These VIDESSENCE instruments also incorporate all the performance features of VIDESSENCE studio lights, with the added benefit of being packaged for field work.

VID-LITES are professional-grade location lighting tools. Each fixture is designed to be extremely durable and to allow for hassle-free set-up in the field. VID-STICKS are smaller, modular gadget fixtures that individually supply a variety of lighting effects and, when "ganged" together, function as high-output luminaires.

VIDESSENCE Production Services/Rental

As more video and motion picture professionals call upon the rental industry for VIDESSENCE technology, VIDESSENCE stands committed to supporting its standards and equipment within that industry. In 1994, large inventories of VID-LITES, VID-STICKS, VID-VISION Camera and Camera Support systems, and VID-KEY Composite Image Lighting Systems will be available for the rental industry.

VIDESSENCE goods and services should be available through your favorite rental company. If it doesn't have them, ask that they call VIDESSENCE.

RGB Cosmetics

VIDESSENCE lighting maintains a literal relationship with the human eye and the camera – what you see is what you get. For this reason, VIDESSENCE offers RGB Cosmetics, a complete line of high quality makeup and skin care products that have been tested and evaluated for critical color-rendering abilities.

Each VIDESSENCE broadcast customer can receive professional cosmetic consultation for its talent and a customized inventory of RGB Cosmetics, as well as VIDESSENCE lighting installed in its makeup area. Applying the cosmetics under VIDESSENCE lighting gives talent an accurate rendering of the image that will be seen on air check. Look for VIDESSENCE RGB Cosmetics in professional supply and expendable stores near you soon.

Teleconferencing/Audio-Video Lighting

VIDESSENCE is currently releasing a complete line of lighting systems that bring studio-quality Sustained RGB Light to large teleconferencing facilities, single desktop videoconferencing stations, and everything in between. These products will represent the first and finest standard in video environment illumination.

Many audio-video and telecommunications applications use inexpensive camera platforms and subject video processing to severe compression or encoding. VIDESSENCE Sustained RGB Light is the simplest form of quality control and image enhancement for these situations.

VIDESSENCE

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LIGHT THAT REPLACES INCANDESCENCE

KOIN-TV, CBS, Portland, Oregon

VIDESSENCE is the most affordable video image enhancement system you can employ. If you produce video in a studio on a regular basis, the operational cost savings of a VIDESSENCE Lighting System should give you a short payback period. If you produce in the field, the minimal amount of power you will need for lighting and the long life of the VIDESSENCE products will save you time and money. If you produce special effects, table-top realities, etc., VIDESSENCE systems will speed your production process, improve your final quality, and perform consistently, day in and day out. In every case, VIDESSENCE offers a standard that is technically consistent, financially smart, and offers new levels of artistic expression.

VIDESSENCE

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VIDESSENCE products are manufactured and distributed under license of United States Patents 5,012,396 and 5,235,497. Other patents pending.

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Studio support products, accessories; Sets, drapes, acoustic materials, equipment racks, furniture

SONEX Acoustical Products 2103
Arrakis Systems 3912
Wheatstone Broadcast Group 5108
AEV Snc di Vaccari GEC 5424
John Gorrell Woodworking 10757
AMCO Engineering 11307
Forecast Installations 11562
UniSet Corporation 11701
Winsted Corporation (M1715) 11927
Vortex Communications 12206
Acoustic Systems 12807
ESE 12808
EMCOR Products/Crenlo 12833
Pacific Radio Electronics 13047
Zero Stantron 13115
Great American Market 13121
Hi-Tech Furnishings 13362
Torpey Controls & Engineering 13415
Beaveronics 13611
Theatre Service & Supply 13638
Acoustical Solutions/Alpha Audio 13640
Industrial Acoustic/IAC 14041
TCS-Tripp Communications 15380
The F J Westcott Company 15481
American Studio Equipment 16078
Carpel Video 16338
Peerless Industries Inc. 16438
Bretford Manufacturing 16469
Display Devices 16472
Matthews Studio Equipment 16653
Cinemills 16658
Marco Inc 17579
Beck Associates 18170
Hoodman 18615
Electrorack Products 18943
Nigel B Furniture 19473
ERGO 90/Ergo Industries 20014
AMX Corporation 20021
Anthro M 412
Studio Technology

Tape, optical recording media; Tape storage systems; Degaussers; Videocassette labels, software; Music, video libraries; Translation/voice-over services

Broadcast Programming 1424
TM Century 1526
Fidelipac 1920
Fresh/The Music Library 2000
Gefen Systems 2803
Henry Engineering 3700
Energetic Music 3921
audiopak 4018
SCA Data Systems 4208
US Tape & Label 4209
Radio Computing Services 5202
Sonic Science 10057
Vistek Electronics 11543
Rorke Data 11555
Sound Ideas 11703
Sony Recording Media 11711
Optimum Productions 11862
27th Dimension Inc. 11947
Studio Film & Tape 12201
Valentino Production Music 12203
Network Music 12427
Data Security 12451
Capitol Production Music 12905
Killer Tracks Music 13043
Promusic 13148
Audio Action 13449
DeWolfe Music Library 13620
Garner Industries 13622
FirstCom 13625
Manhattan Production Music 13635
Sanix Corporation 13646
Research Technology Int'l/RTI 13646
Production Garden Library 13743
Professional Label Inc. 13841
TRF Production Music Libraries 14044
TCS-Tripp Communications 15380
Zonal 16325
Carpel Video 16338
3M Pro A/V Products 16605
Ampex Corporation 17101
Storeel 17612
Videomagnetics Inc. 18014
H L Dalis 18070
United Ad Label 19119
Apogee Electronics 19181
DIC Digital 19183
Associated Production Music 19201
Aircraft Digital Music 19205
MSE Video Tape Services 19741
CBS News M1810
Soundtrack

Test and measurement equipment

Schmid Telecommunication 1606
Delta Electronics 2224
Potomac Instruments 2310
Belar Electronics Lab 2508
Marconi Communications Systems 2526
Altronic Research 2700
Logitek 3215
Audio Precision 3402
RCI Systems Inc. 3702
RE Electronics 3801
Neutrik Instrumentation 3906
Neutrik USA 3906
Holaday Industries 3920
Crown International 4400
Selco Products 4618
Kintronic Laboratories 4824
Coaxial Dynamics 5116
Radio Design Labs 5406
Astrodesign/Mira Vision 10153
ComTek 11114
Canare Cable/Cables & Connectors 11118
Video Accessory 11127
Minolta 11605
AVCOM of VA 11607
ScheduALL by Vizuall Inc. 11662
Multidyne Electronics 11948
B&B Systems 12147
Telecast Fiber Systems 12747
Horita 12751
Leader Instruments 12803
McCurdy Radio Industries 13111
Techni-Tool 13143
Tally Display Corp. 13162
Tentel 13408
Television Equipment Associates 13411
Jensen Tools 13605
Computer Assisted Technologies 13612
Antenna Technology 13644
Troll Technology 13801
Leitch Video (M213) 15746
Video Design Pro 15901
Videotek 16127
Concept W Systems 16253
Hamlet Video International 16349
James Grunder & Associates 16349
Burst Electronics 16471
Aerosonic Ltd. 16474
Milestek 16477
Maxell Corporation of America 16611
ASACA ShibaSoku 16619
Philips TV Test Equipment A/S 16630
Magni Systems 16684
Tektronix 17119
Veetronix Inc./Reach Electronics 17146
Techflex 17784
Link Electronics 17981
H L Dalis 18070
Microvideo Ltd. 18781
Dorrough Electronics 18815
Faraday Technology Ltd. 19123
Wohler Technologies 19539
Hewlett-Packard/Video Comm. Div. M 117

Vehicles; Equipment transport cases and bags

E-Z UP International 5212
Phoenix ENG 10962
Howe Industries 11547
Television Engineering 13117
Thermodyne International 13127
Clipper Products 13147
Star Case 13624
Professional Label Inc. 13841
BAF Communication 15174
Wolf Coach 16106
Calzone Case 16124
AF Associates 17353
Hardigg Industries 18314
Anvil Cases 18820
Telepak San Diego 19107
ENG Mobile Systems 19143
Will-Burt 19203
Advent Communications 19255
Wescam Systems Int'l 19778
Nalpak Video Sales 20027

Wire, cable, connectors

Neutrik USA 3906
Switchcraft 4909
Insulated Wire/Microwave Products 4916
Professional Sound Corp. 5124
Cole Wire & Cable 10759
Canare Cable/Cables & Connectors 11118
LEMO USA 11323
Whirlwind/US Audio 11627
Trompeter Electronics 12801
Audio Accessories Inc. 13041
GEPCO International 13351
Mohawk/CDT Broadcast Cables 13431
Wireworks 13607
Nemal Electronics International 13619
Connectronics 13628
Belden/Cooper Industries 16069
VEAM 16366
Union Connector 16435
Milestek 16477
Kings Electronics 16831
ADC Telecommunications 17172
H L Dalis 18070
United Ad Label 19119
Apogee Electronics 19181
Clark Wire & Cable 19537

Turn to page 118 for the comprehensive NAB '94 Exhibitor Listing.

Booth numbers shown are based on information from NAB and the manufacturers as of Feb. 1, 1994. It is possible that some numbers will have changed by show time. We have no control over such changes and regret any inconvenience it may cause.

Roland
ProAudioVideo
See us at NAB Booth #3406.
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Exhibitor Highlights

A comprehensive listing by company of product

Alcatel Network Systems/Telspace 18883
Microwave link products; TM 400 series for audio, video.
Circle (331) on Reply Card

Alden Electronics 18614
Weather graphics systems; NEXRAD data demonstrations.
Circle (333) on Reply Card

Alesis 4612
Digital audio products, ADAT multitrack recorder, remote control equipment.
Circle (334) on Reply Card

Alexander Batteries 11113
Batteries and battery maintenance equipment, tri-analyzers, Smart chargers; New Generation Smart chargers.
Circle (335) on Reply Card

Alias Research M 913
Graphics software, Animator, PowerAnimator 3-D modeling, rendering, animation.
Circle (336) on Reply Card

Allen Avionics 19113
Hum eliminator; video delay lines; video filters.
Circle (337) on Reply Card

Allen Osborne Associates 19573
Transportable masts; production utility products.
Circle (338) on Reply Card

Alpha Image 18032
Component digital production switchers; Alpha 500, Alpha 501; routers and signal conversion equipment.
Circle (339) on Reply Card

Alpha Lyracom/Panamsat 19781
Program distribution, transmission services.
Circle (340) on Reply Card

ALTA Group/Dynatech 18032
Video recording, processing and switching equipment.
Circle (341) on Reply Card

Altronic Research 2700
RF power measurment equipment, Model 6725 25kW, Model 640105 dual port VHF air-cooled loads.
Circle (342) on Reply Card

AMCO Engineering 11307
Electronic equipment enclosures; Frugal Frame vertical consoles.
Circle (343) on Reply Card

AMEK Consoles/TAC 19166
Audio consoles, Hendrix, SR6000, TAC Bullett; console automation.
Circle (344) on Reply Card

American Lightwave Systems 17172
Fiber transmission equipment, DV6010 and DV6016 digital video transmission systems.
Circle (345) on Reply Card

AML Inc. 20039
Cellular power amplifiers; multichannel MMDS/ITFS boosters.
Circle (346) on Reply Card

Ampex Corporation 17101
Video recording equipment, editing, switching, effects products; video and audio recording media, accessories; DCT recorders.
Circle (347) on Reply Card

Ampro M1621
Video projection systems.
Circle (348) on Reply Card

Amtel Systems 16642
Editing controllers, E-Trax workstations and E-Pix interface products.
Circle (349) on Reply Card

AMX Corporation 20021
Teleconferencing, multimedia products.
Circle (350) on Reply Card

Anchor/ROH 11601
Multichannel monitoring, audio distribution, custom and standard interconns.
Circle (351) on Reply Card

Andrew Corporation 15674
Transmission equipment; Antennas for UHF, VHF, MMDS, LPTV, HDTV, STL/TSL, earth stations; HELIAX, rigid coaxial lines, circular wave guide; satellite antenna controllers, receivers, accessories; jumper cable assemblies; dryline dehydrators; IEEC connectors; Cold Shrink weatherproofing kits.
Circle (352) on Reply Card

Angenieux Corporation 17615
Video camera lens systems, 20x8.5, 1x6.5 2/3" and 20x7, 15x5 ½" cameras.
Circle (353) on Reply Card

Antenna Concepts 15169
UHF Blaster and Sizzler, FM Tracker antennas; wireless cable products; transmission line connectors.
Circle (354) on Reply Card

Antenna Technology 13644
Range of satellite earth stations and related electronics components; Simulsat multibeam antennas; receivers; LNAs, LNBs, jumpers, cables, connectors; heating systems; switching systems; test equipment; system design, consultation, services; Vanguarde Instruments and PROFline digital audio systems.
Circle (355) on Reply Card

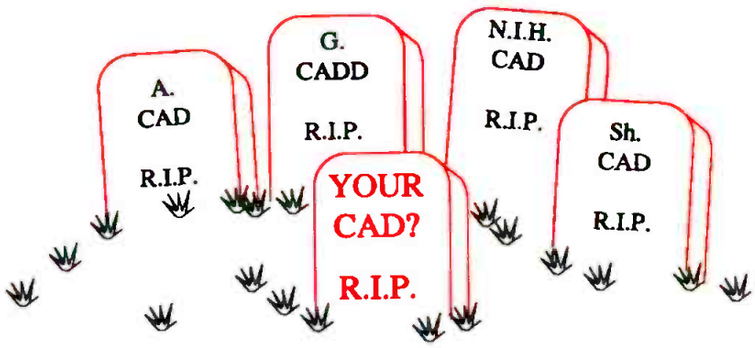
Anthro M 412
Facilities furnishings; 72" wide workstation rack cart with door; 60" wide cart.
Circle (356) on Reply Card

VidCAD

The fastest communications design software in the West!

A challenge rang forth through the West — *"Betcha I'm the fastest and most thorough design software around."* He drew his VidCAD mouse and drew 45 pieces of equipment, 120 cables, 6 jack designation panels and one router, all linked to cable and equipment databases and reports...before the others had a chance. It took them 3 to 5 days, but he only took 35 minutes. As the smoke cleared, our VidCAD hero said,

"I'm 70 times faster than you were"



Call or fax VDP today to find out how you can speed up your design, documentation and maintenance before its too late....

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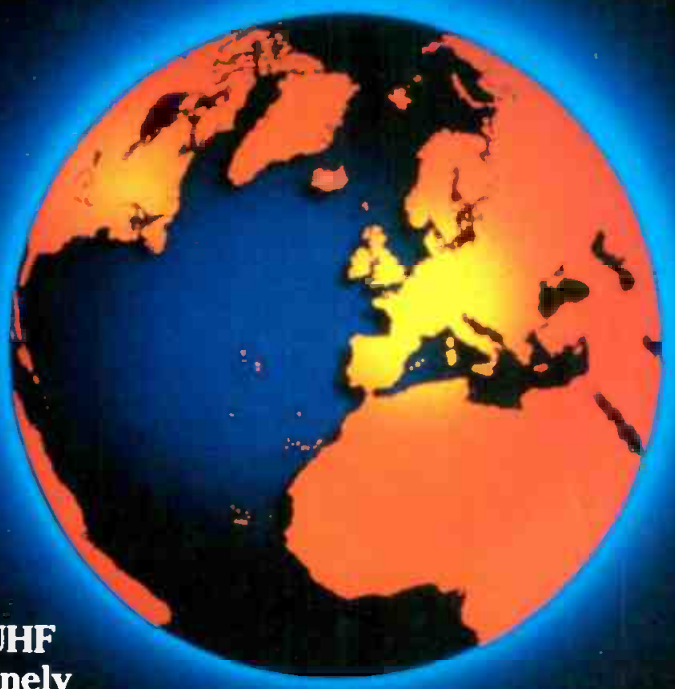
Acrodyne...the best of all worlds.

UHF TV Transmitters

Solid State Technology

The proof is in! Since 1989, Acrodyne has been delivering affordable solid state 1 kW UHF TV transmitters—**no tubes, no tuning, no downtime.**

- Redundant power supplies
- Built-in diagnostics
- Modular construction
- Frequency agile designs



Advanced Tetrode Technology

Our product line includes the world's only single tetrode 30 kW UHF TV transmitter. Acrodyne's advanced systems are demonstrating exceptional field reliability—**the only new UHF transmitter development which meets and routinely exceeds expected tube life at full rated power.**

- Ultra high plant efficiency
- Solid state drivers
- Inherent linearity minimizes precorrection
- Low cost tube replacement
- Parallel systems available

The digital TV transmitter company

ACRODYNE

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FAX: (215) 540-5837

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Anton/Bauer 13123
Battery/charger. lighting products; InterActive Logic series batteries; Satellight portable lighting system.
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Anvil Cases 18820
Transport cases for delicate equipment, A.I.R. isolated rack types.
Circle (358) on Reply Card

Aphex Systems 3924
Audio spectral exciter; Compellor 320, Dominator II dynamics controllers.
Circle (359) on Reply Card

Apogee Electronics 19181
Master digital audio tape; Wyde-EYE digital audio cable; A/D converters; UV1000 CD encoder.
Circle (360) on Reply Card

Apple Computer M1731
Personal computers, peripherals.
Circle (361) on Reply Card

Applied Digital Technology 11162
Information not available
Circle (362) on Reply Card

Arrakis Systems 3912
Audio mixers, Systems 6, 12, 18; studio furniture; Digilink, TrakStar production workstation audio management system.
Circle (363) on Reply Card

Arriflex 17169
Motion picture cameras, Arriflex 535; support products; ARRI geared head; lighting products.
Circle (364) on Reply Card

ART/Applied Research & Technology 1706
Audio processing systems including time delays, digital reverbs, compressors, gates, time/pitch compressors; Phantom mixing consoles; DR8000 digital audio recorder.
Circle (365) on Reply Card

ARTI/Advanced Remote Techn. M1214
Desktop video, multimedia.
Circle (366) on Reply Card

ASACA ShibaSoku 16619
Audio analyzers; audio, video routers; multiformat, digital control, auto setup monitors; closed captioning equipment; decoders, encoders; DAs; envelop delay measuring sets; erasable rewritable MO disk audio files; still stores; dropout counters; GCR, HDTV motion picture memory; digital IF demod; HR color monitors; test signal, sync generators.
Circle (367) on Reply Card

ASC Audio Video Corporation 19573
CASE videotape editing systems, editing utility software; Avid, KRK, Lexicon, Drawmer, 360 Systems/Digi Cart, Focusrite, DK Audio, Aphex.
Circle (368) on Reply Card

ASC Press 16481
Information not available
Circle (369) on Reply Card

ASDG M1221
Information not available
Circle (370) on Reply Card

Associated Production Music 19201
Music, effects libraries, APM Best of the Best package, Broadcast 2 production package.
Circle (371) on Reply Card

Astrodesign/Mira Vision 10153
NTSC/HDTV programmable signal, test generators; HDTV converters, sync generators, still image recorders, frame grabbers, switching equipment; multimedia scan converters.
Circle (372) on Reply Card

AT&T 18558
Telephone, program transmission services.
Circle (373) on Reply Card

ATI Audio Technologies 13603
6-, 8-, 12-channel mixers; mic, line, monitor, turntable, interface, NANOAMP utility amplifiers; audio DAs, studio metering systems; headphone amps; press box distribution systems.
Circle (374) on Reply Card

Audi-Cord 3926
Audio cart recorders/players, DL series and S series.
Circle (375) on Reply Card

Audio Accessories, Inc. 13041
Audio jack panels, jacks; pre-wired audio patch panels; nickel-plated patch cords, cord holders; Polysand; video panels; RS-422 patching; Edac connectors; accessories.
Circle (376) on Reply Card

Audio Action 13449
Production Music Library on CD format.
Circle (377) on Reply Card

Audio Developments 16125
Portable mixers; audio processors AD151, AD152; AD153 audio DAs.
Circle (378) on Reply Card

Audio Precision 3402
Audio system analyzers, System One and Portable One Plus, Portable One, System One Dual Domain; reduced bit-rate coder testing software for digital broadcast systems; ATS-1 Lab Windows and Lab View BPIB software drivers.
Circle (379) on Reply Card

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Design Services...defining the future.

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digital post house North Coast Communications, Syracuse University, and WordPerfect Corporation have selected STI as their facilities consultant.

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• Networks
• Facilities

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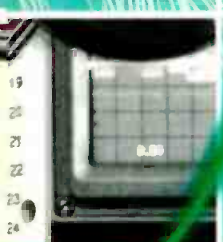
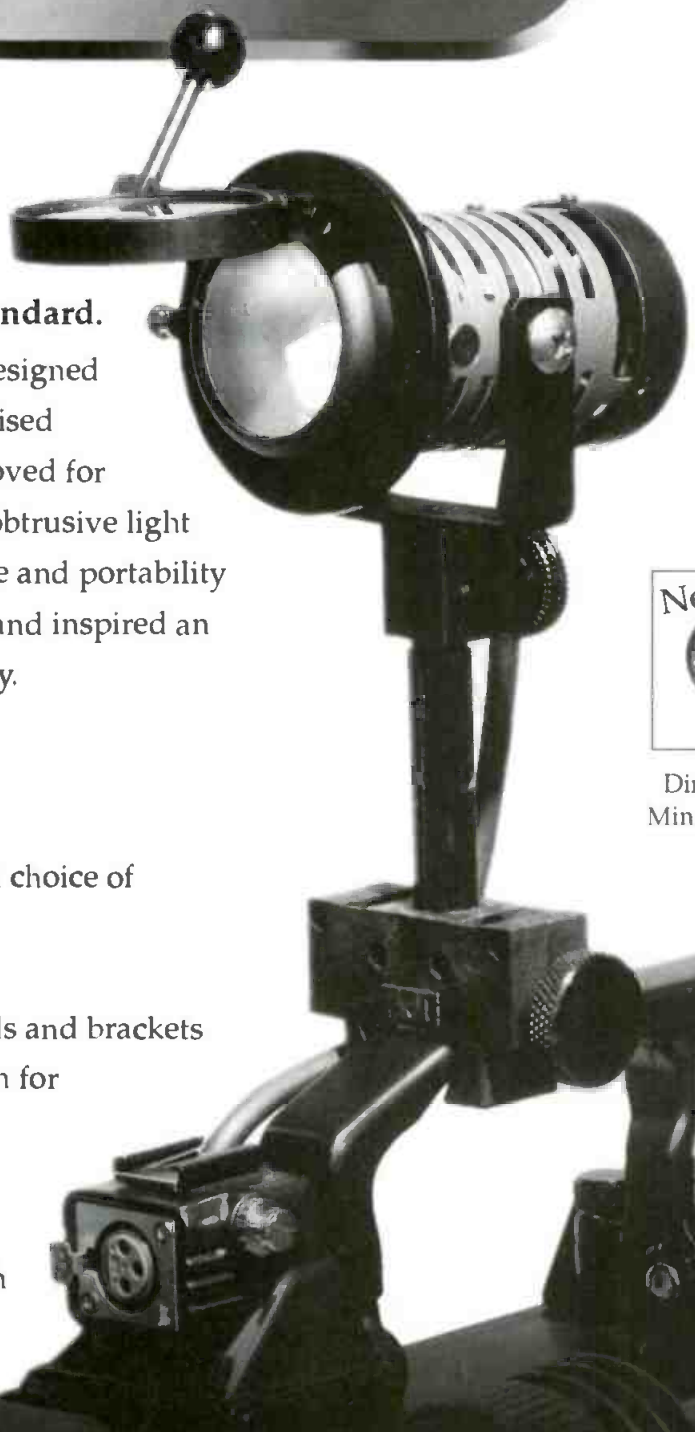


Frezzi® 90's



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- available in a dual light head configuration for maximum light power
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- Professional Mini-Fill kit available in crush proof carrying case (shown below)

Dimmer Controlled Mini-Fill, model MFIC

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Audio Processing Technology Ltd. 4306
Digital audio processing units using data compression, apt-X 100 system.
Circle (380) on Reply Card

Audio Services Corporation 4506
Audio mixers, recorders, microphones, speakers and accessories, Professional Sound MilliMic and ASC wireless boompole; Stellavox Stelladat and Fostex PD2 DAT recorders; Microtec-Gefell microphones.
Circle (381) on Reply Card

Audio Technica US 12506
Microphone products for all applications; mic accessories; SmartMixer mic mixer; AT4050/CM5 large diaphragm condenser mic; multimedia speaker systems.
Circle (382) on Reply Card

Audiomation Systems/Sellmark 5126
Information not available
Circle (383) on Reply Card

Audion Laboratories 1402
VoxPro digital sound workstation.
Circle (1168) on Reply Card

audiopak 4018
Cartridge media; broadcast A-2, AA-3 and AA-4 cartridges.
Circle (384) on Reply Card

Auditronics 2302
Audio mixing systems, 210 series radio on-air, 900 series TV news/production consoles; 1900 series IFB/Mix-Minus system; Destiny 2000 program management systems with control console, control software and 200MB computer.
Circle (385) on Reply Card

Augan Instruments
Digital audio workstations.
Circle (386) on Reply Card

Aurora Systems (See Pesa Chyron) 19401
Electronic graphics products; AU/240 and AU/250GT systems.
Circle (387) on Reply Card

Autodesk M 901
Graphics software, 3-D Studio Release 3 animation tool.
Circle (388) on Reply Card

Autogram 4520
Audio mixers for radio broadcast, production, Pacemaker series; Mini-Mix audio consoles.
Circle (389) on Reply Card

AVCOM of VA 11607
Portable spectrum analyzers (PSA-65A, -37D, -35A); network/spectrum analyzers; spectrum display monitors; SCPC/video/SCS satellite and portable receivers; microwave video links; microwave accessories; broadband noise generators.
Circle (390) on Reply Card

AVID Technology (M1301) 17111
Digital non-linear editing systems, Media Composer series, NewsCutter/Airplay broadcast news, Media Suite desktop editing; Video Shop, Avid Net, Media Server networking solutions, storage; AudioVision audio workstation; integrated film, video and audio production, post-production and broadcast news production environments; multiple production product lines; programming product lines; direct-to-air transmission systems.
Circle (392) on Reply Card

Avitel Electronics 19478
DSC 1100 signal corrector; under monitor displays; serial digital terminal equipment with DAs, D/As, serializers, deserializers.
Circle (393) on Reply Card

AVP Manufacturing 18780
Audio, video, digital jackfields; cable, patchcords; single, multipair cables.
Circle (394) on Reply Card

AVS Broadcast
Standards conversion products, including Cyrus Prime and EOS; Film Noire video processor; Integra digital vision mixer with 3D effects, routng; TK 3:2 frame integral transfer equipment; DVA 10 digital video analyzer; DX 120/DX210 digital video encoders.
Circle (395) on Reply Card

Aydin Corporation-HPA/Magnetics 200
Amps for satellite communications uplink applications; TWT, klystron power amps for S-, C-, X-, Ku- bands; Magnetic assemblies for broadcast applications; turnkey TV transmitter upgrade service.
Circle (396) on Reply Card

B

B&B Systems 12147
Audio measurement, monitoring products, Phasemonitor and Imagescope.
Circle (397) on Reply Card

B&H Photo 13428
Video, audio and multimedia equipment dealer.
Circle (398) on Reply Card

BAF Communication 15174
Satellite news, ENG, EFP, radio remote vehicles; turnkey earth stations; systems engineering, integration; IFB management systems; Dual-Path RF SNV switching systems; mast-mounted CCD color camera.
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- NTSC in / out
- Non volatile cmos memory

824P IMAGE INSERTER
- Same as 824 /PAL version, pixel resolution 720 x 512

808 IMAGE INSERTER
- Self contained unit, one rack unit high.
- Image size, corner screen to full frame
- 24 bit color (paletted)
- Built in linear keyer, 256 step
- 256 colors on screen at any one time, from a palette of over 16 million colors
- Resolution 720 x 480
- Auto fade in / out
- NTSC in / out
- Non volatile cmos memory

808P IMAGE INSERTER
- Same as 808 /PAL version, pixel resolution 720 x 512

908 MULTI IMAGE INSERTER
- Self contained unit 1 rack unit high
- Floppy drive 3.5" 1.44mb high density
- Full RS232 communications port
- Programmable input port
- Mouse controlled/menu driven
- Image size corner screen to full frame

908P MULTI IMAGE INSERTER
- Same as 908 /PAL version pixel resolution 720 x 512

950 MULTI IMAGE/ VBI DECODER

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- Enables remote control and insertion of logo,s at affiliate stations

9000 IMAGE MANIPULATOR
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- Mouse/keyboard controlled, menu driven
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- 24 bit color (paletted)
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BAL Components 19113
Serial, digital DigiStream 3 interfaces; NanoDelay HDTV delays; Synchrotime synchronizer; comb filters; utility video switchers.
Circle (400) on Reply Card

Balboa Capital 10557
Information not available
Circle (401) on Reply Card

Balcar/TEKNO 17978
U.S. distributor for Balcar (France) lighting products, Fluxlite.
Circle (402) on Reply Card

Band Pro Film/Video 16646
Remote control for camera support equipment, camera lenses; dollies, pan/tilt heads; miniature special purpose cameras; film, video production equipment.
Circle (403) on Reply Card

BARCO Industries 12429
Video monitors, CVM series; video projectors, HDM series; BVRS, BARS signal routers; CATV headend equipment, FSM860 headend monitor/supervisor system; Reference Calibrator 120T/121FS monitors.
Circle (404) on Reply Card

Barco-EMT 12429
Digital cartridge recorders, players EMT-460, -461; EMT-710 audio router.
Circle (405) on Reply Card

BASYS 19247
Complete newsroom automation systems, NetStation PC workstations, machine control and archiving.
Circle (406) on Reply Card

BCS Broadcast Store 17112
Broadcast equipment sales, brokerage.
Circle (407) on Reply Card

BE Radio magazine (M706) 10359

Beaveronics 13611
Studio clock, timing systems.
Circle (408) on Reply Card

Bec Technologies 1502
Information not available
Circle (409) on Reply Card

Beck Associates 18170
Custom configurations of modular console components; TBC remote controls; stereo audio monitors; stereo audio VU/phase meters.
Circle (410) on Reply Card

Belar Electronics Lab 2508
Modulation monitoring products for radio, TV; FMMA-1 The Wizard digital FM analyzer; RFA-4 agile FM RF amp with memory presets; digital FM stereo monitor/analyzer.
Circle (411) on Reply Card

Belden/Cooper Industries 16069
Complete range of wire, cable products, 1505A precision video cable, 1508A-1519A Belden series 24-gauge multipair snake cables.
Circle (412) on Reply Card

Bencher 19111
Graphics camera support products, Copymate II, M2, VP200 and VP300 copy stands.
Circle (413) on Reply Card

Benchmark Media Systems 11059
Audio signal control and distribution products, MIA-4 pre-amps, LoudMouth reporter control station, Junior Audio Director Plus monitoring module, AudioWorld Interface and MDA-102PA microphone preamp.
Circle (414) on Reply Card

BEXT 2414
FM transmitters, amplifiers, exciters, PTX 30, LC FM composite receiver.
Circle (415) on Reply Card

beyerdynamic 11315
Wireless equipment, microphones, headsets; S170H handheld and S170P pocket microphones and NE170 diversity receivers; DT 150 monitoring headphones; DT 190 sportscaster headset/microphone combo.
Circle (416) on Reply Card

BGW Systems 19560
Audio power and distribution amplifiers; rack-mount computers; accessory rack-mount products; subwoofers; bi-amplified personal monitors.
Circle (417) on Reply Card

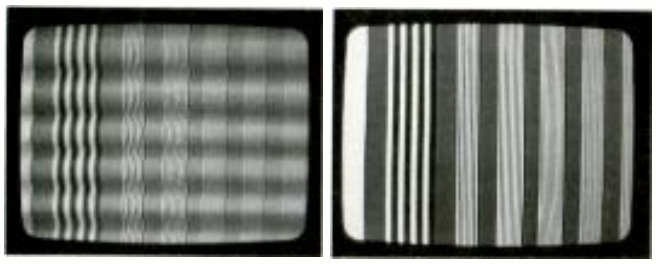
Bogen Photo 16666
Line of camera support products, Mini-Pro tripods; Top Video suspension systems; Top Lift self-climbing hoists; lighting filters; Bo-Flex collapsable reflectors; Gitzo tripods and heads.
Circle (418) on Reply Card

Bonneville Broadcasting 1424
See Broadcast Programming
Circle (419) on Reply Card

Bradley Broadcast Sales 4002
Distributor; Telos telephone systems; Unity audio processors; audio signal bandwidth filters.
Circle (420) on Reply Card

Brek Conner Group 18454
Production titling systems.
Circle (421) on Reply Card

Bretford Manufacturing 16469
Equipment mounting products, wall-, ceiling mounts; BBPN48-E8 wide-body A/V table, VRC70E TV/VCR security center.
Circle (422) on Reply Card



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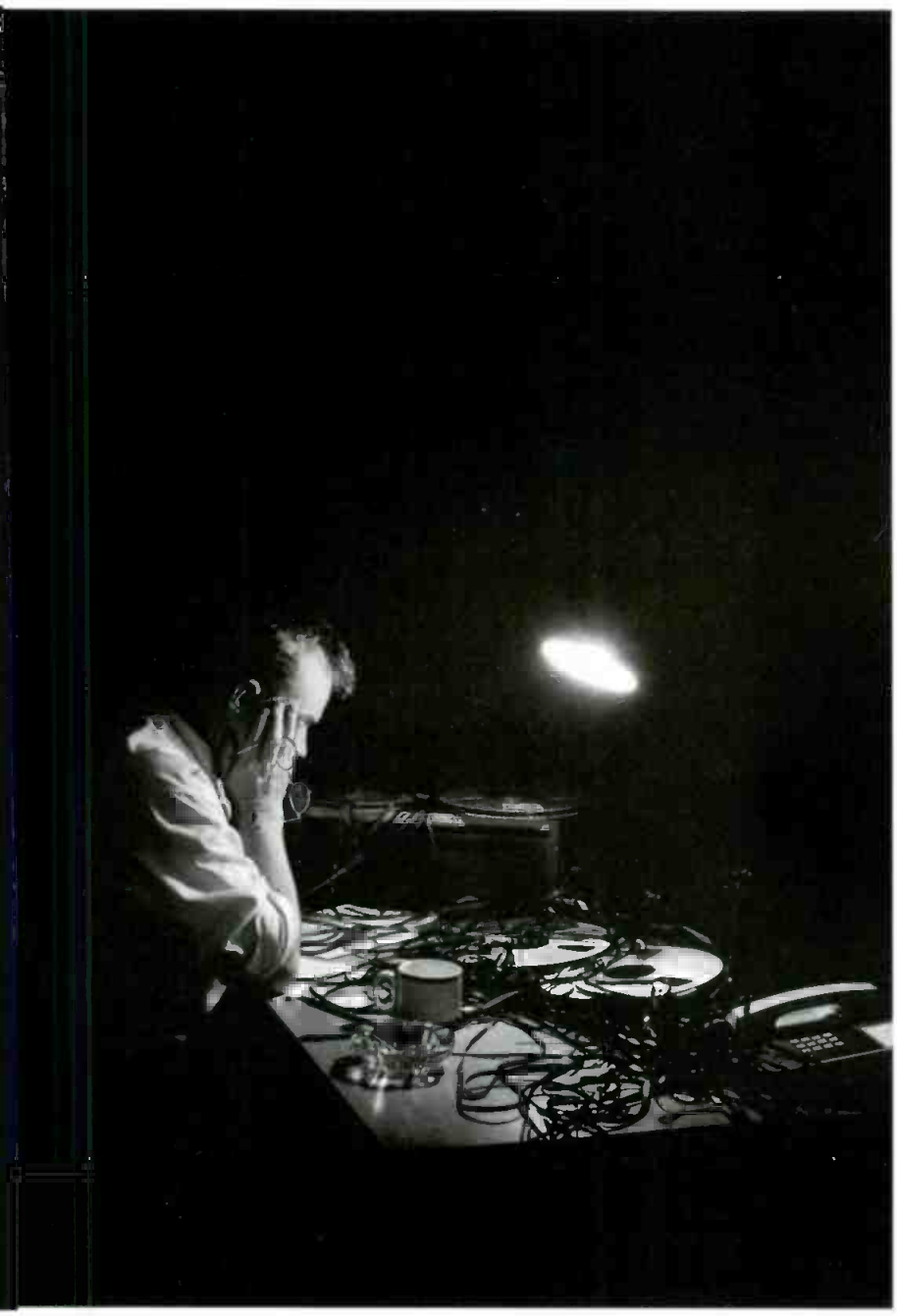

So, there he was, this *client*, for want of a better word, telling me, in no uncertain terms we needed a piece long ago consigned to the bin. I could see myself burning the midnight oil again, desperately trying to find this 3 second out-take from the 2000 feet on the cutting room floor.

And what about the night before! I'd mixed down a couple of nifty, if a little time-consuming crossfades, then realised I had a problem - all the edits from earlier that evening also needed crossfades to cover the gaps. Oh well, Sleep's overrated anyway! It's just something else to do in bed!

I should've listened to Jim! I'd just replaced my ageing tape deck with a gleaming new machine when he said, "*You could get a complete SADiE™ system for less than that - real-time crossfades, non-destructive editing and so fast to use, it's incredible!*"

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Broadcast Electronic Services 17375
Video signal distribution, format conversion products, GPI Network 4104x router; Betabox interformat editing unit.
Circle (423) on Reply Card

Broadcast Electronics 3424
FM broadcast transmitters; digital audio storage equipment, AV-90 AudioVAULT; cartridge recorders; audio mixers.
Circle (424) on Reply Card

Broadcast Engineering mag. (M706) 10359

Broadcast Int'l Group 17582
Information not available
Circle (425) on Reply Card

Broadcast Marketing Int'l Ltd 19328
Kobold production and ENG HMI lighting products; Noriyuki time code devices, including Scriptboy wireless TC reader.
Circle (426) on Reply Card

Broadcast Microwave Services 12301
Microwave radio equipment, BMA-3000 Autotrac King antenna pedestals, TBT-50A frequency agile portable transmitters.
Circle (427) on Reply Card

Broadcast Programming 1424
24-hour program formats, including Country, Adult Contemporary Christian, Classic EZ and Easy Mix.
Circle (428) on Reply Card

Broadcast Software Ltd./BSL 12862
Transmission system management software products.
Circle (429) on Reply Card

Broadcast Supply Worldwide/BSW 4820
Distributor, approximately 200 lines of professional audio, RF/radio products; digital audio workstations.
Circle (430) on Reply Card

Broadcast Video Systems/BVS 16736
Signal distribution and video processing products, D100-NTSC comb filter decoder and MASTERKEY downstream keyer; MASTERKEY 5 component linear keyers; VBI 232 encoder/decoder; VM+4 summing switcher.
Circle (431) on Reply Card

Broadcasters General Store 2506
Distributor of audio products for radio, Telos Systems digital hybrids and Frank Foti Unity 2000; also distribute DNF ST-200 VTR controllers, Roland DM-80 hard disk recorders, Auditronics consoles/mixers and Fidelipac digital cart recorders.
Circle (432) on Reply Card

Bryston 1609
Audio monitor amplifier, Model 7B-PRO.
Circle (433) on Reply Card

BTS Broadcast Television Systems 18023
Video cameras, LDK 10 DPM dynamic pixel management series with 4x3-16x9 switchable aspect ratio; LDK9 wide screen update; HDTV cameras; Series 3000/300 control panels; expanded control panels for Venus routers; Saturn master control switchers with mix and match of digital and analog sources; DCR 6000 gigabit recorders; Video Gallery graphics system; FLH 1000 HDTV telecine.
Circle (434) on Reply Card

Burk Technology 4818
Remote control systems, AutoPilot multisite units.
Circle (435) on Reply Card

BURLE INDUSTRIES 11962
Power devices for RF transmission; camera tubes.
Circle (436) on Reply Card

Burst Electronics 16471
Micro character generator, audio mixer/switcher for Video Toaster; Video DAs.
Circle (437) on Reply Card

C

Cablewave Systems/RF Systems 15753
Antenna products, Bogner wideband and MMDS, ITFS, FM, STL antennas; high power FlexWell transmission line; Cablewave broadcast antenna pattern computing software.
Circle (438) on Reply Card

Calaway Editing 18032
On-line, off-line editing controllers.
Circle (439) on Reply Card

California Amplifier 10860
Information not available
Circle (440) on Reply Card

Calzone Case 16124
Equipment transport products, Titan, Ultime series.
Circle (441) on Reply Card

Canare Cable/Cables & Connectors 11118
Signal distribution patchbays, 242U-VJ22W-C for video; tools, wire, connectors, BCP-C4B 75Ω BNC crimp plugs; audio transformers; BCJ-XJ-A10TR; L-5CFB 75Ω coaxial cable.
Circle (442) on Reply Card

Canon USA/Broadcast Optics 15738
Broadcast lenses including J14ax17B KRS V with vari-angle prism optical stabilization system; standard and Internal focus lens systems; LX-200 HI8 prosumer camera; laser transmission systems.
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Capitol Production Music 12905
Music libraries, including Archives IIne.
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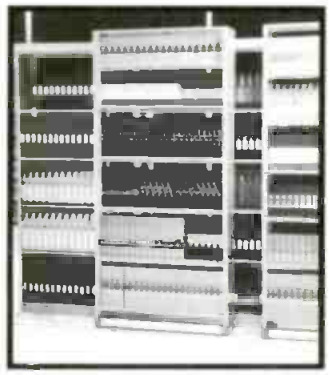

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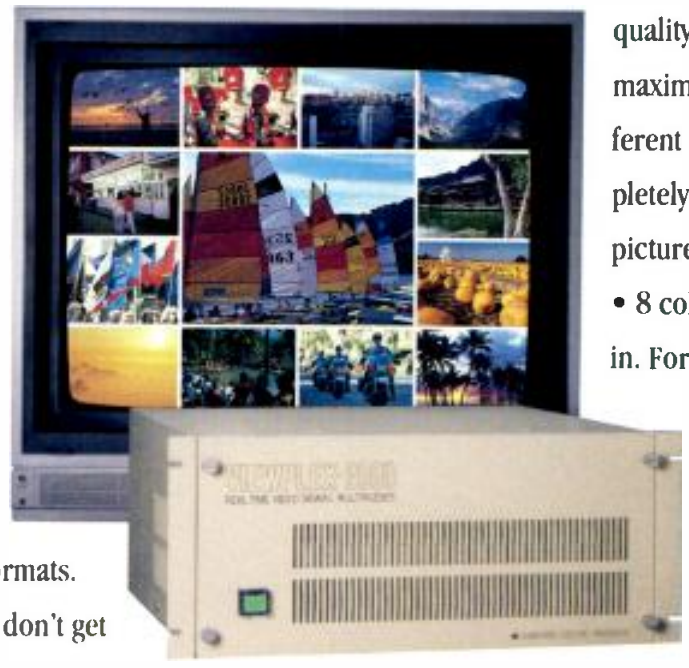
The VIEWPLEX-2000 is the ultimate video signal multiplexer. It will display up to 16 different channels on one screen with excellent clarity, making applications virtually unlimited.



VIEWPLEX-2000 is ideal for monitoring in a closed circuit set-up, broadcasting multiple images in a collage, or broadcasting sequential images for instructional formats.

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Video libraries.
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CCA Electronics 4220
Solid-state FM transmitters; high performance FM exciters; AM and SW transmitters to 50kW; FM transmitters to 45kW.
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Digital fiber optic transmission systems for broadcast video, program audio and data, permitting up to 32 channels per fiber; RS-250C short-haul performance redundancy, A/B switching and other options.
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CEL (See Snell & Wilcox) 19746
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Centaur Development M1403
Desktop, video and animation products.
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Central Tower 1906
Towers, monopoles for broadcast applications; structural engineering analysis; construction services, antenna, line installation; turnkey projects; self-supporting towers.
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Century Precision Optics 19764
Wide-angle optical adapters, slide-to-video transfer equipment.
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Chapman/Leonard Studio Eqpt. 13833
Lighting, camera support products.
Circle (454) on Reply Card

Chimera 17584
Lighting products, Chimera Quartz, Daylite Cine Banks.
Circle (455) on Reply Card

Christie Electric 11709
Battery chargers/analyzers, CASP/1200, CASP/2000 systems.
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Chromatek Inc. 12462
Signal, scan conversion equipment.
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Chyron (See Pesa Chyron) (M1114) 19401
Character generators, production titlers, graphics products.
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Cine 60 19117
Lighting products, batteries, chargers.
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Cinekinetic 19128
Utility camera support products for ENG, outdoor production.
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Cinema Products 11633
Camera support products, SteadiCam video SK; camera control systems.
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Cinemills 16658
Lighting products and systems; studio furnishings.
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Circuit Research Labs 3015
Audio processing equipment, Audio Signature 4-band stereo. MBL-100 news/talk AM processing systems; FM generators; event sequencing systems.
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Clark & Associates 1715
Digital audio products, including multichannel, hard-disk recorders; audio delays; automation products for radio, TV, cable; SMPTE TC PC cards; video titling, multichannel switcher status displays.
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Clark Wire & Cable 19537
Series 1300 audio snakes; Hannay cable reels; bulk audio, video cable, connectors; remote composite cables, patchbays, reminated reels; custom assemblies, harnesses.
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Clear-Com Intercoms 18015
PL-Pro 2-channel, single rack-space speaker station with IFB; TEL-1000 auto answer auto null telephone-to-intercom interface; Paragon single-rack, shielded, amplified stereo monitor speaker; ICS-2102 24-button Matrix Plus II station; 26x26 Mini Matrix.
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Clipper Products 13147
Utility, equipment carts; Cosmos carry-on storage mobile organizer system.
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Coaxial Dynamics 5116
RF wattmeters, RF loads.
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Cole Wire & Cable 10759
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Color Computer Systems M1627
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ColorGraphics Systems 18032
Videographics workstations, DP/MAX.
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Colortran 17659
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Broadcast automation products.
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Comark Communications/Thomcast 16113
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Communication Specialties M1711
Computer-to-video scan converters; VGA, S-video, video DAs.
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Communications Data Services 4019
RFCAD; International terrain data; Fryers Site Guide/CDS on-line services; North American Terrain Data (U.S., Mexico, Canada).
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Comprehensive Video Supply 16346
Video amplifiers, multimedia monitor cables, desktop video production accessories; PC-/Mac-based Edit Master; Walter Brewer lighting systems integrations services.
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Compression Labs 16682
Video signal compression systems.
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Comprompter 19164
Electronic newsroom software ENR V2.4, AutoWire and VoteMaster.
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Computer Assisted Technologies 13612
BCAM 4.0 maintenance management software; CAT/SV service center management software; CATest 2.0 VTR, switcher and router interfaces.
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Computer Concepts 3908
Radio automation products, DCS digital commercial system, Audio Switcher.
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Computer Engineering Associates 12259
Computerized newsroom equipment, the CEA Newsroom System on a PC network with Windows.
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Computer Graphics World M 202
Trade publications.
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Computer Prompting & Capt Co. 16943
Video prompters, CPC-2000 SmartPrompter+, CPC-500 closed-/open-captioning system; CPC-1000D flat-screen display; CPC-700 CaptionMaker Plus closed-captioning software.
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Comrex 12206
Audio Frequency Extenders for remote audio pickups with integrated mixing; DX-100/DX-200 Digital Audio codecs; telephone couplers and hybrids; wireless IFB system for van-to-field cueing; TV aural monitors.
Circle (489) on Reply Card

COMSAT 13051
Satellite communications products. International satellite program distribution systems.
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ComStream Corporation 4000
Satellite reception electronics, ABR200 digital audio receiver and integrated digital audio network; ABR200 desktop broadcast receiver; Remote Performance monitors; broadcast-quality video transmission systems.
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Comtech Antenna Systems 13402
Satellite communications products, 5M motorized antenna system, EC6, offsat transmit satellite antenna.
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ComTek 11114
Wireless microphone equipment, MRC-82 Camera Companion receiver; IFB-72 cueing and talent feedback system; BST-25 base station transmitters and PR-25 personal receivers.
Circle (495) on Reply Card

COMWAVE/Communications Microwave 11329
20W transmitter model SB020B; 10W transmitter model SB010B.
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Concept W Systems 16253
Single-coax, field adaptable CAMPLEX multiplexer systems for bidirectional A/V signal and CCU data signals, power; for ENG, EFP, SNG remote camera productions; NTSC, PAL, SECAM standards.
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Conifer Corporation 11301
Antennas, block downconverters, low noise preamplifiers; frequency conversion formats; reception products for wireless cable, MMDS and ITFS.
Circle (498) on Reply Card

Connectronics 13628
Connector products, One Piece series adaptors.
Circle (499) on Reply Card

Continental Electronics 3418
Complete line of AM, shortwave and FM radio transmitters and associated equipment.
Circle (500) on Reply Card

Control Concepts/Leibert 16336
Power protection/conditioning equipment, the Isolatron, Isolatrol active tracking filters; complete protection for low- to high-power transmitter requirements as well as computers and automation systems.
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Corporate Computer Systems 4826
CCS Audio Products: audio transmission codecs, Micro 56+ 7.5kHz and Micro 66i 7.5kHz dual rate units; CDQ1000/CDQ2001 audio codec; CDQ2000 stereo MUSICAM codec; PACE digital audio editing workstations.
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Cortana Corporation 3704
Lightning, static protection products, Stati-Cat, Stati-Kitty and Stati-TomCat systems.
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COSA/Company of Science & Art M1235
CoSA After Effects 2.0, special effects software.
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Countryman Associates 12202
Microphone products, the EMW series.
Circle (505) on Reply Card

Creative Logic M1124
Information not available
Circle (506) on Reply Card

Crouse-Kimzey Company 1708
Audio distributor; Otari Prodisk 464 digital workstation; Denon DN970FA CD player.
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Crown International 4400
CM-312 head-worn mic; full line of microphones, amplifier products.
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Crystal Graphics M1609
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CSI Camera Support International 20139
Camera support, dollies, tripods, pan/tilt heads.
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CTE International 3000
FM broadcast transmitter products, exciters, power amplifiers.
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Cue Tech Teleprompting 12762
Prompting systems.
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Cycle Sat 12447
Program distribution services, transmission security equipment, Cyclecypher.
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D

Dalet Digital Media System 3803
Digital audio workstations.
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Dan Dugan Sound Design 17147
Automated mixer controls.
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Daniels Publishing Group 12909
Publications listing broadcast equipment technical data, applications information; equipment buyers guide.
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Data Center Management 20055
Supplier of newsroom automation systems.
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Bulk tape degaussers, including MP-14, TC-14 and Type II-A.
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Multimedia, desktop video products, including Media 100/V2.0, FX option and CG option.
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Datatek 13814
Signal routing, distribution equipment; D-2800 series routers, increased density with surface mount techniques; all signal formats - analog audio, video; digital audio, video; time code, data.
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Dataworld 1918
Broadcast industry database; reports, research services; customized marketing maps and maps for the broadcast industry, including international.
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daVinci 18032
Color correction processors for video, telecine Renaissance Hi-Res Kilovectors.
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Dawn Satellite Inc. 17779
3.1 and 5.0 meter motorized satellite downlinks; digital-ready LNB amplifiers; Coversat ice and snow prevention covers; distributors of commercial satellite communications products.
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DB Elettronica 4600
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Dedotec USA 17148
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Delta Electronics 2224
Broadcast transmission monitoring products, SM-1 splatter monitor, OIB-3 operating impedance bridge.
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DENON 4303
CD cart recorders, cassette decks; CD cart players.
Circle (528) on Reply Card

DeSisti Lighting/DESMAR 15681
Lighting products.
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Desktop Video World M 518
Publication.
Circle (530) on Reply Card

DeWolfe Music Library 13620
Production music libraries.
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DGS Pro Audio (Gotham Ltd.) 5214
Audio products.
Circle (532) on Reply Card

DH Satellite 13609
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Circle (533) on Reply Card

DI-Tech 13103
Model 5886 analog video and D1/D2 digital router with matrices to 64x64; digital inputs equalized, outputs reclocked.
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Diaquest M 801
Computer animation controllers.
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DIC Digital 19183
Magnetic recording media, MQ digital audio tape, Microfinity 8mm videotape, 4mm width data-grade cartridge tape, rewritable magneto-optical disks; HQ series professional DAT cassettes.
Circle (536) on Reply Card

Dielectric Communications 15719
digiTLine broadband, digital transmission line; TUP NTSC standby antenna systems, HDTV ready; transmission line accessories.
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Digidesign 1002
Digital audio recording systems.
Circle (538) on Reply Card

Digimusic 2703
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Circle (539) on Reply Card

Digital Arts Film/TV Pty M 109
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Circle (540) on Reply Card

Digital Micronics M1421
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Circle (541) on Reply Card

Digital Processing Systems 11930
Time base correction, synchronizer products, video format converters; sync, test generators; video monitoring systems; DR-2100 personal animation recorders for PC; universal remote controls.
Circle (542) on Reply Card

Digital Vision 17143
Digital video processing products, DVNR 1000 noise, film grain reducer, DVCC 1000 YRGB 4:4:4:4 color corrector; TelevEyes pro scan converter.
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Disc Manufacturing Inc. M 209
Information not available
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Discreet Logic Inc. 18563
High-resolution, high-speed on-line software systems for film, HDTV, video; INFERNO, FLAME and FLINT software systems for special visual effects.
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Display Devices 16472
Large screen projector support systems, Datalift series.
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DNF Industries 16375
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Dolby Labs 1620
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Dorrough Electronics 18815
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Doty Moore Services 19180
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Doug Vernier Broadcast Tech. 5152
Broadcast consultants.
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DSI Communications 18817
Engineering, construction firm; specialization in video, RF system design, construction, maintenance.
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Dubner International M1121
Videotape logging systems software; SCENE STEALER automatic scene detector for Windows with STORYBOARDER software.
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DVS Digital Video Systems 10354
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Dwight Cavendish 16072
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DYNAIR Electronics 13806
Signal routing, distribution and control products, including System 2000, Series 36 and Digital X; fiber optic video, audio and data transmission systems; interactive graphics/video walls; Genesis modular line of digital interfacing and conversion equipment.
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Dynatech Corporation 18032
See: Alpha Image; ALTA Group; Calaway Editing; ColorGraphics Systems; daVinci; Dynatech NewStar; Quanta; Utah Scientific: technology companies developing, manufacturing, supporting digital and analog products for broadcast, production and post-production businesses; Digistore D^2S^2.
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EarthWatch Communications 19485
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Echolab 13424
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Econco Broadcast Service 2208
Rebuilt power transmitting tubes, klystrons.
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Editing Technologies Corporation 15466
Video editing products, Ensemble editors.
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EDX Engineering 1327
Engineering software, SHOWMAP V4.10 for coverage based on terrain data, RPATH V6.10 for microwave and STL path analysis.
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EEG Enterprises 16324
VBI data products, VDR-2 data receiver, TVCD100 line-21 encoder.
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EEV 16663
UHF TV power products; high efficiency IOT7340R air-cooled and IOT7360 water-cooled Inductive output tubes; KSC3371 70kW ESC klystrons.
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Camera support products, Skymote; Dinky dolly; accessories, grip kits; Kaleidoscope Hot Head II; Piccolo, VIP, Sky-King cranes.
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Elantec Inc. 19463
High-performance analog and mixed signal standard and application-specific integrated circuits for applications ranging from high-end broadcast equipment to consumer electronics.
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Electric Image 19485
Graphics software; ElectricImage animation system, version 2.0.
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Electro-Voice 15716
Microphone products, including RE27N/D, TE36N/D dynamic cardioids; S-40 compact monitor system.
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Electrohome M1429
Video projection systems.
Circle (572) on Reply Card

Electronics Diversified Inc 20083
Lighting control systems, dimmers.
Circle (573) on Reply Card

Electronics Research 3212
FM transmission antennas, Panel types and Super High Power side-mount systems.
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Electrorack Products 18943
Equipment rack systems.
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Electrosonic Systems 15685
Video display systems, Procube II, PICBLOC 3; ImageMAG controller for single-source videowalls; PICBLOC videowall control system.
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Elenos 1024
Radio transmission equipment.
Circle (577) on Reply Card

EMC/Dynatech Video Group 18032
Non-linear video editing equipment, digital Primetime Editor editing controller.
Circle (578) on Reply Card

EMCEE Broadcast Products 16033
Transmitter systems for MMDS, VHF, UHF, wireless cable; field engineering, systems engineering, shadow mapping, site surveys; transmission system components; installation packages.
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EMCOR Products/Crenlo 12833
Electronic equipment cabinetry, ESQ and 10 series modular enclosure lines.
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ENCO Systems 5121
Hard disk audio storage systems.
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Energetic Music 3921
Music Libraries.
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Energy-Onix 5408
AM and FM transmitter products, MK series 1-tube FM systems, conventional plate-modulated AM models, SSA/SST series low-power FM, Legend series medium-power FM.
Circle (583) on Reply Card

ENG Mobile Systems 19143
Products for remote production, Camera transport cradle and NITEK NiCad battery maintenance products.
Circle (584) on Reply Card

Engineering Animation M 907
Information not available
Circle (585) on Reply Card

Ensemble Designs 13101
Video production equipment, serial/digital systems products.
Circle (586) on Reply Card

Enterprise Systems 12562
Broadcasting business systems.
Circle (587) on Reply Card

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Entertainment Digital Network 1026
High-fidelity digital audio interconnection services.
Circle (588) on Reply Card

Entertainment Technology Inc. 16373
Information not available
Circle (589) on Reply Card

Equipment Broker (The) 16385
Broadcast, production equipment brokers.
Circle (590) on Reply Card

ERGO 90/Ergo Industries 20014
Equipment rack, mounting utilities.
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ESE 12808
Time-code products, ES-488 SMPTE generator, reader, inserter; ES-247 quad 1x6 video DAs; signal generators; master clock systems; ES-185 GPS master clock/time code generator; ES-2940 dual 1x4 audio/video DAs and 5-output blackburst generators; ES-195 GVG Master 21 interface/calendar; LUX line products.
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ETC-Electronic Theatre Controls 15743
Lighting control products, response series dimmers, microVision^FX control, effects consoles.
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Euphonix 5418
Digitally controlled audio mixing systems, CSII console with SnapShot Recall and Total Automation control.
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Eventide 4809
Time modification systems, Ultra-Hamonizer effects processors; broadcast audio and video delay systems, the BD941/942/980 and BD1000/1002; VR240 digital logger.
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Evertz Microsystems 18276
Time-code equipment, 4015 film footage encoders; 7100 transport emulator; EV-35 Keykode readers; Key-Log telecine data logging software; digital video keyers/converters; digital audio decoder/delay processors; digital audio encoders.
Circle (596) on Reply Card

Extron Electronics M 319
Matrix 200 series switcher, router; Andora scan doubler; CD 400 digital quad decoder.
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F

Fairlight ESP 18076
Digital audio workstations.
Circle (598) on Reply Card

Faraday Technology Ltd. 19123
Remote-operated, rack-mounted cable clones for testing the integrity of serial digital datastreams.
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Faroudja Laboratories 13101
Video signal processing products, CTE-SN/CFD-SN encoder/decoder, detail enhancers, CTC-2 component transcoders; multi-standard, PAL/NTSC line doublers.
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FAST Electronics 19766
Multimedia, DTV products; Video Machine desktop studio; digital players/recorders; YUV option; VM video production switcher for Macintosh.
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Fast Forward Video 11949
Time-code products, P2 portable generator, F30 generator.
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Fiber optic transmission systems with diagnostic indicators; AM RGB video to 35MHz; FM video, stereo audio; FM stereo audio; AM video/stereo audio; single- and multi-mode versions; bidirectional dual-fiber systems; digital processing.
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Fidelipac 1920
Air Marshal hard-drive digital audio system for cart replacement or total automation; DYNAMAX MX, MXE series mixers; Dynamax series DCR1000 digital cartridge machines.
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FirstCom 13625
Production music libraries and assistance products, CD format; Online music service; MusiQuick search software.
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Flash Technology 1618
Tower lighting products, beacons.
Circle (606) on Reply Card

Flight Data Center 20186
MS-DOS software to retrieve weather radar maps via modem; HR 2D or 3D maps for Doppler NEXRAD and RRWDS sites.
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FloriCal Systems 12829
SpotLinker produces station breaks from announcement inventory stored in Sony Flexicart; NewsRepeater monitors and records live news, then repeats newscasts until next live news; ShowTimer, AirBoss on-air TV automation; TV tape delay automation; robotic cart machine controller.
Circle (608) on Reply Card

FM Systems 19528
Audio level controllers; digital video sync meters; ATIS Eater ID signal filter.
Circle (609) on Reply Card

Focal Press 13404
Professional, educational and reference ma-

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terial for broadcast and other electronic media; backlist of more than 150 books,.
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Folsom Research M1120
Information not available
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FOR-A 18013
Audio mixers, disk recorders; video products, HMC-1010 capture system, PVM525 production mixer; TBCs, synchronizers, effects systems, still stores, display and projection products; scan converters; edit controllers; universal digital processors; PC-based editing systems; switchers; DVEs.
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Forecast Installations 11562
Consoles, cabinets, including Image Master edit consoles; custom designs for video production facilities.
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Fostex 19185
Audio recorders, analog, R-DAT, multitrack; audio mixing systems.
Circle (614) on Reply Card

Fresh/The Music Library 2000
Production music libraries.
Circle (615) on Reply Card

Frezzolini Electronics 13422
Frezzi Mini-Fill light ; AR124, AR304 autoranging computer-controlled chargers for all batteries; MA1 diagnostic all-battery type charger, discharge analyzer.
Circle (616) on Reply Card

Fujinon 16958
Lens products for ENG, studio, field and HDTV; micro-computer controlled studio lenses.
Circle (617) on Reply Card

Full Sail Center for Recording Arts 18885
Education in film, video, audio production; 1", ¾" and Beta SP formats.
Circle (618) on Reply Card

Future Network Inc. 11130
Information not available
Circle (619) on Reply Card

G

Garner Industries 13622
Complete line of tape degaussers to erase 1" reels, S-VHS, MII, Betacam SP, U-matic SP, D-1, D-2, D-3, 8mm and NSA Type I/II media.
Circle (620) on Reply Card

GE American Communications 16601
Total program delivery services for broadcasters via satellite; digital audio, SCPC network programming, SCPC data, broadcast TV, syndication, SNG, international/occasional TV, business video.
Circle (621) on Reply Card

GE Lighting 11708
Information not available
Circle (622) on Reply Card

GE PDPO M 518
Information not available
Circle (623) on Reply Card

GE Support/RCA Broadcast 11128
Field maintenance service for existing RCA equipment.
Circle (624) on Reply Card

GEC-Marconi Comm. Systems 2526
Test, measurement equipment; radio/TV transmitters.
Circle (625) on Reply Card

Gefen Systems 2803
Background music systems, CDJ classical music/M&E organizer for MAC, IBM-compatible/Windows system for SFX post-production; CDJ net broadcasting automation software; multimedia software management system; Filemaster interface software.
Circle (626) on Reply Card

General Microwave Services 17982
Information not available
Circle (627) on Reply Card

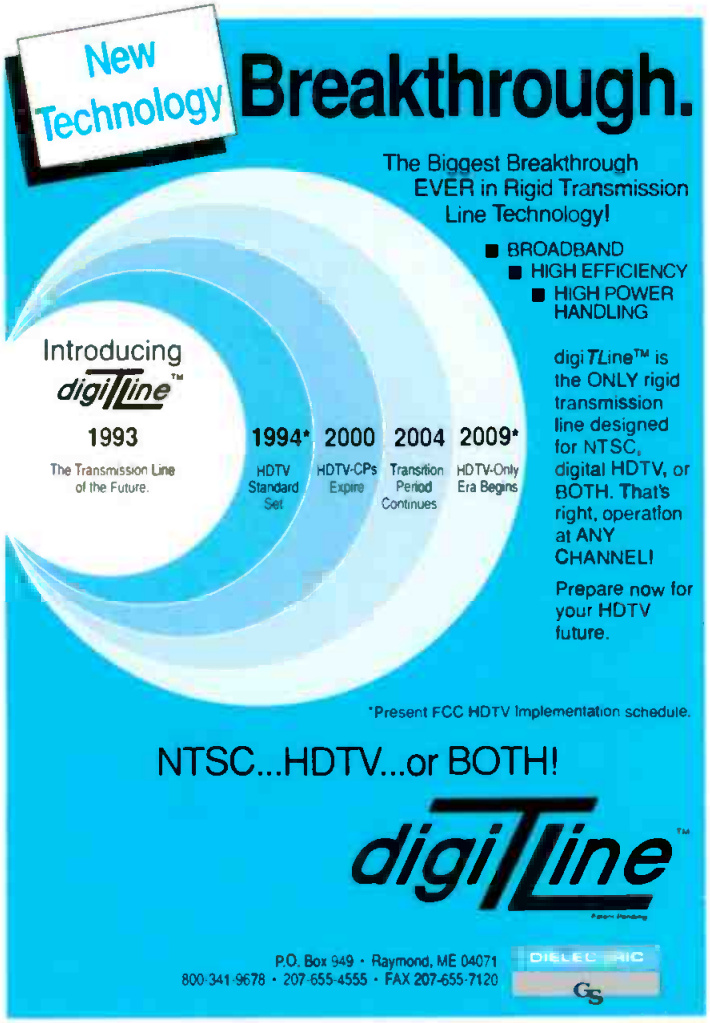
Genesis Microchip M 807
Specialty integrated circuits.
Circle (628) on Reply Card

Gennum/Video-Broadcast 17377
Specialized integrated circuit products; GENLINX serial digital chipset for SMPTE 259M, GS9010 receiver, GS9015 reclocker, upgraded GS9005 receiver, GS9004 cable equalizer; GS series sync separators; GF9102 filter for digital video processing.
Circle (629) on Reply Card

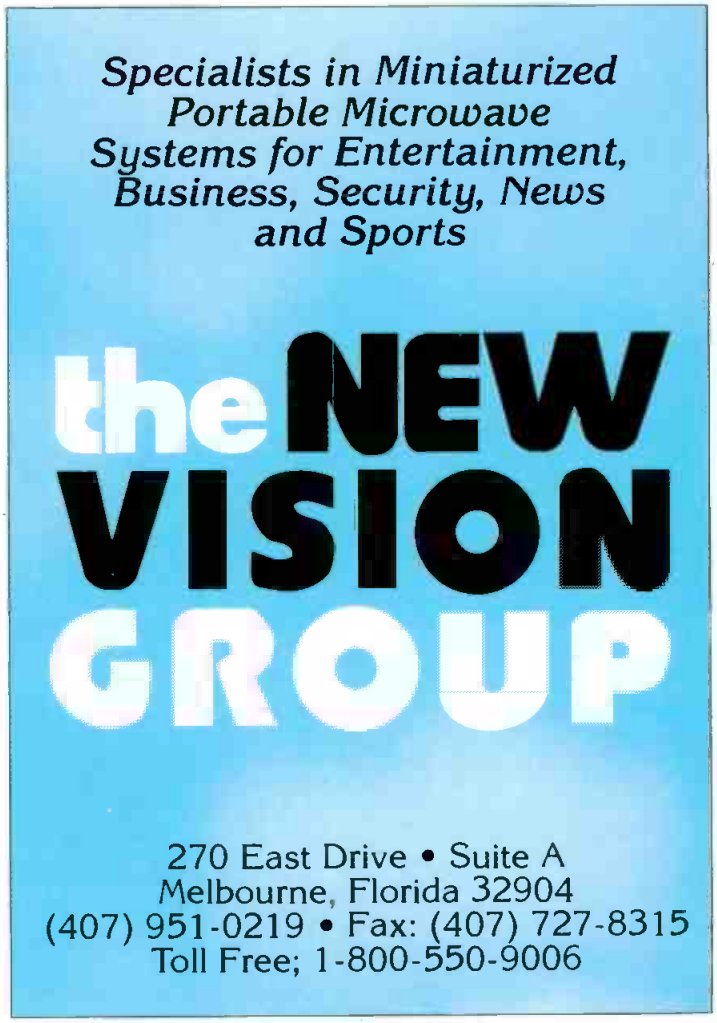
Gentner Communications 2612
Audio processors, bandwidth extenders, telco hybrids, pre-wired patch panels, digital audio workstations, transmitter remote control systems.
Circle (630) on Reply Card

GEPCO International 13351
Complete line of audio and video cable products; single, multi-pair audio, dual channel stereo, coaxial, triaxial, multi-core, mic, component analog, digital audio and parallel digital video cables; breakout boxes, cable reelers, panels, rack rails, cable assemblies; authorized Kings distributor.
Circle (631) on Reply Card

Getris Images 19743
High-end computer-based digital videographics systems for post production,



Circle (70) on Reply Card



Circle (71) on Reply Card

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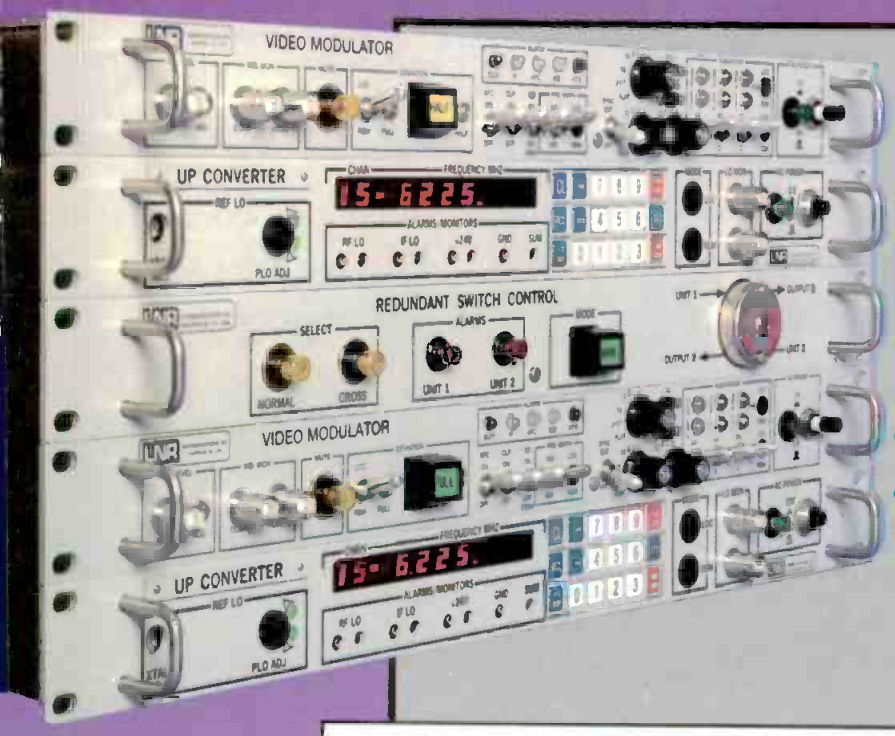


TYPICAL REDUNDANT CONFIGURATION

LVM Analog/Digital SERIES

LNR Series LVM Low Profile Data Quality Video Exciters are broadcast-quality units that combine a compact satellite video modulator with a low phase noise digital-ready upconverter.

Features:

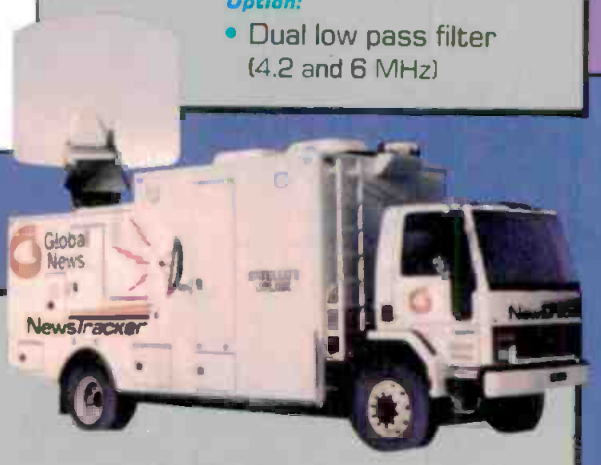
- Video modulator exceeds RS-250C and IESS-306 standards and has consistently outperformed all others.
- Agile data upconverter for inclusion of an SCPC data channel or digital video.
- Slimline construction - complete system in 3½" rack panel space. Offers a full range of front panel controls, indicators, and monitor points including:
  - Full/half transponder switchable
  - Subcarrier pre-emphasis selectable
  - Subcarrier level/deviation adjust
  - NTSC/PAL/B-MAC/SECAM switchable

Available Models:

C-Band Model	LVM6-D4	(5.925-6.425 GHz)
C-Band Model	LVM6-D4/575	(5.850-6.425 GHz)
Ku-Band Model	LVM14-D4	(14.0-14.5 GHz)
DBS Uplink Model	LVM17-D4	(17.3-17.8 GHz)
IF Output Model	LVM70	(70 MHz)

Option:

- Dual low pass filter (4.2 and 6 MHz)



LVE

GDE

UEV

Also Available...

LVE SERIES
Low Profile Ku-band Video Exciters for SNV Mobile Uplinks

GDE SERIES
Group Delay/Amplitude Equalizers

UEV and DRV SERIES
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Circle (143) on Reply Card

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broadcast, corporate communications, product design; Eclipse paint and animation; Venice paint, rotoscope, animation, compositing; Studio Venice 4:4:4:4 studio; Hurricane line, the multi-DVE-layers graphic suite.

Circle (632) on Reply Card

GML Inc. 19459

High-end all-discrete signal processing peripherals; rack-mount mixers; series 2000 moving fader automation.

Circle (633) on Reply Card

Gorman Redlich 4812

EBS and weather service equipment, Model CEB EBS encoder and decoder, Model CRW weather radio.

Circle (634) on Reply Card

Graham-Patten Systems 11551

Digital edit suite mixers, D/ESAM 800 digital system; digital interface converters; D/ESAM 400 digital edit suite audio mixer.

Circle (635) on Reply Card

Grass Valley Group (M1633) 16933

Signal management systems, routers; MCF fiber optic products; VPE series, Sabre editing controllers; production switchers #4000, #3000, #1000, #1200; DPM-700, DPM-4300 effects; Windows NT PC-based graphics systems, Presto titlers, VideoDesigner paint systems; Master-21 master control switchers; scalable graphics products.

Circle (637) on Reply Card

Gray Engineering Labs

Professional SMPTE time code equipment, data encoding/decoding systems; time code generators, readers, analyzers, code phase correctors, character inserters, video-assisted film editing, safe area generators.

Circle (638) on Reply Card

Great American Market 13121

Lighting utility equipment; grip products; random and strobe flicker generators; electrical testers, including 3-in-1 GamChek; New Great American patterns 'breakups'.

Circle (639) on Reply Card

Group One Ltd. 19569

Information not available

Circle (640) on Reply Card

GTE Spacenet 18946

Satellite program distribution/relay services.

Circle (641) on Reply Card

H

H L Dalis 18070

Distributor for Belden Wire & Cable, Neutrik and SwitchCraft connectors, Fluke meters; distributor for Sony, JVC and Denon DAT and S-VHS videotape.

Circle (642) on Reply Card

Hallikainen & Friends 1712

Audio mixers, TVA series, programmable transmitter control systems, DRC190.

Circle (643) on Reply Card

Hamlet Video International 16349

Waveform, vector, stereo audio measurement and monitoring devices using digitally generated outputs on standard monitors; Hamlet picoscope 300, videoscope 301WVA, microscope 302x; hand-portable WF units; cellular power amplifiers; multichannel MMDS/ITFS boosters.

Circle (644) on Reply Card

Hardigg Industries 18314

Equipment transport cases; ProRack 19" EIA enclosure.

Circle (645) on Reply Card

Harris Allied Broadcast Div. 2218

Radio, TV transmission equipment, solid-state AM, FM, UHF, VHF, medium wave transmitters; KOT, MSDC UHF transmitters; short-wave transmitters; medium wave phasing systems, antennas; remote control products; digital FM exciters; distributor.

Circle (646) on Reply Card

Harrison by GLW 11317

Audio mixing consoles and control equipment, SeriesTen B.

Circle (647) on Reply Card

HEDCO div. of Leitch 15746

Routing, distribution equipment for analog and digital audio, video, pulse and data; audio, video distribution amplifiers.

Circle (648) on Reply Card

Henry Engineering 3700

Audio, control interface products, dubbing workstations; Stereoswitch 3-input stereo audio switchers; caller-interactive voice information systems; CD music libraries.

Circle (649) on Reply Card

Hewlett-Packard/Video Comm. Div. M 117

Plain paper video printers; mag-disk video recorder, storage system and broadcast server; Video-on-Demand interactive systems; A/D, D/A converters, encoders, decoders, serializers, deserializers; Quality Advisor signal analysis; HP VidJet Pro video print manager; Digital Video Disk Recorder.

Circle (650) on Reply Card

HHB Communications Ltd. 1403

PORTADAT range of portable DAT recorders, PDR1000, PDR1000TC; Advanced Media Products DAT tape; CEDAR audio restoration products; CDR indexer; ATC studio control monitors, Coles mics.

Circle (651) on Reply Card

Hi-Tech Furnishings 13362

Work area furnishings.

Circle (652) on Reply Card

Hitachi Denshi 17546

Video cameras and imaging, digital SK-2600 studio and portable; Z-2000 portable camera; video recorders, digital cameras.

Circle (653) on Reply Card

Holaday Industries 3920

Magnetic field, RF radiation metering products, HI-3624 ELF and HI-3012 field strength meters.

Circle (654) on Reply Card

Hoodman 18615

Sunshades, monitor hoods for glare-free viewing of monitors; Video Chariot video cart.

Circle (655) on Reply Card

Horita 12751

SMPTE LTC, VITC time code readers, generators, inserters; TC TOOLKIT tape logging software; color bar, blackburst, sync, audio tone generators; safe area generators; titler, character generator, time/date-stamp generators; GPS-based SMPTE time code and position logging products.

Circle (656) on Reply Card

Horizon Technology M1603

Information not available

Circle (657) on Reply Card

Hotronic 13614

Audio delays, solid-state video recording devices, video processing equipment; TBC, frame synchronizers.

Circle (658) on Reply Card

Howe Industries 11547

Custom transit cases and shipping containers.

Circle (659) on Reply Card

Hughes Communications 19253

Broadcast satellite services, program distribution.

Circle (660) on Reply Card

Hughey & Phillips Inc. 4301

FAA-approved obstruction lighting, controllers and remote monitoring for tall towers.

Circle (661) on Reply Card

I

IBM M1321

Information not available

Circle (662) on Reply Card

IBM Corp./U.S. Mktg/Sales/Comm. 17501

Computers, software.

Circle (663) on Reply Card

IDB Communication Group 5226

Information not available

Circle (664) on Reply Card

IDB Communications 16064

Satellite communications systems, the Flyaway Phone satellite terminal in a suitcase; digital video compression services; Atlantic, Pacific and domestic cable distribution.

Circle (665) on Reply Card

Ideal Industries/Electronics 18284

Information not available

Circle (666) on Reply Card

IDS/SAIC 10150

Eidophor video projection systems.

Circle (667) on Reply Card

Ikegami Electronics 19319

Video cameras for studio and portable use; HK-366 2/3" FIT wideband cameras; HDTV camera, monitors; video monitors; DMC-4500 digital encoder, decoder; PF-701S portable mini microwave link; display monitors.

Circle (668) on Reply Card

Image Logic Corp. 19566

Videotape Log Producer software, controls many RS-422 and non-422 VTRs; closed captioning to ADA and VDD requirements; LTC/VITC SMPTE time code reader for ISA PC computer bus; foreign language captioning; AKSESS open caption generator for meetings, conferences.

Circle (669) on Reply Card

Image Video 11311

Signal routing, distribution equipment; 9501 20x30 video, dual/mono audio router; 9520/21 20x10 video, dual/mono audio router; Model 8010 master control switcher.

Circle (670) on Reply Card

Imagica Corporation 16081

Information not available

Circle (671) on Reply Card

ImMIX 19746

Digital video post-production workstations, VideoCube and VideoCube Plus.

Circle (672) on Reply Card

Industrial Acoustic/IAC 14041

Acoustic, sound control products.

Circle (673) on Reply Card

Information Int'l/DMG 11629

Graphics software for design, production of 2D, 3D animation; ARKImage, Morf-DMG.

Circle (674) on Reply Card

Innovision Optics 18169

Probe lense camera system; Mini-Mover motion control system; remote mini-jib arm.

Circle (675) on Reply Card

Inovonics 2306

Audio processing systems, Model 250 digital controlled system; FM generators, Model 706 FM/FMX system.

Circle (676) on Reply Card

Insulated Wire/Microwave Products 4916

Information not available

Circle (677) on Reply Card

Intelligent Resources 19969

Graphics for Macintosh PCs, Video Explorer video processor; VideoBahn interface; Docking Cards; RGB input module digitizers; RGB output module 32-bit to video converters.

Circle (678) on Reply Card

Intelsis Sistemas Inteligentes 10562

Information not available

Circle (679) on Reply Card

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Intelvideo 19207
Video encoding, decoding, enhancement products, IV-5 pre-coder/color detailer and IV-6 digital color encoder, digital NTSC color encoder/decoder, IV-9R color corrector, SG sync generator and others, picture-quality restorer model HQ, co-channel filter model CF.
Circle (680) on Reply Card

Interface Control M 315
Information not available
Circle (681) on Reply Card

Interlace Engineering Corp. 19574
VMAXX frame buffers; E10 digital composite encoders; M10 memory expansion board.
Circle (682) on Reply Card

International Datacasting Corp. 3922
Reception equipment for satellite data transmission, SR250 and IDC FM/FM receivers.
Circle (683) on Reply Card

International Film Workshops 10559
Information not available
Circle (684) on Reply Card

International Tapetronics/ITC 1218
Audio recording systems, ITC 99B, Delta series cartridge machines; Digital Program Repeaters; audio routing systems; CD players, hard drive storage devices; DigiCenter digital audio management system.
Circle (685) on Reply Card

Intraplex 5118
Digital transmission equipment, T-1, E-1 and variable rate multiplexers for audio, voice and data transmission via satellite and terrestrial networks; PT/PR 350 PT/PR 355 codec modules; Intralink STL+ integrated STL package for digita T1 lines.
Circle (686) on Reply Card

IRIS Technologies 16376
Audio, video switching and control systems.
Circle (687) on Reply Card

IRT Electronics Pty. Ltd. 19839
FO transmitter, receiver systems; vertical interval audio transmission products.
Circle (688) on Reply Card

Italiana Ponti Radio SRL 15182
Radio transmission, STL products.
Circle (689) on Reply Card

ITELCO spa 19414
Radio, television transmitters, STL products.
Circle (691) on Reply Card

ITS/Information Transmission 11951
Solid-state 1kW UHF transmitter, translator, ITS-830/ITS-832; Series 1700 MMDS/ITFS transmitters; Ffilterplexers, combiners; UHF/VHF Exciter Plus system retrofits.
Circle (692) on Reply Card

J

J-Lab 12438
Video production utility products; CFS-1 field, portable video switcher; DA-1 with humbucking, EQ 6-output; DA-2 1x4 audio DA with tone source.
Circle (693) on Reply Card

James Grunder & Associates 16349
Video processing equipment, Yamashita scan converters, sync generators; Feral Industries TBC/synchronizers; Hamlet Video International video test equipment.
Circle (694) on Reply Card

Jampro Antennas 1915
TV, FM broadcast transmission antennas, circularly polarized models; inter-digital combiners, filters; flat-panel FM, cavity panel, HDTV/NTSC simulcast antennas.
Circle (695) on Reply Card

JBL Professional 15713
Audio monitoring products, Control Series speakers, SR and series power amplifiers; MPS series amplifiers; audio processors.
Circle (696) on Reply Card

Jefferson Pilot Data/JDS 13811
Broadcast business systems, software.
Circle (697) on Reply Card

JEM-FAB 12849
Digital signal distribution products, Model One D-Patch RS-12B machine control patching system; routing switchers; B-MAC monitors.
Circle (698) on Reply Card

Jensen Tools 13605
Numerous tools and tool kits for video, audio technicians, broadcast engineers; various metering, signal source products, JTK-5000 computer maintenance kit; Fluke Model 87 DMM.
Circle (699) on Reply Card

JLCooper Electronics 19563
Audio mixers.
Circle (700) on Reply Card

John Gorrell Woodworking 10757
Model 3046 slant front console systems; equipment racks, desktop editing workstations, models 3672, 3684, 3696.
Circle (701) on Reply Card

JVC Professional Products 18046
Video cameras, including low-light capability to 1.5 lux; new models of video recorders, recorder/editors, editing controllers and playback decks; video monitors; microphones, audio recording equipment.
Circle (702) on Reply Card

10

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Maybe the most remarkable feature of DAD is that it runs under DOS, the most commonly utilized software in the world, and on standard off the shelf hardware. Maintenance support, parts, and expansion hardware can be easily obtained anywhere. And you are assured that as computer technology continues to evolve, DAD will grow with it. You never need to be out of date. There are no monthly licensing fees and upgrades are free for the first year.

DAD can be configured to fit any size facility, from a stand alone Workstation that does double duty for both Production and On-Air to multiple Workstations, each equipped for a specific application, operating on a true Local Area Network. Redundancy and backup features can be configured to meet any need or budget. And DAD talks to CD Jukeboxes, Routing Switchers, and more.

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Debuting more than two decades ago, field and ENG crews quickly adopted the 635A and RE50 as industry standards, instantly recognizing their trendsetting shape and design, unmatched reliability and clean sound. And they continue to set the industry standard like no other microphones!

When there is only one chance to get it right, the 635A and RE50 remain *the* choice — in black or beige — no matter the conditions.

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Circle (75) on Reply Card

K

K&H Products **16465**
Camera support products; equipment transportation cases, Shoulder Case for Sony BVW 400, Camera Case for Sony DXC-537.
Circle (703) on Reply Card

K6500 **17858**
Information not available
Circle (704) on Reply Card

Karl Heitz **13631**
Mic fishpoles; camera support equipment, GITZO tripods, fluid heads, monopods, related equipment.
Circle (705) on Reply Card

Kavouras **13129**
Weather radar products, displays, RADAC 2100 color radar accessing system and TRITON Doppler radar; Dramatic Triton surround weather graphics, version 3.0 software; WxAdvisor storm tracking sofware; TDR series radars.
Circle (706) on Reply Card

KD Kanopy **5003**
Information not available
Circle (707) on Reply Card

Kent Green Video Group **19081**
Consulting, facilities design; production services, producing, tech direction, engineering; computer support.
Circle (708) on Reply Card

Keystone Communications **12433**
Production services.
Circle (709) on Reply Card

Killer Tracks Music **13043**
Production music libraries.
Circle (710) on Reply Card

Kings Electronics **16831**
Connectors, including fiber optic Tri-Loc, video jacks; BNC connectors, terminators, adapters, video jackfields, breakaway panels, patch cord assemblies; video patch plugs, terminations, adapters.
Circle (711) on Reply Card

Kintronic Laboratories **4824**
Antenna phasing, isolation products for AM/MW radio facilities, custom AM/MW directional phasing system and Isolator for multiantenna installation on an AM tower.
Circle (712) on Reply Card

Kline Towers **19755**
Design, fabrication and erection of guyed, self-supporting, platform and multiarray towers, space frame structures and special type antenna structures for broadcast and military applications.
Circle (713) on Reply Card

Knox Video **16433**
RS audio, video routing switchers, 12x2, 8x8, 16x16 matrices; Desktop Video Manager products, PC switcher, PC event controller, PC still-store.
Circle (716) on Reply Card

Kowa Optimed Inc. **4912**
Magneto-optical disk recording for audio.
Circle (717) on Reply Card

KUB Systems Inc. **19564**
DANCE digital animation compositing effects system.
Circle (718) on Reply Card

L

L E Nelson Sales **13616**
Stage and studio lamps by Thorn, GE.
Circle (719) on Reply Card

Lakeside Associates **11549**
Production facility design, construction; consulting service.
Circle (720) on Reply Card

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India : NEW DEHLI
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Fax : (91-11) 645 3357

Italia : ROMA
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Japan : TOKYO
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Fax : (81-3) 3264 66 96

Schweiz : LENZBOURG
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Fax : (41-64) 50 45 11

Sverige : TYRESO
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Fax : (46-8) 742 80 20

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Larcan-TTC 15708
Manufacturer of AM/FM, TV broadcast transmitters; XL series of UHF/UHF LP transmitters, translators; digitally synthesized TV exciters.
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LDL Communications/Larcan 15758
VHF TV transmitters, type TTS30M 30kW; ADC LAMBDA low-band VHF CP transmission antennas.
Circle (722) on Reply Card

Leader Instruments 12803
Audio, video and RF test equipment; component/composite vector and waveform monitors, signal generators; surround sound and stereo monitors.
Circle (723) on Reply Card

Lectrosonics 20019
Wireless mic systems, Pro-Mini ENG and H185 plug-on transmitter mics.
Circle (724) on Reply Card

Lee Filters 17619
Color effect, correction and diffusion lighting filter media for professional lighting designers, cinematographers.
Circle (725) on Reply Card

Leightronix 19534
Time event controller for automated playback, recording, switching; telephone remote equipment control; PC-based VHS/S-VHS commercial insertion control software; interactive video equipment control; custom control engineering, design, development.
Circle (726) on Reply Card

Leitch Video (M213) 15746
DigiBus modular products for D1, D2 formats, synchronizers, A/D and D/A converters; audio demultiplexers; StillFile still store; VSR-16x16 serial video routers; video DAs, sync generators, serial video test generator; EDH encoding/monitoring DAs; serial video DAs
Circle (728) on Reply Card

LEMO USA 11323
Audio, video connectors.
Circle (729) on Reply Card

Leonetti Company 18082
Studio lighting products, Sunray HMI and EB series electronic ballasts.
Circle (730) on Reply Card

Lester Audio Laboratories 1613
Fiber-optic transmission equipment; DAS-2000 system converts up to 64 analog audio inputs with 16 return lines to a data stream on one fiber cable for transmissions to 3 miles.
Circle (731) on Reply Card

Lexicon 2524
Digital audio workstations, Opus; Model 2400 stereo audio time compressor, expander systems.
Circle (732) on Reply Card

Lighthouse Digital Systems 12438
Digital signal routing switchers, including DCR digital router, SRX 400Mbit/s system, 32x32 Pathfinder with AES audio and HDTV switching rates.
Circle (733) on Reply Card

Lightmaker Company 16381
Manufacturers and marketers of AC ballasts for flicker-free HMI lighting instruments rated 200W to 12kW.
Circle (734) on Reply Card

Lightning Eliminators & Consult. 13401
Lightning prevention systems, Spline Ball Ionizer and Dissipation Array systems; Chem-Rod chemically activated grounding electrodes; transient voltage surge suppression devices for power, communications lines.
Circle (735) on Reply Card

Lightware 15485
Information not available
Circle (736) on Reply Card

Lightwave Systems 1613
Fiber optic transmission systems for 2-channel, 20-bit audio.
Circle (737) on Reply Card

Lightworks 19934
Heavyworks; Lightworks editor, turbo, assistant and digistation; off-line, random-access non-linear editing systems.
Circle (738) on Reply Card

Link Electronics 17981
Signal distribution products; test and measurement equipment, system timing unit; audio monitor amplifiers.
Circle (739) on Reply Card

Listec Video 16633
Video prompting systems.
Circle (740) on Reply Card

LM Engineering 19571
Information not available
Circle (741) on Reply Card

LNR Communications 1306
LVM series digital video flyaway earth stations, dual-band C/Ku; earth station components.
Circle (742) on Reply Card

Logitek 3215
Audio mixing systems, Mariner water resistant, Stereorack and TR2 mixers; audio level metering systems; audio DAs.
Circle (743) on Reply Card

Loral Microwave-Narda 4310
Information not available
Circle (744) on Reply Card

Louth Automation 17348
Broadcast automation systems; machine control systems.
Circle (745) on Reply Card

Lowel-Light 16649
Lowel Fresnel lighting instrument; location lighting equipment, lighting kits, accessories.
Circle (746) on Reply Card

LPB 1924
Signature III and series 7000 stereo linear fader consoles; low power AM transmitters meeting Part 73AM nighttime, Part90 TIS/HAR and Part 15 unlicensed limited area broadcast; carrier current systems; radiating coaxial cable, limited area FM systems; Signature series rotary fader audio consoles.
Circle (747) on Reply Card

LSI Logic M1220
Information not available
Circle (748) on Reply Card

LTM Corp. of America 17046
Lighting products, Superlite 12k HMI, Cinepar 2500 HMI, Pepper and Sungun lighting systems.
Circle (749) on Reply Card

Lyon Lamb Video Animation M 813
Animation systems, Mini VAS-2 systems; RTC real time scan converter.
Circle (750) on Reply Card

LYS Electronic DTDA 19979
Information not available
Circle (751) on Reply Card

M

Macrovision 17581
Videotape nonduplication products.
Circle (752) on Reply Card

Magic Teleprompting Inc. 16483
Prompting systems.
Circle (753) on Reply Card

Magni Systems 16684
Signal monitoring products, Magni Monitor; multimedia equipment, VGA Producer Pro; WVM-710 video monitoring system.
Circle (754) on Reply Card

Magnum Tower 2209
Manufactured radio, TV and communications towers.
Circle (755) on Reply Card

Mainframe Computer Graphics 19769
Newsroom, graphics products, INSCRIBER titling environment; INSCRIBER character generator.
Circle (756) on Reply Card

Management Graphics (M1134) 19786
Solitaire Image Recorders used in post-production for animation, special effects, digital compositing; supporting Vistavision, Academy offset, Full frame, etc. for file formats from D-1 to SGI bitmaps to PC and Mac files.
Circle (757) on Reply Card

Manhattan Production Music 13635
Production music, Chesky Records classical series; MPM 47 Corporate Culture, MPM 48 Under Siege.
Circle (759) on Reply Card

Marco Inc. 17579
Modular rack systems.
Circle (760) on Reply Card

Marconi Communications Systems 2526
Test, measurement equipment; radio/TV transmitters.
Circle (761) on Reply Card

Mark IV/E-V 2412
Wired, wireless mics; audio compressors, gates, Klark Teknik DN-3600 programmable graphic equalizer; digital delays; DDA QII LCR audio console; Midas remote consoles; crossovers; parametric equalizers.
Circle (762) on Reply Card

Marti Electronics 3918
STL and ENG products, STL-10 studio transmitter link and RPT-30 ENG transmitters.
Circle (763) on Reply Card

Matco Mfg & Test 19213
Video record/playback automation, MA-201 playback system; MA-300 tape duplication control.
Circle (764) on Reply Card

Matrox Electronic Systems 10650
Desktop video production systems for PCs; Matrox Studio for high-end video post-production; Personal Producer for video editing; Illuminator PRO videographics board; Matrox Marvel multimedia controller; MAX real time digital animation recorder.
Circle (765) on Reply Card

Matthews Studio Equipment 16653
Camera support products, ITE pedestal, pan/tilt series; MC 88 crane; SPAGS spacer bags.
Circle (766) on Reply Card

Maxell Corporation of America 16611
Recording media for Betacam SP, D-2, D-3 formats; Digital Betacam.
Circle (767) on Reply Card

MC Lights and Manufacturing 17785
Information not available
Circle (768) on Reply Card

McCurdy Radio Industries 13111
DCS 3000 serial digital and Microcompact digital intercoms; M/2000 automation system; McCart digital audio storage, multichannel playback; UMD-32 3-color 32-character under monitor display; ATS-100 audio test set; AT2656 stereo audio monitor; UIO-80 serial/parallel machine control interface; Series 9000 A/V DAs, accessories.
Circle (769) on Reply Card

MCL/Inc. 19558
TWT amplifiers for M/N 10961 700W C-, M/N 10999 300W Ku-band, multiband (C-, X-, K-bands).
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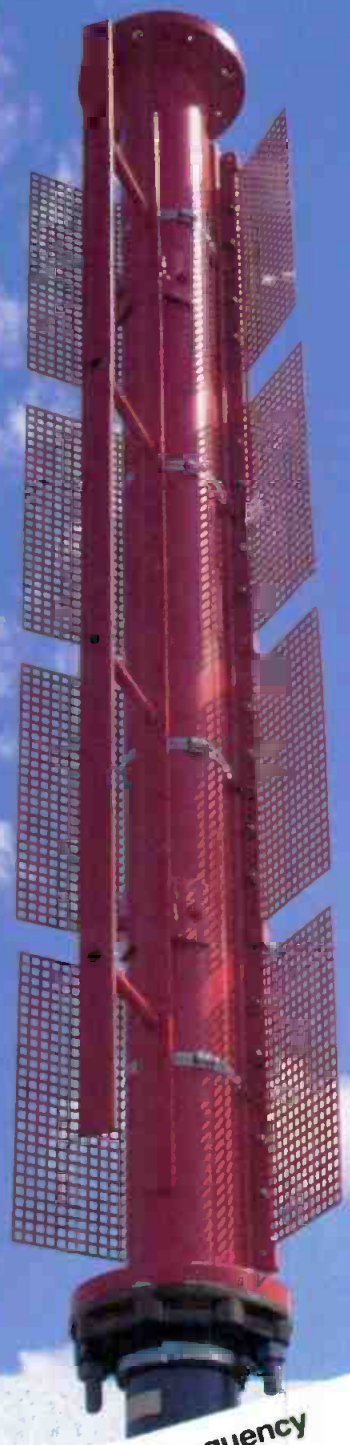

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- PTV4 panel HDTV antennas
- Low- & high-power circular polarized FM antennas
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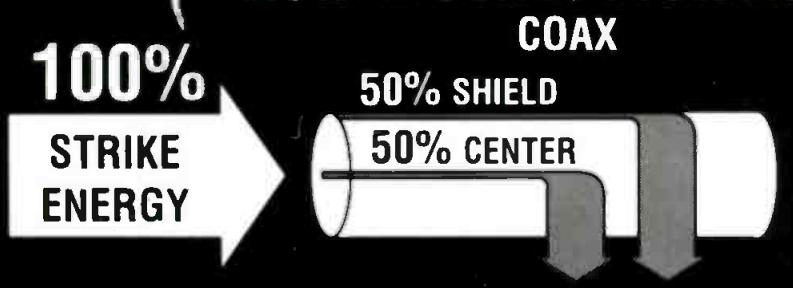

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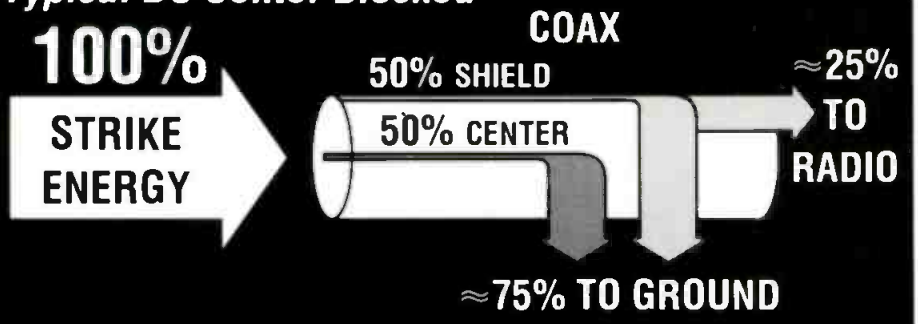

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Media Computing 11106
Broadcast automation packages, PROtec and ANGIS systems; Angis companion.
Circle (771) on Reply Card

Media Concepts 11647
Used broadcast TV production equipment.
Circle (772) on Reply Card

Media Touch Systems 1006
Automation control products, AutoPLAY satellite-studio integration; MIDAS digital audio playback unit; Media Touch digital audio editing program; Pick 'N Play studio control software package; "Auto-Record" workstation.
Circle (773) on Reply Card

Meret Optical 17278
Fiber optic products.
Circle (774) on Reply Card

Merlin Engineering Works 13836
Video processing equipment, ME-278-S synchronizer; ME-981/-991 data encoder, decoder.
Circle (775) on Reply Card

Micron Audio Products 17151
Complete line of Micron wireless and diversity systems, accessories, for ENG/EFP, film, stage; SQN-4S IIIa stereo portable audio mixer.
Circle (776) on Reply Card

Micron Tool & Manufacturing 18581
Camera support systems, Black Magic boom extensions with remote head, pan/tilt control.
Circle (777) on Reply Card

MicroNet 19466
Video transmission services - terrestrial linking New York, Philadelphia, Washington DC, Dallas, Austin, Houston, San Antonio; earth stations in Dallas and New York for domestic and international services.
Circle (778) on Reply Card

Micropolis M 512
Information not available
Circle (779) on Reply Card

Microtime 17622
Video effects systems, including IMPACT; TBCs, synchronizers; version 5.0 software for Composium II workstations; image processing products for video synchronization and format conversion.
Circle (780) on Reply Card

Microvideo Ltd. 18781
Serial digital test generator; logo generator; serial digital keyer; D-1 proc-amp; data inserters; serial digital component to analog NTSC converter; 4:2:2 and 4:4:4:4 A/D and D/A converters.
Circle (781) on Reply Card

Microwave Filter/Comband 13341
Interference, bandpass, bandstop filters for cable TV, microwave, earthstation signal applications.
Circle (782) on Reply Card

Microwave Radio 13801
ENG, microwave radio products, FLR/FLH direct modulation and heterodyne systems and ProStar 2T2WB 2GHz portables.
Circle (783) on Reply Card

MII Users Assoc. 17277
MII tape format user group.
Circle (784) on Reply Card

Milestek 16477
BNC connectors, cabling for analog and digital video; cable cutting, stripping, crimping tools; computer networking adapters, cabling, connectors; also distributors for Trompeter, North Hills, ADC Telecommunications; video tool kits; 75Ω BNC plugs; coax cable assemblies.
Circle (785) on Reply Card

Miller Fluid Heads (USA) Inc. 15729
Camera support systems, pan/tilt heads,

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matte boxes; Series II ENG/EFP tripods.
Circle (786) on Reply Card

Minerva Systems 19076
MPEG encoding systems for digital video publishing with A/V capture, encoding and decoding for real-time, operator-assisted video compression.
Circle (787) on Reply Card

Minolta 11605
Light meters, analyzers, CA-110 LCD color analyzer; CA-100 CRT color analyzer with upgraded white balance process for TV, computer monitors.
Circle (788) on Reply Card

Mira Imaging M 929
Information not available
Circle (789) on Reply Card

Mira Vision 11962
Information not available
Circle (790) on Reply Card

Miralite Communications 13447
Satellite communications products, 7900 LNB; Space Line digital telephone service system.
Circle (791) on Reply Card

Miranda Technologies 16255
A/D and D/A converters; SMD oversampling converter between component video and RGB analog, serial/parallel video to composite, S-VHS NTSC or PAL; NTSC encoders; Imaging Quartet single R/U 4-card frame for imaging modules; SDA-100 serial digital DA; toccata-STD I/O card; titania V1.4 software; VFC-321 video format converter..
Circle (792) on Reply Card

Mirror Image Teleprompting 10059
Information not available
Circle (793) on Reply Card

Mitsubishi PED M1129
High-resolution, large screen monitors; monochrome and color printers; industrial VCRs.
Circle (794) on Reply Card

Mobile Media 20040
Information not available
Circle (795) on Reply Card

Modulation Sciences 11102
Audio processors, spatial image enlarger; modulation measurement equipment, digital FM peak deviation monitor; Diversity subcarrier receiver; RDS/RBDS encoder; RDS/RBDS data receiver.
Circle (796) on Reply Card

Mohawk/CDT Broadcast Cables 13431
Water-resistant triaxial cable; serial digital D-1, D-2, D-3 video coax; parallel digital D-1, D-2, D-3 data cable; digital audio, video, camera cable; fiber-optic video link.
Circle (797) on Reply Card

Mole-Richardson 16640
Lighting products, lamps, fixtures.
Circle (798) on Reply Card

Montage Group 16660
Non-linear videotape editing systems, Montage Picture Processors; Montage for the Video Toaster and Amiga AGA.
Circle (799) on Reply Card

Moseley Associates 2824
PCL 6000 aural STL; DSP 6000 digital STL with ISO/MPEG codec, AES/EBU rate converter options; MRC 2 (with programmable coprocessor module) and MRC 1620 remote control systems; TASKMASTER 20, MASTERCONTROLLER PC software for transmitter remote control; RPL-4000 remote programming link; StarLink 9000 digital modular simplex/full duplex system with personality modules.
Circle (800) on Reply Card

MSE Video Tape Services 19741
Videotape products.
Circle (801) on Reply Card

Multidyne Electronics 11948
Signal distribution products, VPDA-2 video/pulse/subcarrier DAs with EQ; test products, TS-16 NTSC V/A test generator; solid-state audio recorders; video distribution tray.
Circle (802) on Reply Card

Murry Rosenblum Sound Assoc. 5115
Audio Ltd. div. wireless microphone systems; cases for four diversity receivers.
Circle (803) on Reply Card

MYAT 4619
Rigid coaxial transmission line components and accessories; $^{7}/_{8}$" 50Ω to $9^{3}/_{16}$" 50Ω.
Circle (804) on Reply Card

N

N Systems/NSI 13133
Stiletto central ENG receive and transmit antennas; MCS 2.0 PC-based remote control systems; Silhouette ENG transmit antennas; Superquad central ENG receive antennas; Super Pod helicopter ENG antenna systems.
Circle (805) on Reply Card

Nady Systems 11327
Wireless mic systems using VHF and UHF frequencies.
Circle (806) on Reply Card

Nagra-Plus SA 11906
Nagra analog, digital audio recorders.
Circle (807) on Reply Card

Nalpak Video Sales 20027
Utility grip products, TP 1460/ TP 1344 TuffPaks, RP series molded rack cases; Travel Kart series; accessories for Magliner; sandbags.
Circle (808) on Reply Card

National Supervisory Network 1426
Transmission plant monitoring service.
Circle (809) on Reply Card

Nautel 1912
Solid-state AM, FM radio broadcast transmitters, AMPFET ND50 50kW; AMPFET ND10 10kW AM systems; NE50 digital FM exciters.
Circle (810) on Reply Card

NDG Phoenix 13606
Software products for graphics and facilities management, Studio Management and Library Management software.
Circle (811) on Reply Card

Nemal Electronics International 13619
Precision audio and video cable, #1570 and #2201A; MC424P flexible mic cable; Kings broadcast products, Cat wire and cable, Switchcraft, Amphenol, Blonder-Tongue, Belden Alpha, Cablewave.
Circle (812) on Reply Card

Neotek 2226
Audio mixing consoles, The Elite and The Elan.
Circle (813) on Reply Card

Nesbit Systems Inc. 18780
Software systems for facilities, equipment tracking; business tracking, reporting, ad sales planning, affiliate sales, budget building; media library system; travel manager.
Circle (814) on Reply Card

Network Music 12427
Production music libraries.
Circle (815) on Reply Card

Neumann USA
Microphone products, RMS-191 stereo, KRM 81 shotgun microphones.
Circle (816) on Reply Card

Neutrik Instrumentation 3906
Portable and programmable audio system measurement products; 3501, 5500 test systems, Nanocon, smallest 3-pole connector available; EZ Patch patch panel with switching configuration; XY series XLR cable connector. IDC terminaton; ¼", TT (Bantam) plugs, jacks; audio test systems.
Circle (818) on Reply Card

Neve/AMS (See Siemens Audio) 16623
Audio consoles, Neve 66 series TV/production mixers; audio processors: analog, digital audio recorders; stereo mics; audio editor/workstations, AMS Logic 1.
Circle (819) on Reply Card

New EVS
Slow-motion video equipment, the LSM Live Slow Motion system.
Circle (820) on Reply Card

New Media
Information not available
Circle (821) on Reply Card

Newark Electronics 16364
Information not available
Circle (822) on Reply Card

News Technology Corp. 19437
Election Central news computer systems.
Circle (823) on Reply Card

NewsMaker Systems 20053
Newsroom automation interface products for titlers.
Circle (824) on Reply Card

Nigel B Furniture 19473
Custom furniture for broadcast and video post-production; multimedia work consoles; radio broadcast STN furniture consoles; audio workstation consoles; software for laying out facilities.
Circle (825) on Reply Card

Nikon Electronic Imaging 18178
FW-ENG, F-ENG converters; S19x8B, S15x8.5B S9x5.5B TV Nikkor zoom lenses; full selection of lens accessories; film scanners, color printers, ImageAccess archiving and image management software; HDTV still cameras.
Circle (826) on Reply Card

Norpak 16369
Teletext data transmission products, TTX6X0 receivers with integrated VCR.
Circle (827) on Reply Card

Norsat International Inc. 1503
Satellite communications systems, receivers; C-band LNBs; C-band, Ku-band PLLs; dual LNBFs; C-band DROs; Cygnus receivers.
Circle (828) on Reply Card

Northern Technologies 18069
Information not available
Circle (829) on Reply Card

Nova Systems 13843
NovaMate XT transcoding TBC and NovaSync3 modular frame synchronizer; NovaBlox modular video processing systems; TBCs, synchronizers, encoders, decoders, transcoders, DAs, routers.
Circle (830) on Reply Card

NPR Satellite Services 4807
Satellite transmission services for radio broadcasting.
Circle (831) on Reply Card

NRG Research 10259
Power sources, including Power Station II, Power Can, Motive Pro; Vari-lite.
Circle (832) on Reply Card

NTL 17346
Video processing technology; satellite uplink, downlink products; broadcast network facilities; EDTV 1000 upconverters; video compression systems; MPEG video compression products.
Circle (833) on Reply Card

Nu-Media M1224
Information not available
Circle (834) on Reply Card

NUCOMM 11333
Antenna products for ENG and other microwave applications.
Circle (835) on Reply Card

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- mixer/monitor switch
- adjustable peak output LEDs
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Nurad Technologies 17685
Microwave antennas, electronics.
Circle (836) on Reply Card

NVISION 20081
Digital audio accessories, NV4448, NV1050 sample rate converters; NV3512 router; NV 1000 terminal equipment; NV1055 4-channel digital audio mix/minus and routing module; NV1060 digital audio delay compensator module; optional BNC/1-volt digital I/O interfaces; video products.
Circle (837) on Reply Card

Nytone Electronics 13406
Film/slide transfer equipment, 35mm slide system with pan, zoom, fade functions between slide.
Circle (838) on Reply Card

O

O'Connor Engineering Labs 18854
Camera support products, Ultimate series 515S and 1030S fluid heads; model 2575V; TLT tripod.
Circle (839) on Reply Card

O.L.E. Limited 19934
Lightworks editing control systems.
Circle (840) on Reply Card

Odetics Broadcast 18932
Enhancements and expansions to large library maintenance systems; TCS90 cart machine with Digital Betacam format with digital cache capability; News Control Terminal; WorkStation accessories.
Circle (841) on Reply Card

OMB America 3400
Radio/TV transmitters.
Circle (842) on Reply Card

Omicron Video 13141
Signal distribution products, Model 500 series A/V routing switchers and Model 200 series A/V DAs; video keyers, genlock systems.
Circle (843) on Reply Card

OpAmp Labs 17778
Audio, video signal distribution, switching equipment, A-24/2ML audio and VA-16 1x16 video/audio press feed boxes.
Circle (844) on Reply Card

Optibase M1315
Information not available
Circle (845) on Reply Card

Optical Disc Corporation 18949
LaserDisc recording systems and Recordable Laser Videodiscs (RLVs); Model 610A/620A recording system accepts composite video; digital video and CD technology.
Circle (846) on Reply Card

Optimage Interactive Services M 414
Desktop video equipment; multimedia products.
Circle (847) on Reply Card

Optimum Productions 11862
Versioning, dubbing of videos, films with translations from and into English from other languages; meets broadcast and feature film specifications.
Circle (848) on Reply Card

Options International 13359
Telecine utility products; Meta-RTS Plus interface kit; telecine alignment and resolution test film; combination 16mm and 35mm Keykode reader head; 8001/8002 digital video serial-to-parallel/parallel-to-serial converters; 8025 digital keyers.
Circle (849) on Reply Card

Optivision M 609
Information not available
Circle (850) on Reply Card

Orban/AKG Acoustics 2806
Over-the-air Optimod audio processor series; OPTIMOD-TV digital 8282 audio processors; DSE 7000 workstation.
Circle (851) on Reply Card

Ortel 18181
Fiber-optic links, including System 8000 microwave fiber-optic interfacility links for every signal type between the antenna pedestal and control room.
Circle (852) on Reply Card

Otari 1209
Audio mixing systems; analog, digital audio recording equipment; console automation.
Circle (853) on Reply Card

Oxberry M1024
Animation equipment.
Circle (854) on Reply Card

P

P E Photron (M1719) 10256
Information not available
Circle (856) on Reply Card

Pacific Radio Electronics 13047
Racks, panels; precut holes accommodating various manufacturers' connector products.
Circle (857) on Reply Card

Pacific Recorders & Engineering 3612
Audio mixing consoles, cassette recorders; digital audio workstations.
Circle (858) on Reply Card

Paco Electronics USA 19115
NiCad battery products; DP series.
Circle (859) on Reply Card

PAG Ltd. 13422
AR series batteries, chargers and analyzers, PAG SFI NP1 fast charger and PagLok batteries and associated products; PAG battery analyzer.
Circle (860) on Reply Card

Paltex
ECS-85 joystick video editors; DYAD composite digital mixer-keyer; enhancements for high-end Paltex multi-machine inter-format, inter-manufacturer editors.
Circle (861) on Reply Card

Pan American Satellite 19781
Program distribution/transmission services.
Circle (862) on Reply Card

Panasonic 18001
Video cameras, camcorders including AG-DP800 "SUPERCAM" with digital signal processing; D-3, M-II, S-VHS recorders, including AG-DS800 slow motion VTR; AJ-D580 D-5 VTR; monitors; switchers; AQ-235W 16:9/4:3 digital studio camera; "W" series of MII VTRs; WV-E550 DSP, a 3-CCD digital signal processing multipurpose camera; AG-DS850 S-VHS editing VCR with Digital Slow-Motion capability; AG-5210 multipurpose VHS VCR; AJ-EV30 tape evaluator, monitors, TV automation library management system and switchers.
Circle (863) on Reply Card

Pandora International 11506
Enhanced DCP color processors; Pogle telecine control systems; Pogle tape-to-tape color processor systems; electronic cursor generators.
Circle (864) on Reply Card

Parallax Graphics Systems 17575
Video graphics, paint, animation software, including ADVANCE digital compositing, effects and sequence editing; DIPSS digital ink and paint software system.
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PCS Staging M 809
Information not available
Circle (866) on Reply Card

Peerless Industries Inc. 16438
Monitor/TV wall and ceiling mounts, the Jumbo and Designer series; floor stands for TVs and VCRs; speaker stands.
Circle (867) on Reply Card

Penn Fabrication 16084
Information not available
Circle (868) on Reply Card

Penny & Giles 4526
Signal controls, faders; M3000 linear, MRF 11 rotary motorized series; T-bar controls; precision controllers; Audio Control Module precision faders and control devices, including the PGF 8000 and 3000 series of linear faders.
Circle (869) on Reply Card

Penta Laboratories 5426
Information not available
Circle (870) on Reply Card

PEP 19101
Videotape editing products, Shotlist software; DigiSpot digital recorder, player cart replacement.
Circle (871) on Reply Card

Perrott - The Battery People 16339
Full line of alkaline, lead acid, Nicad, lithium, silver zinc and custom battery assemblies; BET-5001 battery pack energy tester.
Circle (872) on Reply Card

Pesa Chyron Group (M1114) 19401
Digital electronic graphic systems and character generators/titlers with serial CCIR 601 I/O; networking capability; MAX!>, MAXINE!, INFINIT!, CODI; CENTAUR, CINDY video adaptor boards. See also: Aurora Graphic Systems; Chyron Graphic Systems; CMX Editing Systems; Pesa Micro Communications; Pesa Switching Systems.
Circle (873) on Reply Card

PESA Micro Communications 19401
Transmission line; HDTV/HTSC UHF panel antennas; HDTV absorptive filters; HDTV feasibility program with interactive display.
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Pesa Switching Systems 19401
See also Pesa Chyron. SD5000 serial digital routing switchers supporting D1, D2, D3, 360Mbit/s compressed 16:9 HDTV; SDA5000 serial digial audio routing switchers; RM4000/5000 analog A/V routers; RC5500 system controller; Lynx II small scale analog, serial digital routers.
Circle (875) on Reply Card

Phasetek Inc. 5215
Manufacturers of AM antenna phasing equipment, antenna tuning units, RF components and RF inductors.
Circle (877) on Reply Card

Philips Business Inc. M1713
Information not available
Circle (878) on Reply Card

Philips Components 16628
Video camera tubes, UHF klystrons, inductive output amplifiers; CCD chips, modules.
Circle (879) on Reply Card

Philips TV Test Equipment A/S 16630
Test and monitoring systems, PM5640 video signal generators; PM5686 NICAM modulator; PM5664 waveform, vector monitor.
Circle (880) on Reply Card

Phoenix ENG 10962
ENG vehicle construction, design; "One-man band" ENG vehicles.
Circle (881) on Reply Card

Photomart Cine-Video 17275
Information not available
Circle (882) on Reply Card

Pinnacle Systems 17569
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Pioneer New Media Technologies 17182
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Circle (884) on Reply Card

Pixel Power Ltd. 13941
Information not available
Circle (885) on Reply Card

Potomac Instruments 2310
RF test/measurement products, 1900 series directional antenna monitoring system and FIM series MF(AM)/VHF/UHF field intensity meters; AA-51 A automatic audio analyzer.
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Prime Image 17184
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Professional Label Inc. 13841
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Professional Sound Corp. 5124
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Progressive Image Technology 13829
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Circle (894) on Reply Card

Promusic 13148
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Circle (895) on Reply Card

Prophet Systems 5221
Radio automation systems.
Circle (896) on Reply Card

Q

Q-TV 18854
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QSI Systems 16333
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Quality Video Supply 13347
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Circle (902) on Reply Card

Quanta 18032
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Quantel 17126
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Questar Systems (Farpoint Systems) 10061
AccuPrompt software for Macintosh desktop, PowerBook series computers; NTSC output.
Circle (905) on Reply Card

Quickset 12508
Camera support products; Huskey, Apollo, Mercury fluid heads.
Circle (906) on Reply Card

R

R-Columbia Products 13145
Wireless intercom products, IFB/ENG headphones; ENG/IFB pocket telephone; wireless IFB headset/receiver; mini dynamic headset; full-duplex intercom headphones; replacement intercom headphones/belt packs.
Circle (907) on Reply Card

Radamec EPO Ltd. 17353
Automated camera support equipment, ARC Advanced Robotic Control, Cue Computer for simultaneous multicamera movement with data tablet, touchscreen interfaces, RP2/RP2H free-roaming pedestals.
Circle (908) on Reply Card

Radiation Systems/Mark Antennas 15766
Microwave antenna products.
Circle (909) on Reply Card

Radio Computing Services 5202
Music library software; complete digital audio and data networks; live assist studio or full automation software for radio.
Circle (910) on Reply Card

Radio Daze 1710
Information not available
Circle (911) on Reply Card

Radio Design Labs 5406
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Circle (912) on Reply Card

Radio Express 4903
Information not available
Circle (913) on Reply Card

Radio Systems 3012
RS series audio mixers; RS-1000 DAT audio tape recorder; aualog, digital master clock/timer systems; mono, stereo DAs; DDS Digital Delivery System for on-air, a multi-user operating system with user panels for access to various digital and analog sources.
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RAM Broadcast 3002
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Ramsa Audio/Panasonic 18001
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Rank Cintel 12441
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RCI M1135
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Circle (919) on Reply Card

RCI Systems Inc. 3702
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RE Electronics 3801
Test, measurement equipment for audio, RDS data transmission products.
Circle (921) on Reply Card

Rebo Studio 10353
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Circle (922) on Reply Card

Recognition Concepts 10556
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Rees Associates 16631
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Circle (924) on Reply Card

Register Data Systems 4508
Complete business software packages for broadcast with sales, traffic, billing, accounting systems.
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Research Technology Int'l/RTI 13646
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RF Industries 19481
Information not available
Circle (927) on Reply Card

RF Plante 11059
Radio transmission systems.
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RF Technology 11303
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RGB Computer & Video M1403
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RGB Spectrum M1714
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Circle (931) on Reply Card

Richardson Electronics 12901
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Rohde & Schwarz 13107
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Roland Corporation 3406
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Rorke Data 11555
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Ross Video 15704
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The M S Russin Group, Ltd. 13413
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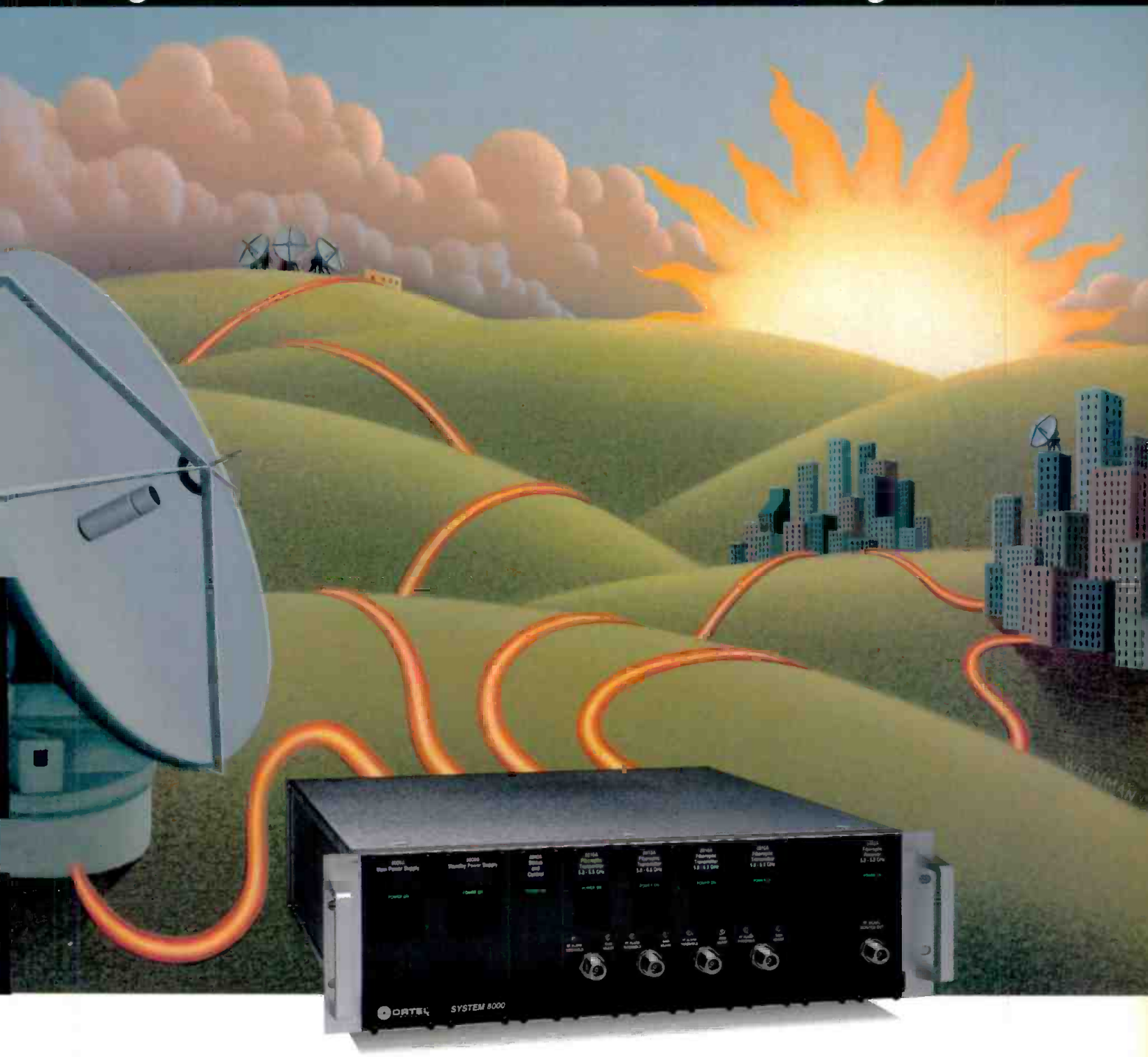

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Samson Technologies 12436
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San Francisco Satellite Center 13633
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Circle (941) on Reply Card

Sandar Electronics 3703
Audio recorders for film.
Circle (942) on Reply Card

Sanix Corporation 13646
Bulk audio/video tape eraser systems.
Circle (943) on Reply Card

Sanken/Audio Intervisual Design 2002
Lavalier, handheld and other microphone products.
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Satellite Communications 10857
Information not available
Circle (945) on Reply Card

Savage Technology M1701
Information not available
Circle (946) on Reply Card

SCA Data Systems 4208
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Scala Electronic 15726
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Schafer World Communications 4022
CD automation system.
Circle (949) on Reply Card

ScheduALL by Vizuall Inc. 11662
Information not available
Circle (950) on Reply Card

Schmid Telecommunication 1606
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Circle (951) on Reply Card

Schwalm/Power Technologies 19562
Information not available
Circle (952) on Reply Card

Scientific Atlanta 13825
Satellite communications equipment, earth station antennas, video receivers, antenna controllers.
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Scott Studios 4020
Radio automation systems.
Circle (954) on Reply Card

Selco Products 4618
Equipment replacement components, R32AF VU meters and Collet Knobs.
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Sennheiser Electric 12136
Headphone, microphone and wireless RF products; TLM 193 large diaphragm cardioid condenser mic.
Circle (956) on Reply Card

SESCOM 13601
Audio signal distribution products; ENG utility Field News Bridge.
Circle (957) on Reply Card

SG Communications 16627
Tower design, engineering, fabrication; tower accessories, modification; turnkey site development and construction, antenna installation.
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Shereff Systems 15764
PC-based titlers, Pro Video VGA-16.
Circle (959) on Reply Card

Shively Labs 4224
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Shook Electronics
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Shotmaker Dollies & Cranes 15177
Camera support equipment, Super Panther, Mini Panther camera dollies, remote cranes; expandable sleepers.
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Information not available
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Siemens Audio Inc. 16623
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Sierra Video Systems 17443
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Sigma Electronics 16260
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Signal Technology Corp. 19435
Digital signal filters.
Circle (969) on Reply Card

Silicon Graphics M1102
Graphics computer platforms; 601/D-1 option for Galileo video; Cosmo Compress for Indy, Indigo and Indigo^2; Silicon Studio Solutions; interactive video and broadcast.
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Sinar Bron 16365
Lighting products.
Circle (971) on Reply Card

Sira Sistemi Radio s.r.l. 16258
FM, TV transmission antennas, UTV-01 and 3VTV panel antenna designs.
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Skaggs Communications 19125
Information not available
Circle (973) on Reply Card

SKB Case Company 18681
Equipement transport cases.
Circle (974) on Reply Card

Smarts Broadcast Systems 5224
Radio autiomation systems.
Circle (975) on Reply Card

Smith Systems M1515
Information not available
Circle (976) on Reply Card

SMPTE 12906
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Snell & Wilcox (See also CEL) 19746
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Softech Systems Inc. 18483
Computerized newsroom systems.
Circle (979) on Reply Card

Softimage 16675
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SoftTouch 16943
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Solid State Logic 19158
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Solidyne 1615
Information not available
Circle (983) on Reply Card

SONEX Acoustical Products 2103
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Sound Ideas 11703
Production music, effects products, libraries.
Circle (990) on Reply Card

Soundcraft 15713
Audio mixer systems, SAC 200 production and on-air consoles, Delta series consoles.
Circle (991) on Reply Card

Soundtrack
Production music; ADS UP!.
Circle (992) on Reply Card

Specialized Communications 13062
Information not available
Circle (993) on Reply Card

Specialty Connector 15484
Information not available
Circle (994) on Reply Card

Spectral Synthesis 2801
Digital audio workstations.
Circle (995) on Reply Card

Sports Network 2206
Information not available.
Circle (996) on Reply Card

Sprague Magnetics 1612
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Circle (997) on Reply Card

Sprint Video Group
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Circle (998) on Reply Card

Sprocket Video Technologies 20016
Utility devices, serializers, deserializers.
Circle (999) on Reply Card

Staco Energy Products 1713
Information not available
Circle (1000) on Reply Card

Stagecraft Industries
Information not available
Circle (1001) on Reply Card

Standard Communication 16075
Satellite TV products, Agile Omni Broadcast MT-830; Intnl MT-830I satellite TV receivers.
Circle (1002) on Reply Card

Stanton Magnetics
Phono pickups, 890AL DJ Pro; headphones.
Circle (1003) on Reply Card

Stanton-Video Services Unltd. 19739
Camera support products.
Circle (1004) on Reply Card

Star Case 13624
Transport cases for equipment, components, rack-mount types.
Circle (1005) on Reply Card

Steenbeck 18814
Video, film edlting, transfer systems.
Circle (1006) on Reply Card

Stereographics M1710
Information not available
Circle (1007) on Reply Card

Storage Dimensions M1529
Information not available
Circle (1008) on Reply Card

Storeel 17612
Videotape storage systems, Room Stretcher Hi-Roller small format storage with pull-out trackless feature; Room Stretcher Express.
Circle (1009) on Reply Card

Strand Lighting 13818
Lighting fixtures, control products.
Circle (1010) on Reply Card

Strassner Editing Systems 19978
Video editing control equipment, Version 6.0; EdiQit Windows-based edit controller kit.
Circle (1011) on Reply Card

Studer Digitec 1213
Numisys cart systems, editing systems.
Circle (1012) on Reply Card

Studer ReVox 1213
Mixers; CD players/recorders, D740; audiotape recorders, A807A 4-track; telephone hybrids; R-DAT recorders; digital, analog switchers, DAWs; automation systems.
Circle (1013) on Reply Card

Studio Audio Digital Equipment 5525
Professional digital audio workstations.
Circle (1014) on Reply Card

Studio Spectrum Inc. 19986
Information not available
Circle (1015) on Reply Card

Studio Technologies 13618
Mic pre-amps; audio processors, stereo simulators; DAW accessories; Model 80 stereo analog audio DAs; AES/EBU digital audio DA.
Circle (1016) on Reply Card

Studio Technology
Custom broadcast furniture.
Circle (1017) on Reply Card

Sumitomo Electric 10060
Split screen displays, VIEWPLEX-2000 shows up to 16 different channels on one monitor.
Circle (1018) on Reply Card

Summit Software Systems
Information not available
Circle (1019) on Reply Card

Sun Micro Systems M 612
Graphics computer platforms.
Circle (1020) on Reply Card

Sundance Technology Group 19105
Editing products with MAC software control, Q-CUT editing, Q-BASE logging database.
Circle (1021) on Reply Card

Superior Electric 4914
Electronic and electrical control equipment; STABILINE series power protection equipment; UPSY uninterruptible power supplies, power conditioners, transient suppressors, RFI filters; WHR series voltage regulators; AC disturbance monitors.
Circle (1022) on Reply Card

Sure Shot Teleproductions 16624
Ku-/C-band transportable earth stations; production facilities, transportable equipment.
Circle (1023) on Reply Card

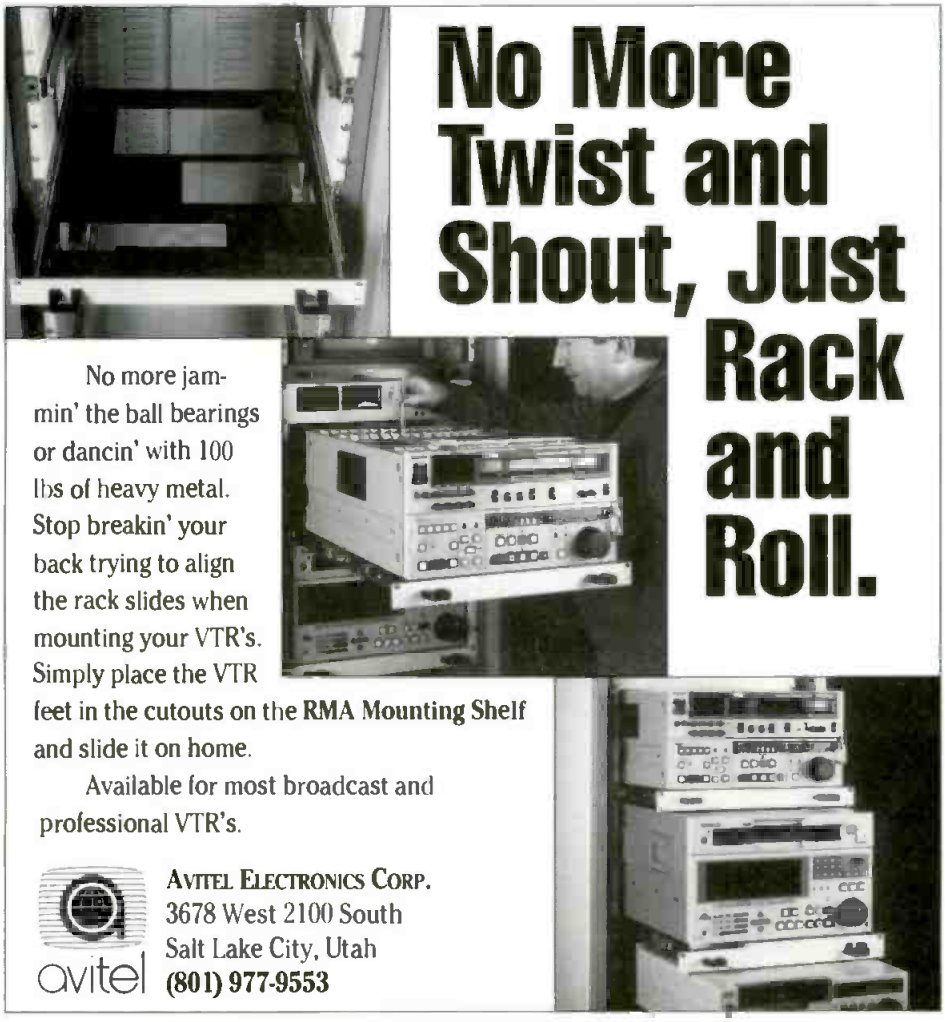
SVS M1434
Information not available
Circle (1024) on Reply Card

Swintek Enterprises 11705
Wireless mic, intercom products, Mark 200 intercoms, Mark Q/ENG microphone;s Mark IL UHF wireless microphones.
Circle (1025) on Reply Card

Switchcraft 4909
Shell-less, Weathertight and QG connectors; solderless plugs; video patch panels, cords; cable assemblies; jacks, plugs, switches.
Circle (1026) on Reply Card

SWR Inc. 16043
RF feedline products; broadband TV antennas, FM antennas, Field Engineer Service, 5-year limited parts, labor warranty; MMDS antennas.
Circle (1027) on Reply Card

Symetrix 4622
Audio processors, 528 Voice processor, 511A single-ended noise reduction system.
Circle (1028) on Reply Card



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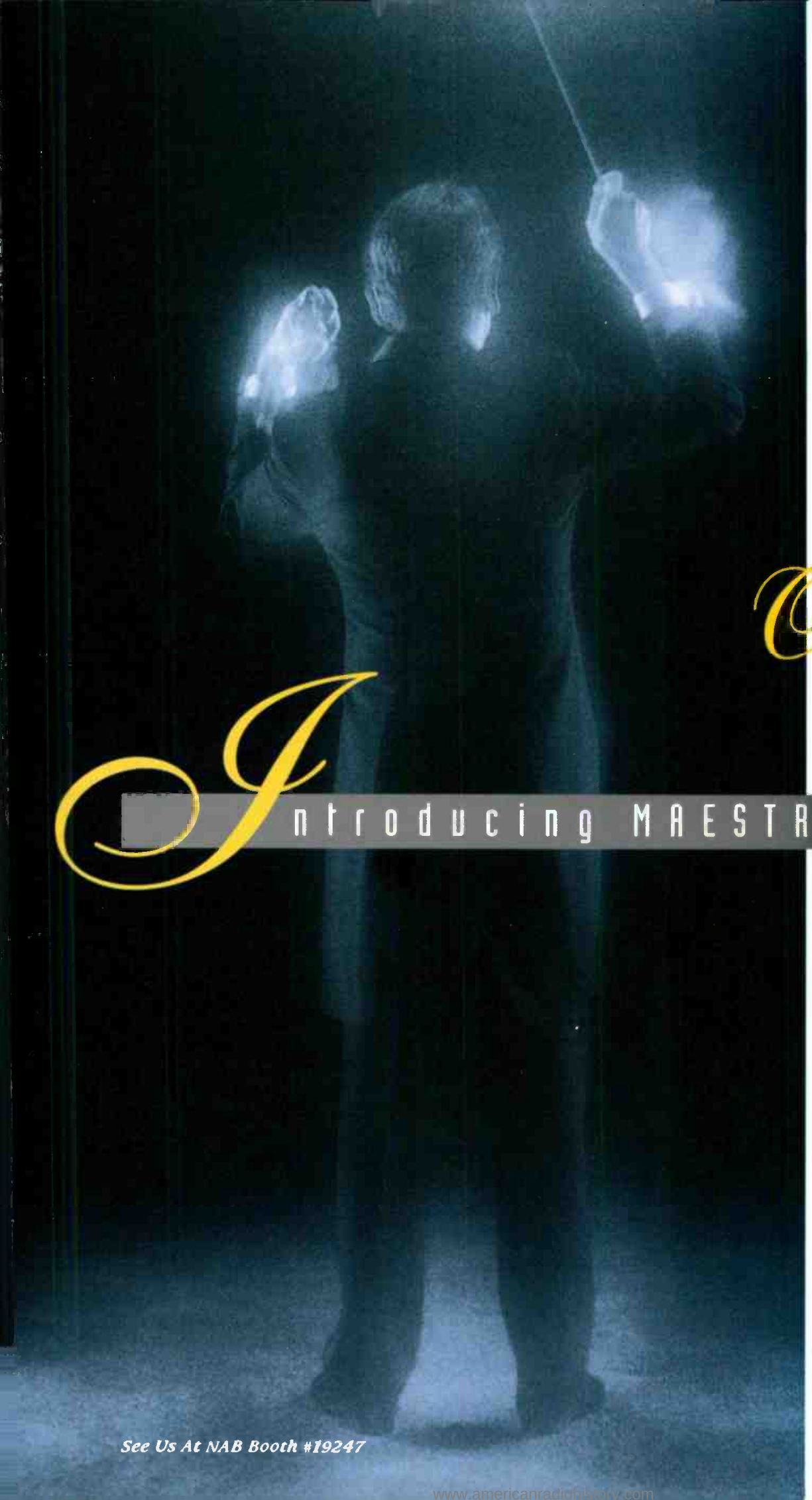

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Synelec M 201
PRISM graphic workstation display walls, 72" retroprojectors.
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SYSTEK 16383
Information not available
Circle (1030) on Reply Card

System Associates 13432
Used broadcast and TV production equipment brokers.
Circle (1031) on Reply Card

Systems Wireless 13636
Wireless microphone systems, HME series 800 UHF wireless intercom system; field production wireless equipment from Vega, Lectrosonics.
Circle (1032) on Reply Card

T

Tally Display Corp. 13162
Indicators using matrix-type characters to identify and indicate status of equipment; red, green, yellow colors; senses router configurations, etc.
Circle (1033) on Reply Card

TAO/Tech.Aesthetics Operations 19438
Edit controller and editing systems, including Editizer Macintosh versions.
Circle (1034) on Reply Card

Tapscan 1325
Marketing research systems, QualiTAP, TargetONE.
Circle (1035) on Reply Card

Target Vision M 101
TVOs 5.4 multimedia networks for employee communications; TVI DeskTop V2 PC-based text and graphics message system.
Circle (1036) on Reply Card

TASCAM 15669
Audio recorders, BR-20T with center time code track; CD-301, CD-601 CD players; M-1500 series audio mixers.
Circle (1037) on Reply Card

Taurus Communications Inc. 19728
Full service telecommunications services.
Circle (1038) on Reply Card

TCS-Tripp Communications 15380
Videocassette, CD organizer/storage cabinets; double-density mobile or static cabinets fit room space limitations; Roll-Around trucks for videocassette applications.
Circle (1039) on Reply Card

Teccom 20024
Information not available
Circle (1040) on Reply Card

Tech Electronics 18881
Information not available
Circle (1041) on Reply Card

Techflex 17784
FLEXO sleeving, braided monofilament cable, wiring harness managementand protection products.
Circle (1042) on Reply Card

Techni-Tool 13143
Special purpose tools.
Circle (1043) on Reply Card

Technical Necessities 11129
Information not available
Circle (1044) on Reply Card

Technidisc M1123
Information not available
Circle (1045) on Reply Card

Technosystem SpA 19575
Microwave links; modulators, converters, solid-state translators, transmitters; tube translators; RF transmission accessories; turnkey transmitter station, network designs, construction; field maintenance service.
Circle (1046) on Reply Card

Tecnologie Elettroniche Milano/TEM 4906
Radio/TV transmitters, translators.
Circle (1047) on Reply Card

Tekskil Industries 18272
Videoprompting systems, Companion and 14" Easy View studio prompter.
Circle (1048) on Reply Card

Tektronix 17119
TV, audio test, measurement and monitoring equipment for broadcast, cable production, manufacturing, audio, telecommunications environments; waveform/vector monitors, signal generators, synchronizers; Profile disk recorder; ECO422 synchronous changeover instruments; ASW-100 audio switchers; DS1200 demodulator systems.
Circle (1049) on Reply Card

Tel-test 11908
Automation products, MCx2SS master control switcher; ACC air channel control automation.
Circle (1050) on Reply Card

Telecast Fiber Systems 12747
Cable utility products, reels.
Circle (1051) on Reply Card

Telemetrics 18951
Camera support, control products, robotic pan/tilt systems and ENG camera triax adapters; camera CCU; video switcher; PC notebook control panel/software.
Circle (1052) on Reply Card

Telepak San Diego 19107
Equipment transport products; convenience items, T-Brief Producer/Director briefcase; full line of soft-sided carrying cases for portable video equipment.
Circle (1053) on Reply Card

Telescript 19442
Studio and portable monitor prompting systems; computer prompting software for IBM-compatible PCs; computer prompting delivery systems for desktop, laptop, notebook and newsroom.
Circle (1054) on Reply Card

Television Engineering 13117
Mobile TV production, ENG vehicles; system design, construction; IFB controller.
Circle (1055) on Reply Card

Television Equipment Associates 13411
Video filters, baseband video switched box delay lines; delay lines and filters for end-users and OEMs; subcarrier filters; boxed noise elimination filters; Matthey HDTV filters and delay products.
Circle (1056) on Reply Card

Telex Communications/Pro A-V 17115
Audio tape duplication units, Model 6120 high speed system; wired, wireless mic, ENG-4 portable wireless receiver; headsets.
Circle (1057) on Reply Card

Telos Systems 5200
Telephone hybrid products, Telos LINK telco-intercom interface, Telos ONE hybrid.
Circle (1058) on Reply Card

Tennaplex Systems 15726
Broadcast antenna products for FM, TV, HDTV offering omnidirectional and custom patterns.
Circle (1059) on Reply Card

Tentel 13408
Videorecorder repair and maintenance equipment; Tentelometer dynamic tape tension meter; TQ-Dial torque, TSH reference plane, head protrusion and drum eccentricity gauges.
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Texscan MSI 17985
Information display, digital insertion systems.
Circle (1061) on Reply Card

TFT Inc. 1908
STL systems, EIS 911 EBS system, low cost, easy add-on; EIS 912 encoder; DSS92 digital subcarrier system for video STL and satellite applications.
Circle (1062) on Reply Card

Theatre Service & Supply 13638
Studio furnishings, studio cyclorama curtains, track systems; scenic supplies, grip equipment.
Circle (1063) on Reply Card

Thermodyne International 13127
Equipment transport cases.
Circle (1064) on Reply Card

Thomcast 16113
VHF and UHF TV transmitters; AM and FM radio transmitters; TV and radio antenna systems, digital video processing products, Colorado color manipulation; 4:2:2 keyer for mixing, keying; TTV series CCD cameras, TTV1250 HDTV portable camera.
Circle (1066) on Reply Card

Thomcast France 16113
Broadcast systems engineering of complete stations and networks worldwide; wide range of solid-state and tube transmitters for TV from 1W to 40kW (2x20kW) in Bands 1 to 5, FM from 1W to 10kW.
Circle (1067) on Reply Card

Thomson Tubes Electroniques 12208
RF power devices for terrestrial broadcast applications; HPA, TWT devices for satellite, microwave communications; Inductive Output device using Pyrobloc Technology; new concept in power-grid tubes for UHF TV.
Circle (1068) on Reply Card

Thomson-LGT (see Thomcast) 16113
Information not available
Circle (1069) on Reply Card

3M Pro A/V Product 16605
Audio, video recording media.
Circle (1070) on Reply Card

360 Systems 5420
Audio routing switchers, audio recording equipment.
Circle (1071) on Reply Card

Tiffen Manufacturing 16636
Lighting modification gels; FILTERFLEX matte boxes; David & Sanford tripods.
Circle (1072) on Reply Card

Time Logic Inc. 16374
Editing systems; tape control automation.
Circle (1073) on Reply Card

TimeLine 1702
Time-code products; transport synchronizing systems; LYNX digital audio workstations.
Circle (1074) on Reply Card

TM Century 1526
Radio station automation, Digital Commercial System with hard disk storage.
Circle (1075) on Reply Card

TMT electronics AG 19841
Information not available
Circle (1076) on Reply Card

TOA Electronics/Digital Mixing Sys. 19471
Sound reinforcement, recording consoles.
Circle (1077) on Reply Card

Torpey Controls & Engineering 13415
Utility timing products, analog/digital time displays, STW-5 digital timer.
Circle (1078) on Reply Card

Torque Systems M 821
Information not available
Circle (1079) on Reply Card

Toshiba Corporation 11841
Digital SNG/LINK systems; HDTV products, CCD cameras, VCRs, picture computers, FO transmission equipment; NTSC/PAL CCD cameras; Hi8 cameras, camcorders; desktop video production equipment.
Circle (1080) on Reply Card

TouchVision Systems 16066
Videotape editing controllers, D/Vision multimedia and Pro professional systems; full-motion, broadcast video from PC platform.
Circle (1081) on Reply Card

TRF Production Music Libraries 14044
Production music libraries.
Circle (1082) on Reply Card

Trident Audio 5106
Audio consoles for broadcast, tele-/post production. Vector 432.
Circle (1083) on Reply Card

Troll Technology 13801
Remote control facilities for ENG, camera systems, including TS-1400AVd, TS-1900AVd, TS-210, TS-940SL; UCC1000R communication hub; Troll Cam; Skypod live airborne news gathering system.
Circle (1084) on Reply Card

Trompeter Electronics 12801
BNC connectors; patching, distribution products.
Circle (1085) on Reply Card

TrueVision/RasterOps (M1415) 11559
Electronic graphics cards; TrueVista Pro; Targa 2000; computer products, graphics boards, test equipment and video editing systems.
Circle (1087) on Reply Card

TSM/Total Spectrum Manufacturing 17107
Studio camera automation equipment; robotic camera support products, SportsFocuser and ACP AutoCam series.
Circle (1088) on Reply Card

TTC (Larcan-TTC) 15708
HDR (High Definition Ready) IOT SeriesUHF Transmitters; solid state UHF transmitters for TV in various power levels; plus FMS-4000 4kW transmitter, Model X Exciter and FMS-100 transmitter all for FM radio.
Circle (1089) on Reply Card

TWR Lighting 2704
Tower lighting products.
Circle (1091) on Reply Card

U

Ultimatte Corporation 16869
Video compositing systems, the Ultimatte 300, FORMATTE, SYSTEM 6, Ultimatte 45 for mid-sized facilities; Matte Shading; Memory Head motion control; Ultimatte 7 digital.
Circle (1092) on Reply Card

Union Connector 16435
Power distribution equipment, Polybox company switches, CS connector strips.
Circle (1093) on Reply Card

Unique Business Systems 16473
Productivity, business software; RentTrace rental equipment availability tracking.
Circle (1094) on Reply Card

UniSet Corporation 11701
Studio furnishings, sets.
Circle (1095) on Reply Card

United Ad Label 19119
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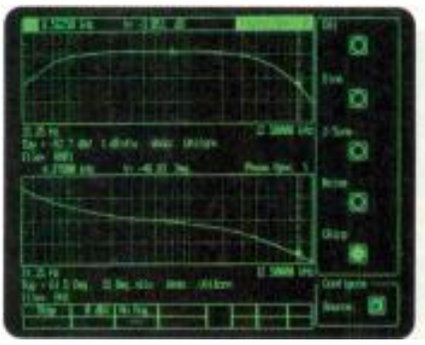
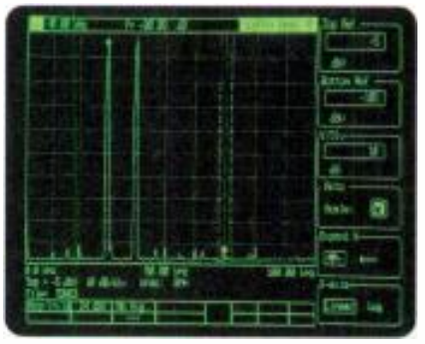
- ☑ Frequency response measurements (Bode plots) to 100 kHz with 0.05 dB accuracy?
- ☑ THD, 1/3 octave, band and sideband analysis?
- ☑ A clean source that does sine waves, white and pink noise, frequency chirps and two-tone signals?
- ☑ 476 µHz to 100 kHz measurement range?
- ☑ An input range of -60 dBV to +30 dBV?
- ☑ Limit tables for GO/NO GO testing?
- ☑ Math functions, selectable windows and direct hard copy outputs?
- ☑ RS-232 & GPIB computer interfaces and a 3.5" DOS disk drive?



Using the SR770's low distortion (-80 dBc) synthesized source, Bode plots of amplitude, phase and group delay are quickly generated.



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The F J Westcott Company 15481
Illuminator reflectors; portable, collapsable scrims & mags in customized kits; portable, collapsable chroma key Illuminator backgrounds in green and blue.
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Westinghouse
SURESINE active power line conditioner.
Circle (1167) on Reply Card

Wheatstone Broadcast Group 5108
Audio mixing consoles, A-6000 Air Master, TV-600 master audio control console; signal processing equipment; modular studio furniture; digital audio hard disk system.
Circle (1150) on Reply Card

Whirlwind/US Audio 11627
Audio mixers, MIX5-SB 4-channel mixer; audio, video cabling, distribution products; transformers.
Circle (1151) on Reply Card

Will-Burt 19203
Telescoping masts, TMD-7-42-367 microwave antenna support; 25' Hurry Up; AC Alert live power line detectors for telescoping masts.
Circle (1152) on Reply Card

Winsted Corporation (M1715) 11927
Special purpose video, studio furnishings, Model E4835 dual pedestal editing desk and K8643 editing console; Cabinet Design kits; Locking rack shelves; Avid and Matrox desks; black mini consoles for multimedia use; recessed monitor consoles; WELS software program for designing modular Winsted furniture.
Circle (1154) on Reply Card

Wireworks 13607
Audio, video utility products, T series individual transformer isolated mic splitters; System 502 A/V cabling components.
Circle (1155) on Reply Card

Wohler Technologies 19539
MSM multisource meters, ARS routers and AMP series monitors; surround sound monitor, digital VTR (AES/EBU) audio monitor.
Circle (1156) on Reply Card

Wolf Coach 16106
Mobile production vehicles.
Circle (1157) on Reply Card

World Broadcast News magazine (M706) 10359

WSI 13343
Weather data services, display products, WEATHERspectrum 9000 workstation.
Circle (1158) on Reply Card

X

Xaos Tools M1329
Video graphics and digital effects software for Silicon Graphics and Macintosh platforms.
Circle (1159) on Reply Card

Y

Y/C Plus M1814
Solutions for Amiga/toaster users; Y/C Plus S-VHS adaptor for toaster.
Circle (1160) on Reply Card

Yale Electronics 1714
Distributor; components; racks; panel, cable connectors.
Circle (1161) on Reply Card

Yamaha Music 13840
Audio mixers; DMC 1000 digital automated recording console; YPDR 601 compact disc recorder.
Circle (1162) on Reply Card

Yamashita Engineering Mfgr/YEM 17744
Video processing equipment, scan converters; digital EDTV decoder, sync generators; distribution amplifiers; CG switchers.
Circle (1163) on Reply Card

Z

Zaxcom 19742
HUB/HCP series TBC/Machine controllers; DMX1000 hard disk audio storage; RTR100 stereo audio router; SRC100 sample rate converter; VTR100 VTR control system; DMX500 low-cost digital mixer for post-production, broadcast; digital proc-amp;
Circle (1164) on Reply Card

Zero Stantron 13115
Modular equipment racks, consoles and cabinets.
Circle (1165) on Reply Card

Zonal 16325
Audio recording tape and film.
Circle (1166) on Reply Card

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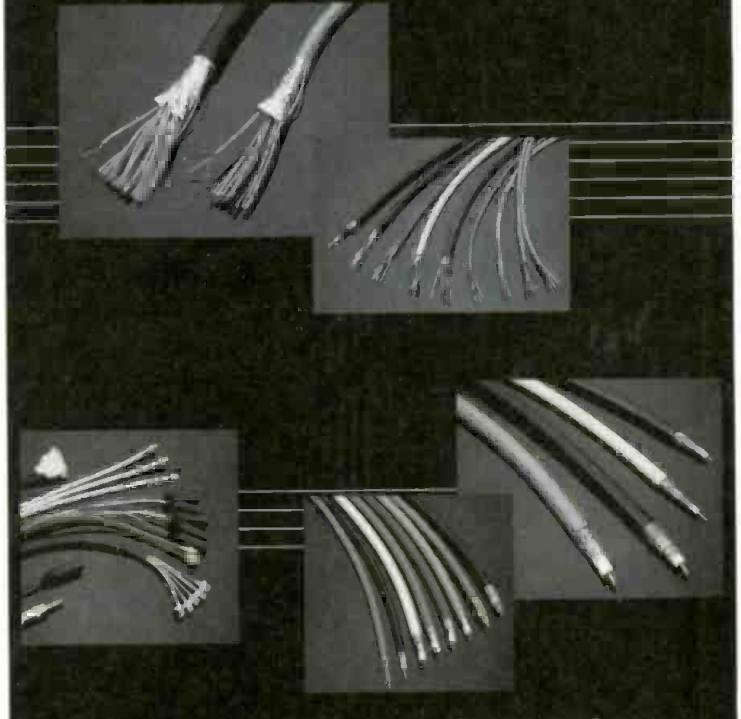

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Field Report

Fujinon S16X lens

By Dick Hogg

KJRH, a Scripps/Howard station located in Tulsa, OK, firmly believes that in order to make television work, you must invest in your future. A project was just completed that revitalized the entire ENG department in hopes of winning broadcasting ground at the local news level.

An NBC news affiliate, KJRH TV-News Channel 2 travels throughout northeast Oklahoma reporting on local news stories. Though not a norm, photographers do travel into outlying areas for major news stories like the recent floods in St. Louis. An extensive sports department covers national sporting events, such as the Super Bowl and also supplies coverage of home games for the Kansas City Chiefs and the Dallas Cowboys.

In an area where traditionally, little money is invested by small stations, KJRH decided it was time to make a bold move.

Time for new equipment

To keep up with the station's demanding schedule, it was decided that older equipment could no longer suffice. This led to the discussions of new ENG camera acquisitions, which began in October of 1992. Through normal attrition, many of the station's cameras and lenses were no longer functioning properly. In an area where, traditionally, little money is invested by small stations, KJRH decided it was time to make a bold move.

The project was led by Vic Turner, director of engineering, and myself, and consisted of extensive evaluations of every camera available in the United States. The station had not bought a new camera in quite a while, so we felt that it was important that the cameras be used on assignment and then assessed.

Hogg is assistant chief photographer, KJRH-TV, Tulsa, OK.

Performance at a glance:

- *Economical hand-held zoom lens*
- *Quality optics*
- *Uses aspheric technology*
- *Rugged, lightweight construction*
- *Smooth, quiet operation*
- *Designed for ease of use*

Lens evaluation

It was decided the evaluation would consist of actual field use of the equipment. This would not only demonstrate functions and features of each camera, but would allow the user to experiment with handling and maneuverability — both of which are equally important.

With lenses playing such a major role in today's camera purchase, a number of decisions had to be made in the final stages of the evaluation. With cameras available in chip sizes of either 1/2-inch or 2/3-inch, it became important for the station to understand the differences between lenses. The station soon discovered that not every manufacturer made lenses attachable to every camera. By determining the lenses and cameras that did work together, the station was then able to choose the combination that would best suit its needs.

In the summer of 1993, KJRH decided that it wanted to continue using the M2 format and chose 1/2-inch chip Panasonic cameras. Lens evaluations began in October of 1993 and were recently completed. Although price was a concern, the station was also intent on finding a lens to provide the features and capabilities for which it was looking. After many hours of testing, the station decided that its lens of choice would be Fujinon's S16X6.7ERM.

Lens evaluation has become almost equally as exhausting as that of evaluating the camera. With technology bringing lenses to a new plateau, there are many considerations other than price to be made when purchasing a lens. Most educated buyers understand that the image the camera is going to capture first comes through the lens, and thus, lens features and performance are of vital importance.

Lens evaluation has become almost equally as exhausting as that of evaluating the camera.

Evaluations of all products were extensive because this was a major project for us in expanding our ENG capabilities. We feel we have found the camera/lens combination that best fulfills the needs of our busy station. Service played a major role in our decision. When our equipment goes down, we need to know that we have the support system behind us to get it back in operating order. We had problems with that in the past and wanted to make sure that it would not be an issue.

This is one of the first stations that I have worked for that has truly invested in its ENG field equipment. Tulsa is the second largest city in Oklahoma and gets a good amount of national publicity. The station made an aggressive, proactive decision in making this idea a reality. We hope that others follow suit to get local news broadcasting back on the map.

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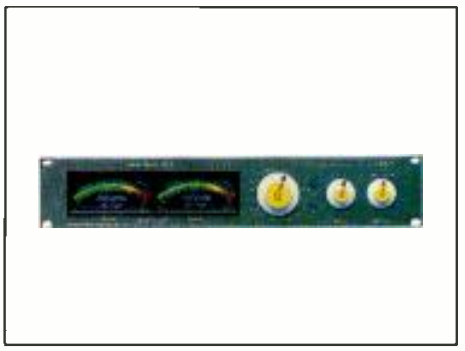
Field Report

Dorrough Model 1200 stereo signal test set



By Dennis R. Ciapura

Stereo audio signal monitoring at radio and TV stations is one of the more subjective areas of broadcast engineering. Some engineers prefer oscilloscope monitoring, some like comprehensive metering and some insist on both. A scope display of a Lissajous pattern yields an instantaneous overview of signal status, while a metered display provides quantified data. For those who want easily interpreted metering, the Model 1200 stereo signal test set is probably the ultimate utility.

Figure 1 shows a block diagram of the Model 1200. The inputs can be accessed either through rear panel screw terminal strip connections or via loop-through XLR connectors. This loop-through feature is convenient because it allows for easy insertion of the instrument in an existing rack-mounted system. The input circuitry is active balanced with 40k input impedance, which ensures negligible loading and ease of interface. When properly installed, the test set should be an electrically transparent addition to the system.

Ciapura is executive vice president of Noble Broadcast Group, San Diego.

Circuit description

After the input buffering, sum and difference audio signals are derived from the left and right inputs. The input amplifiers have 30dB of gain, but unity gain can be selected using the "high" position of the range control. The function selector then feeds either left and right or L+R and L-R to the attenuators and meter drivers. Audio monitoring is available from stereo phone jacks located on the front and rear panels. The front-panel jacks are fed from an additional booster stage to provide a full 1W output to drive headphones or small speakers.

The main attenuator is a high-quality, ganged, 1dB per step unit, calibrated in dBV. With 40dB of meter scale resolution, 30dB of step attenuation and 30dB of ranging, the test set provides 100dB of test and measurement scaling. This makes noise and crosstalk measurements easy to perform and ensures that enough attenuation is available to handle even the most monstrous levels.

Unique metering capability

The meters are a combination of true peak and average indicators in the same display. A solid LED bar arc traces the average level, while peak amplitudes are indicated by a single higher LED segment whenever the peak value exceeds the average amplitude. With pure tone inputs, the displays merge and the peak response is fast enough to show a 3dB peak-to-average differential with a triangular input. The LED scale is green up to -10dB. From -10dB to -1dB, it's yellow, and from 0 to +3dB it's red. This correlates well to typical broadcast audio, which normally exhibits peak levels approximately 10dB above the average level.

With the test set, the peak-to-average ratio is immediately apparent. Although Dorrough labels the meters "Relative Loudness to Peak Modulation," and peak-to-average ratio is certainly a key component of loudness, there is no frequency-dependent weighting. In fact, the metering response is flat from 50Hz to 15,000Hz, with -3dB points at approximately 10Hz and 50,000Hz. The difficulty in arriving at response weightings for loudness representation lies with the response of a listener's reproducer and acoustic environ-

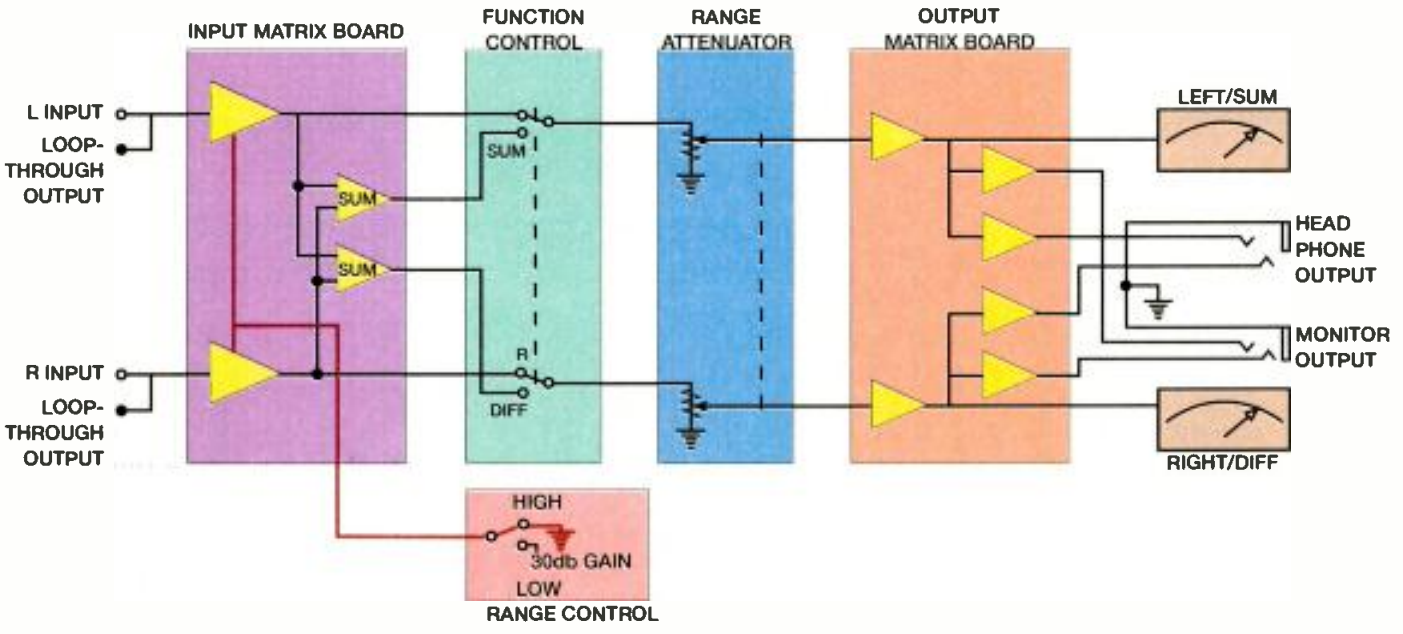


Figure 1. A block diagram of the Dorrough Model 1200 stereo signal test set.

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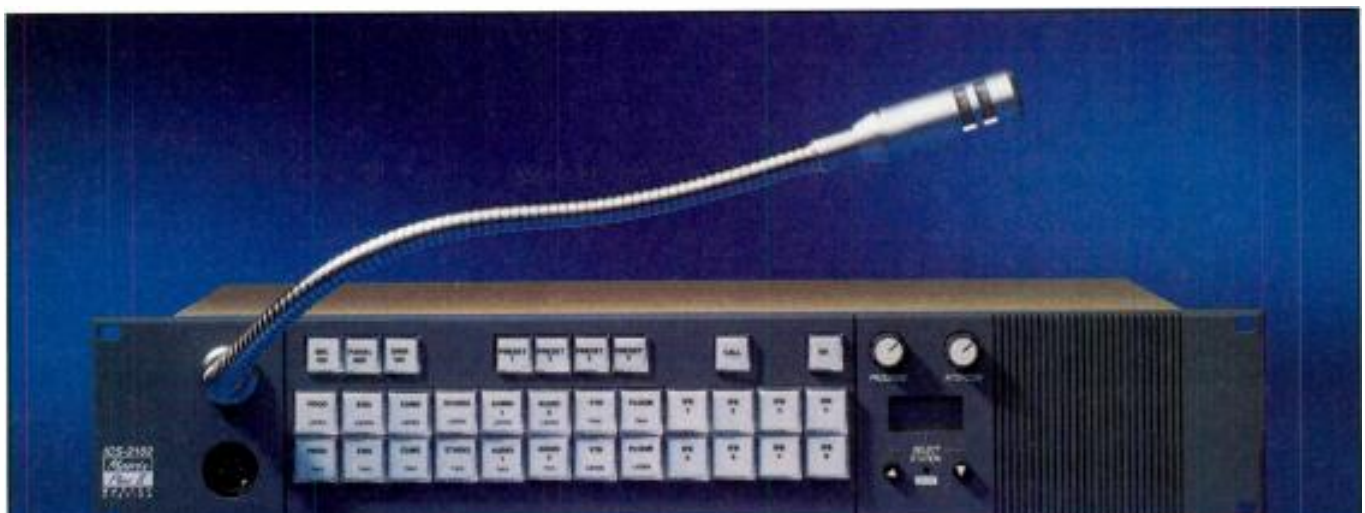

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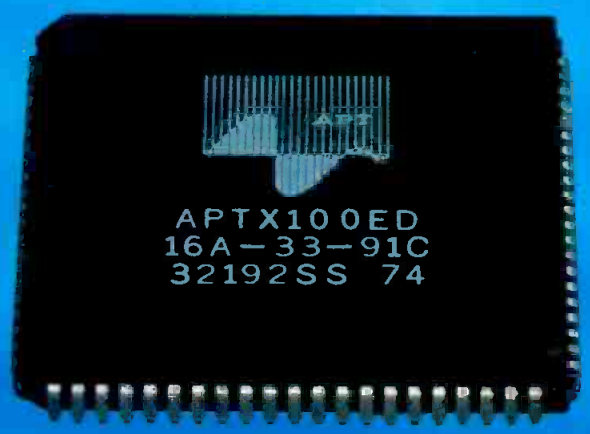

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ment, which must be known for true loudness data to be accurate. Thus, most broadcasters are better served with an unweighted peak-to-average indication. Users with specialized applications in mind can apply the desired weighting to the input audio.

Scale accuracy of the test sample was better than 1dB over the 40dB range. That may not seem exceptional until you consider trying to resolve a standard VU meter reading within 1dB below the -20dB mark on the scale. The persistence time constant of the LED average level bar arc is slower than standard VU ballistics, but most program material produces average level indications within about 1dB of a VU indication for the same peak value.

Typical applications

Best uses for the test set fall into two broad categories: studio audio path monitoring and off-air evaluation. In each application, use of the test set potentially yields better audio, but in different ways: For studio applications, this improvement comes from minimizing the likelihood of audible channel balance and phasing problems, while with off-air monitoring it is useful for maximizing audio processing efficiency. Stereo TV and radio studio audio chains are subject to numerous aberrations that can easily go undetected. Mono sources should stay mono without interchannel phase and amplitude variations as they pass through the system.

It is difficult to provide a scope display that is useful to typical operating personnel. This is where the test set's ability to provide easily interpreted quantitative data is of value. For example, in a typical stereo TV application, using the device in the L+R/L-R mode can provide extremely useful information about what's happening with the audio as the control room switches through the array of mono, stereo and synthesized sources that are so much a part of today's program schedules. If a synthesizer that is supposed to switch out during real stereo programs gets stuck in the synth mode, the L-R display will show significant level during dialog when it should be near zero. It is easy to instruct the operators to notify engineering if the L-R meter is jumping into the yellow during a sitcom's dialog. It's another to hope that they will pick it up from a scope pattern. Channel phase inversions also are simple to spot because the L+R display goes nearly dead and the L-R jumps up.

One interesting radio application of the Model 1200 is for adjusting signal processing gear. As compression is increased, the average level will increase up to a point and then level off. More processing produces more artifacts and only slightly more loudness. One reason that so many stations sound over-processed is that they have never found this "sweet spot." The peak-to-average ratio for the station's actual program material is easily monitored with the test set, and it is obvious when the point of diminishing processing returns is reached. It also can be used to quantify what is happening with levels in a market, and its display is easy for non-engineering staff to interpret.

Overall, the Dorrough Model 1200 stereo signal test set is a pleasure to work with. It easily performs some functions that are awkward with other test equipment. It is fast and simple to use, and straightforward in design.

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➡ *For more information on the Dorrough Model 1200, circle (315) on Reply Card.*

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KUB Systems DANCE

By Mark Lapin

Short-form compositing and editing systems are approaching strategic crossroads, and potential purchasers are questioning which way to go. On the one hand, dedicated boxes designed to perform video processing tasks with a high degree of efficiency have dominated the market for the last 10 years. On the other hand, general-purpose platforms have been growing steadily more powerful. The new generation of Silicon Graphics and Macintosh Quadra platforms are now capable of running animation and compositing software offering many of the features once reserved for dedicated machines.

DANCE breaks new ground between dedicated boxes and general-purpose platforms.

The future clearly belongs to general-purpose systems, which are creating a downward price pressure that will eventually drive more expensive dedicated equipment out of the market. As things now stand, however, there are advantages to both sides. Dedicated solutions still hold a significant edge in speed and power, while general-purpose, software-driven platforms offer benefits in price, flexibility and user-friendliness.

The viewing audience, meanwhile, has become sophisticated and demanding in terms of effects quality. Lower production budgets no longer justify amateurish output, at least not in the eyes of the beholder. Even corporate and industrial videos must compete with the video gymnastics seen in high-profile commercials and network IDs.

Lapin is a technical writer and editor based in San Francisco. Respond via the *BE* FAXback line at 913-967-1905.

In this complex situation, KUB Systems of Foster City, CA, has developed a digital animation and compositing system designed to give users the best of both worlds. The company's objective was not to produce a middle-of-the-road compromise, but to offer a genuine middle ground — the speed and power of dedicated processing with the economy and convenience of general-purpose platforms, integrated in both a philosophical and technological sense.

A dedicated/general-purpose hybrid

The KUB product is called *DANCE, the Smart Choreographer.* DANCE stands for Digital ANimation Compositing and Effects. The system manipulates and composites multiple static images and live video inputs simultaneously in 3-D space at full resolution and in real time. Its operation is designed to give the user a previously unattainable degree of spontaneity and freedom in the creation of effects.

The system offers two flagship features: object-oriented compositing without layers using z-depth management and hierarchical global control. Unavailable even on top-end dedicated systems, these features allow the operator to freely move images in 3-dimensional space without regard to the sequence of layers.

KUB Systems has developed a digital animation and compositing system that give users the best of both worlds.

The DANCE system is a hybrid that uses a dedicated box to perform video processing in real time and a general-purpose platform (the Macintosh Quadra) to provide a mouse-driven, graphical environment for operators. Real-time digital animation and multi-image compositing thus become Mac-resident applications; a fact that will appeal to many operators who see themselves as artists first and computer-jocks second.

The DVE engine

On a hardware level, a fully-configured turn-key DANCE system consists of a Macintosh Quadra (with keyboard, mouse and 20-inch display), a dedicated box (or *object-oriented digital video effects [DVE] engine*) that handles all video processing functions, plus one background and three foreground live video inputs with their associated keys.

Full 10-bit, D-1 quality is used for both input and output. External devices, such as VTRs and digital disk recorders (DDRs) are controlled by a V-LAN network, RS-422 slave or GPI trigger. The full system has five framestores — two for static images and three for live video. Images are loaded into the framestores from live input channels or from Adobe Photoshop files. All framestores can be used to hold a single full-screen graphic, or they can be segmented to hold as many smaller images as can fit in the total buffer space. The DVE engine looks at the framestores in an object-oriented fashion, which means that you can select one, all, or any combination of objects (live or stored) for manipulation.

Full 10-bit, D-1 quality is used for both input and output.

During manipulation, the image elements are simultaneously composited and layered over the background. A lower-quality RGB signal is fed into the Mac, so that a representation of the video effect can be displayed on the screen at computer resolution with an overlay of appropriate handles and icons related to specific control functions. An ethernet

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link sends commands from the Mac to control the dedicated hardware.

The developers of the system felt there were two traditional approaches to video compositing — the editor's approach and the artist's approach.

Editing the artistic way

The developers of the system felt there were two traditional approaches to video compositing — the editor's approach and the artist's approach. Both aim at creative results, but the methods of getting there are extremely different. The editor's approach uses dedicated keyboards, buttons, switches and numerical controls. The artistic approach is more graphic, more intuitive, and less number-oriented. The major problem in either case is staff training. Each facility has its own way of doing things, which operators have to master more or less from scratch. Training time is scarce, however, because owners need to keep equipment constantly in use to maximize their investment.

DANCE offers a synthesis of competing approaches on a hardware level, but in terms of user interface, the developers have come down squarely on the artistic side. The goal was to make an interface similar to popular programs like Photoshop so that users who know Macgraphics can get up and running on DANCE within hours. Full compatibility with Photoshop also allows clients to bring images developed for print ads or brochures into their video effects.

The system's interface is designed to show all relevant information on one screen without overloading the operator. In all compositing, the user is constantly dealing with two domains — space and time. The user-interface for DANCE essentially lets you stick your hand into the time or space domain, grab the object you want and manipulate it at will. If you want to rotate an image, you reach into the animation window and turn it. If you want to move an object in time, you point to the desired position on the time-line and double-click the mouse.

Dancing through layers

Compositing without layers is the prime example of how DANCE takes the difficulty out of a once-complex process. Video compositing began approximately 10 years ago with the advent of DDRs. The great advantage of digital was that it allowed compositors to add layers without losing resolution. The great limitation of disk recording was that you were stuck with the layers you added. If you were going to do something with 50 layers, you had to plan them, build them and respect their priority. If you wanted to get something done quickly and economically, objects tended to stay in the layers to which they were first assigned. DANCE not only gives you the ability to mimic the way a DDR layers, but also provides advanced 2-deep compositing capabilities.

DANCE from KUB Systems includes a Macintosh Quadra with 20-inch display and a dedicated digital video processing box.

The system's interface is designed to show all relevant information on one screen without overloading the operator.

DANCE is designed with a hardware engine that looks at all images at once in an object-oriented, time-shared fashion. Nothing is being recorded or re-recorded. It's all done on the fly. The software/hardware interplay gives users the ability to grab an image and move it forward or backward in 3-D space. This Z-depth capability allows you to change the priority of objects on the fly without worrying about which layer they are on.

Meanwhile, the system's global control feature simplifies difficult animation moves. It allows the user to join multiple objects together and manipulate them as a group, without altering the movements of individual objects within the group.

The system's global control feature simplifies difficult animation moves.

Straddling the fence

One way to measure DANCE against other compositing and animation effects systems is to evoke the familiar Mac-to-DOS comparison. Dedicated systems fall into the DOS category, not because they give you less capability and power, but because they require you to issue specific, non-intuitive commands. DANCE has taken the "friendliness" of the Mac and applied it to a new realm. The concepts incorporated in the system are not revolutionary, but their application in the video industry is new.

Every system has its limitations, of course. DANCE is offered as a turn-key product. The user-interface software is highly expandable, offering access to current and future Mac applications, but the system's dedicated video processing hardware has certain built-in limitations in terms of processing power, layers, objects and inputs. Nevertheless, for the majority of users who have been weighing the advantages of today's dedicated vs. general-purpose platforms, DANCE provides a welcome compromise. Designed to provide advanced real-time compositing, animation and effects, DANCE systems sell for under $70,000.

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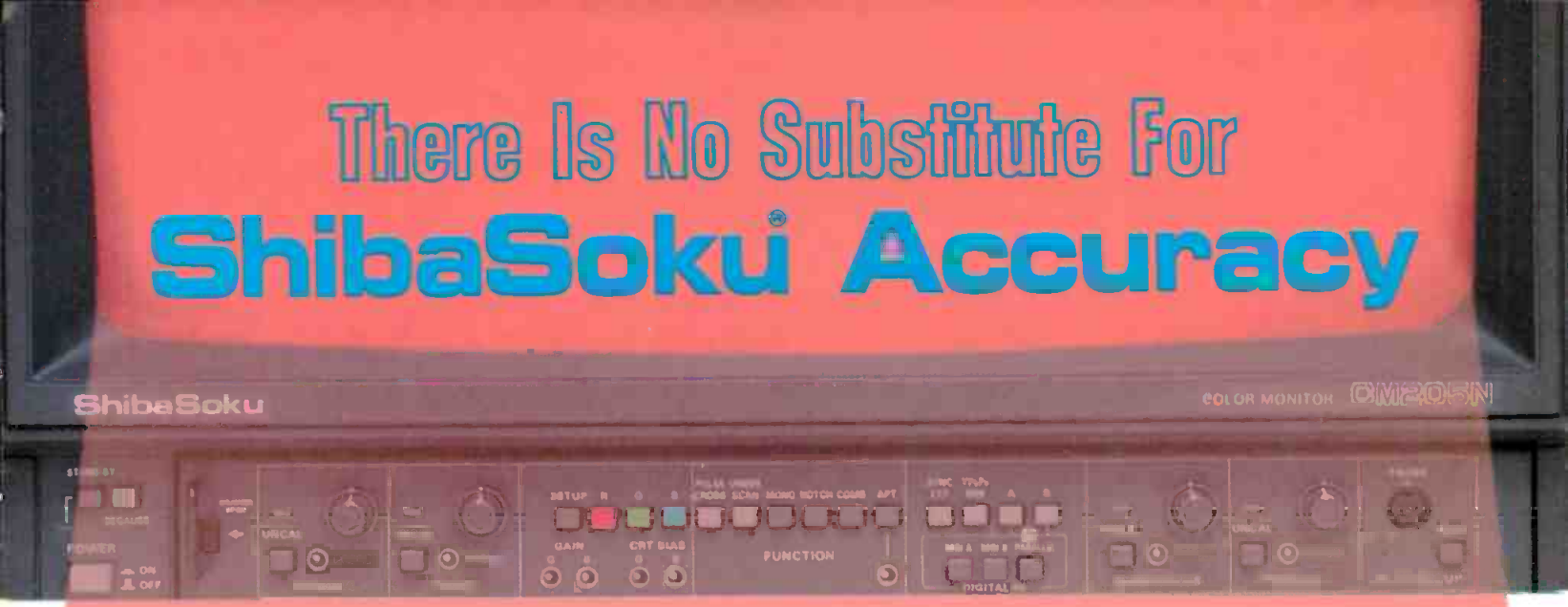

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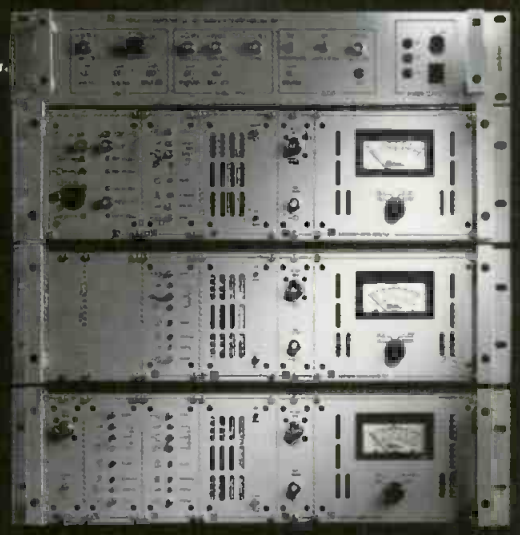
- IFCU / 5° Modular IF-CH TV converter Band I-III-IV-V.
- CCU / 5° Modular TV Transposer Band I-III-IV-V.



DB Elettronica product line is designed in compliance with the most strict international standards employing an advanced technology of modular construction. The result is equipment of very high reliability and simple maintenance.
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Ease of Maintenance

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Eliminates In-Band and Out-of-Band Intermodulation

Superior Cooling ..... YES
Redundant Fans in each Amplifier Module to extend service life

Full Power ..... YES
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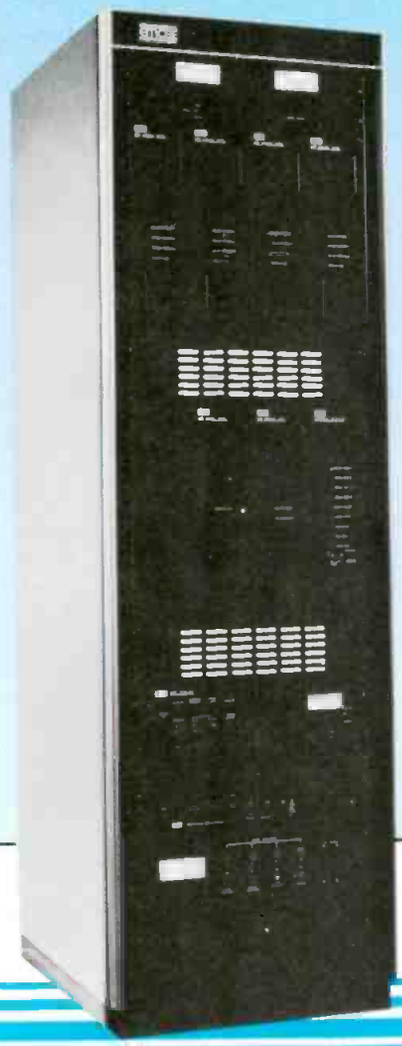

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New Products

Large-diaphragm condenser mic

By AKG Acoustics

• **C3000:** the mic offers switchable polar patterns, cardioid and hypercardioid; features include an internal windscreen, a rugged housing with an internal shock mount, a switchable -10dB pre-attenuation pad for extra headroom and a bass rolloff switch.

Circle (251) on Reply Card

Lens software/Brochures

By Fujinon

•**Select-a-Lens software:** the user plugs in coordinate and the software computes field-of-view, depth-of-field and more, then indicates the best lens for the application; disk is free to Fujinon lens owners (have model number and serial number available).

Circle (249) on Reply Card

ENG lens brochures: two brochures; one has six pages of photos and specifications on 11 lenses, lens accessories and comprehensive configuration drawings demonstrating which accessories are needed for specific systems; second brochure has three pages focusing on Fujinon's ENG lenses, includes color photos of lens with complete specifications on each, plus a page of lens accessories

Circle (236) on Reply Card

Software

By EDX Engineering, Inc.

• **Version 1.2 of MCS:** an IBM-PC compatible program to predict multipath degradation of digital broadcast signals.

Circle (291) on Reply Card

Acoustical Foam

By illbruck

• **Sonex 1:** a flame-resistant alternative for noise reduction and acoustic control;based on an anechoic-wedge design that traps and defects noise; meets all class-1 building requirements and can withstand constant temperatures up to 302°F; available with hypalon coating to repel oil, acid and solvents.

Circle (258) on Reply Card

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NTL

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New Products

Multiple video windowing system
By RGB Spectrum

• **SuperView:** displays up to four real-time video windows on a single high-resolution monitor; each window can be positioned, scaled to full screen, overlaid with computer graphics or overlapped with other windows; accepts NTSC or PAL composite video and Y/C signal from up to four cameras, tape recorders, videodisc or teleconferencing systems simultaneously; accepts high-line rate video signals from FLIR and medical imagers; optional X.TV software provides full integral under X Windows.

Circle (255) on Reply Card

Foam panels
By NetWell Noise Control

• **Acoustical wedge foam panels:** absorb unwanted sound reverberation; 24"x48" panels are available in a variety of thicknesses; AW4 panels offer an NRC value of 1.25; also available in other sizes, with different facial convolutes.

Circle (256) on Reply Card

Product catalog
By Tektronix

• **1994 test and measurement product catalog:** provides test and measurement product specification information, including a 4-color section that introduces new instruments, accessories and enhancements and an applications spotlights section that profiles unique features.

Circle (257) on Reply Card

Videodisc
By Optical Disc Corp.

• **Recordable digital videodisc:** makes possible the permanent storage of for hours of broadcast-quality (8-bit, 4.5MHz bandwidth) digital video or one hour of digital HDTV on a single side of a 12-inch recordable disc; suited for mass-storage requirements of video servers or for program delivery for satellite uplink, video-on-demand, interactive television and commercial video displays.

Circle (260) on Reply Card

Image-processing animation
By Xaos Tools

• **Pandemonium 2.0:** improves the performance of Pandemonium, providing increased speed and efficiency for video production and post-production professionals, broadcast designers, animators and artists, and desktop video producers; provides users with a sketch mode for preview and rendering of images and animations faster at lower resolutions; has an enhanced function tool for greater control through precise spline path editing of the parameters of effects.

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Circle (160) on Reply Card

NAB Booth #2508

Circle (129) on Reply Card

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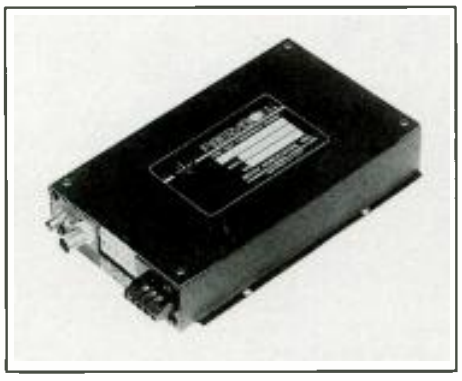
New Products

Battery-pack tester
By K.P. Systems

• **BET-5001:** indicates energy-level percentage remaining using an LED display within 10s; a stand alone unit small enough to fit in a shirt pocket.

Circle (263) on Reply Card

Video/bi-coaxial control transmission system
By Math Associates



• **Fibervision FX/FR-5821:** compatible with all standard video formats, including NTSC, PAL and SECAM; offers a control channel fully compatible with all "up-the-coax" bicoax and virtually all of the control systems that use data transmission during the vertical retrace period; eliminates the timing problem that limits the overall transmission range of some control system — transmission distances of more than 40km are available with the single-mode version; operates at a single optical wavelength of 850nm or 1,300nm and can be used with fiber-optic cable; operating power is 14-18Vac and 24Vac.

Circle (262) on Reply Card

Layering and special-effects package
By Wavefront Technologies

• **Composer:** offers an improved user interface and expanded Macintosh file format support; brings high-end effects to the desktop by supporting the range of Silicon Graphics workstations; color icons, a programmable tool bar, new macros, and a digital video effect for moving 2D images in 3D have been added; provides Network Video Control and supports Targa, PICT, Vista and TIFF; animation clips, still images, special effects, transitions, titles and annotations can be assembled in layers and sequenced in time; supports all film and video formats.

Circle (264) on Reply Card

Distribution amplifier
By Matthey Electronics

• **2503A:** features a combined distribution amplifier and delay distribution amplifier on one circuit board; each signal module comprises two separate channels — an adjustable video delay of up to 2æs with cable EQ, and a channel that offers up to six outputs for video signal distribution; features include on-board selection, which allows the user to combine the channels, differential inputs, front-panel adjustment of delay, gain and cable equalization, and a video-presence indicator.

Circle (266) on Reply Card

Digital technology for post-production
By Laser-Pacific Media Corp.

• **SuperComputer Assembly:** an on-line editing service that delivers the highest-quality digital show master at less than the price for conventional on-line analog composite editing; fully compatible with all digital component and high-resolution HDTV standards; permits greater scheduling flexibility.

Circle (265) on Reply Card

Cable reels
By Clark Wire & Cable

• **C-1500, C-3200 Hannay cable reels:** reels are available to accommodate broadcast cables and composite cables; can be ordered with divider disks and custom drum dimensions and cable openings; C-1500 model for broadcast cables comes with a direct crank with adjustable spring drag or with an optional power chain and sprocket rewind; the heavy-duty C-3200 is available in a range of reel and crank dimensions and with a spring-actuated pin lock and removable direct crank rewind; portable models are also available.

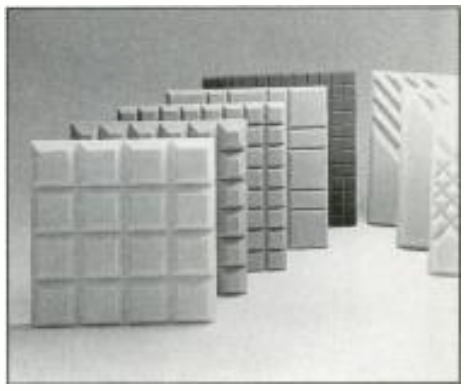
Circle (269) on Reply Card

Video server
By Home Shopping Network

• **The Video Server:** provides flexible architecture allowing a variety of configurations; store digital video in compressed digital format, expands video in the NTSC format at the output or sends compressed data to expansion engine.

Circle (271) on Reply Card

Ceiling tiles
By illbruck



• **Sonex Classix:** fire-resistance, open-cell, melamine foam tiles that meet all class-1 building requirements; available in five block patterns and thickness combinations and three color choices; tiles snap on to existing 2'x2' suspension grids and reduce excess noise.

Circle (267) on Reply Card

Compressor/limiter
By R/Audio

• **PS-3010:** a 2-channel, full-feature compressor/limiter that allows compression to be set anywhere from 1:1 to 1:infinity at threshold levels from +15dB to -70dB; distortion is less than 0.05%; frequency response is +/-1dB from 20Hz to 20kHz

Circle (261) on Reply Card

Transcoder/frame sync
By Nova Systems, Inc.

• **NovaMate XT:** transcoding time base corrector and frame synchronizer; features Y/R-Y/B-Y (Betacam or MII), Y/C (S-VHS and Hi8) and composite video inputs and outputs; available in NTSC, PAL and PAL-M versions; has RGB and U-matic dub input and output options.

Circle (292) on Reply Card

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Now that TTC is part of LARCAN we've got a lot to celebrate, because we've combined the resources of two great transmitter companies. LARCAN is today's market leader with the popular M Series solid-state VHF transmitters and our new cutting-edge solid-state UHF line. LARCAN-TTC excels with the ultra-efficient, high power UHF HDR Series IOT transmitters and our complete low power UHF/VHF lines. On the radio side, we already have more solid state FM transmitters in the field than all other domestic companies. And LARCAN-TTC is definitely HDTV-ready—*right now*. The engineering resources and corporate strength of LARCAN-TTC will insure you a great broadcasting future. Visit us at NAB '94, booths 15758 and 15708 to see products worth celebrating.

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Circle (172) on Reply Card

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New Products

ENG/EFP camera tripods
By Miller Fluid Heads

• **Series II:** available in Lightweight (for use with small CCD and broadcast camcorders), Single Stage (for ENG/EFP cameras up to 25kg) and 2-Stage (for a range of ENG/EFP cameras) models; features the Pro-Lok torque-limited leg clamps, which provide a maintenance-free, single-turn clamp-and-release method of adjusting tripod leg height; has redesigned 75mm and 100mm tripod bowls suitable for attachment to most makes of heads, increase clamping strength and provide a torsion-free attachment; revised leg-angle lock system incorporates a "knock-proof" locking mechanism; available in alloy or high-strength, cross-laminated carbon fiber.

Circle (273) on Reply Card

Transmitter/receiver systems
By Nucomm

• **FT4/FR4 Series:** operates from 90-260 VAC (40 to 400HZ) and +11-32 VDC; accommodates a 70MHz interface to other video and audio systems for transmit/receive terminals or baseband drop and insert functions; optional internal 70MHz modulator/demodulator with up to four programmable audio subcarriers via dip switches is available; equipped with fault alarm detection and system diagnostic circuits; features synthesized phase lock source and broad band solid state amplifier with up to 12 watts of output power; radios covers the 2,2.5,6-7,12-13Ghz bands as well as military and international frequency bands; rack mountable.

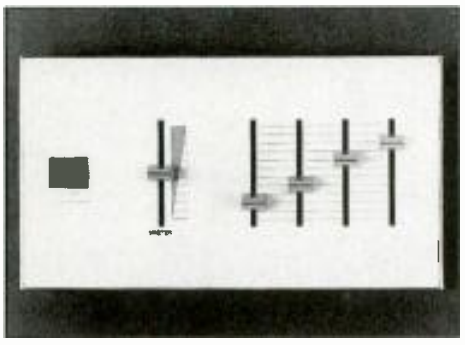
Circle (280) on Reply Card

Digital D-2 keyer
By HMA Video

• **Catalyst:** works in conjunction with the facility's Grass Valley 200 switchers; allows animation, graphics or DVE passes to be built-up with first-generation quality in successive pre-read passes on a D-2 edit master; each completed pass on the master remains in the digital domain as a new layer is added from the switcher

Circle (272) on Reply Card

Wall station
By Colortran



• **DMX:** a self-contained unit with four independent faders, one master fader and a take-control/on-off button; provides control of one or two dimmers per channel; available as a standard wall-mount or portable unit; can operate independently of external DMX input or accept any existing DMX signal.

Circle (268) on Reply Card

Absorbent foams, sound barriers, and adhesives
By USAFoam

• **USAFoam:** aborbent foam; $6.99 per 2'x 4' sheet of anechoice wedge foam, and NRCs up to 1.63, no other products can compare — for effectiveness or value. For more information, to order, or for a free sample kit, call USAFoam toll free at 1-800-95-WEDGE.

Circle (278) on Reply Card

Phone/interface
Eela Audio

• **S 24 Reportophone Plus:** supplements the S 20A and prepared for use with the Eela Audio ISDN Codec; suited for 2- and 4-wire connections; equipped with three mixable inputs.

• **S 24 ISDN Codec Interface:** an interface between the S 24 and an ISDN RJ45 (SO) Extension, complete with internal terminal adaptor; control is accomplished through the S 24; three algorithm modes.

Circle (281) on Reply Card

Digital video post-production workstation
By ImMIX

• **VideoCube Version 1.2:** features, for NTSC and PAL, "build to disk," offers extensive compositing capabilities, variable-speed playback of clips, title rolls and continued enhancements to the editing model and user interface; capabilities include disk-based non-linear editing, true real-time digital video effects, high-resolution anti-aliased character generation and editing and mixing of CD-quality stereo audio; provides storage for one hour of on-line-quality video and two hours of CD-quality audio (additional storage modules can increase storage to six hours and 12 hours, respectively); includes all hardware, software, monitors, speakers and cables.

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New Products

Routing Switcher
By Knox Video

• **RS16x16:** 16x16 audio/video matrix switcher in a streamlined 1 1/2" chassis, features easy front panel key-pad operation or may be controlled by terminal or software-based controllers via the RS232 input; a Windows (TM) driver is available for the RS16x16; front panel LED indicators display present routing pattern at all times and an internal battery holds and restores the current pattern in case of power failure; capable of storing and retrieving 16 preset cross-point patterns; includes an automatic sequencing feature.

Circle (277) on Reply Card

Camcorder
By Canon

• **Canovision 8TM L2:** incorporates date scan and search functions; permits editing from camcorder body; features VL mount system, RC Time Code, data and index code functions, high performance zoom lens, precision focus and exposure control, standard editing system and special digital effects including a new Wipe effect.

Circle (279) on Reply Card

Feedback controllers
By Sabine

• **ADF-1200 (single channel) and ADF-2400 (dual mono/stereo) Workstations:** functions include 12- or 24-band digital parametric filtering, digital shelving filters, digital delay, noise gate, multiple configurations storable in memory, password protection, and 31-band real-time analysis; automatically detect acoustical feedback and determines its frequency.

• **FBX-900 Feedback Exterminator:** a nine-filter feedback controller; automatically detects feedback and eliminates it in less than one second.

Circle (282) on Reply Card

Digital TV audio processor
Orban

• **Optimod-TV 8282 audio processor:** designed for both analog and digital TV audio; controls dynamic range and peak subjective loudness preventing highly-processed commercials from becoming objective; control peak modulation and bandwidth to prevent over modulation; both factory and custom presets available via remote control and programmable on a time/date basis.

Circle (293) on Reply Card

Audio/video equipment By ESE

• **ES-2940:** single rack unit containging Dual 1 x 4 Audio,twod Video Distribution Amplifiers and a five output RS-170AA Black Burst Sync Generator; features video bain and equalization controls, accepts balanced and unbalanced audio.

• **ES-180A:** new "A" version of WWV/WWVH Master Clock, enhancements include improved accuracy to +/- 2.5 ms of UTC when locked and <10ms/day drift when WWV is not present, ability to query RS-232 output as often as 20 times per second and a larger .56" front panel L.E.D. display; capable of driving more than 100 digital slave displays; features five frequency scanning, automatic "2:00 AM" DST correction, battery back-up, RS232C output, 1pps and AM/PM indication.

Circle (284) on Reply Card

Multipurpose Digital Voltmeter/Amplifier
By Ross Engineering Corp.

• **VMD2A Series Meter:** features include DC, Avg (RMS, true RMS, true positive or negative peak follow and store, positive or negative single pulse capture and store, Peak-to-Peak follow and pulse store, 40-hour rechargeable battery, and read-out hold switch.

Circle (285) on Reply Card

Switchers/Upgrades
Abekas Video Systems

• **ASWR8100:** uses full 10 bit CCIR 601 internal processing; offers uLine keying technology, mBoss key borders, and the TimeFrame effects editor; options include full-function reTouch color correctors and dual framestores.

• **ADDR6400:** multi-channel and multi-user system with up to six record or playback channels avaible to four users simultaneously; features 4:2:2 oe 4:4:4:4 resolution record/playback and a disk-based on-line random access editing system; can import or export EDLS and features an optional Graphical User Interface for the editor.

• **A72 Digital Character Generator:** new upgrades include the Turbo option and the FontMaker and IconMaker programs.

• **A65/A66 Digital Disk Recorders:** Roto-Photo interface for Macintosh users is a new plug-ing driver for Adobe Photoshop; accesses the A65/A66 Digitasl Disk Recorders from Photoshop using Ethernet.

• **A57 and A51+ Upgrade:** new anamoph feature allows process 16 x 9 images within the A57 or A51+; new "on-air" mode allows rapid, single-button press access to effects.

• **A84+ Upgrade:** version 4.0 for the A84 upgrades this component digital switcher to an A84+; features 16 x 9 wipe pettern supuport, increased RAM, expanded timeline control, enhancements to the LINC integration software, extended SMPTE protocol support, and an intelligent interface to external routing systems.

• **A83 Component Digital Switcher:** features three Mix Effects Modules and exceptional keying quality; includes user-definable inputs, networking, internal digital disk recording, and LINC system integration ssoftware; Defocus/Color Correction option is new.

Circle (289) on Reply Card

Teleprompting delivery system
By Questar Systems, Inc.

• **AccuPrompt:** system designed for all Apple Macintosh systems for creating scripts, arranging them in order and scrolling them for live teleprompting; allows operator to monitor live scrolling text on screen with the option to edit instantly; offers unlimited fonts by size and style, variable scrolling sensitivity, auto underscan/overscan compensation, and dynamic time scales for elapsed and remaining times; supports XTND file translation; has direct import capabilities from many Macintosh and DOS formats.

Circle (286) on Reply Card

Wireless mic system
By Lectronsonics, Inc.

• **190 Series:** a narrow-band UHF wireless mic system intended for field production with a camera-mounted receiver; provides over twice as much operating range as earlier VHF systems; transmitters and receiver each operate from a 9-volt alkaline battery; produces a full 100mW of RF output with over seven hours of battery life; dual-band compandor reduces noise by about 10dB over conventional compandors; receiver operates with the UM190 belt-pack transmitter or the UH190 "plug-on" transmitter.

Circle (287) on Reply Card

Tape Eraser
Weircliffe Tape Erasers

• **BTE 101:** offers automatic, one-pass degaussing for range of tape formats; safety interlocks inhibit access to the media until erase cycle is complete; features automatic restart.

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HDTV NEWSLETTER

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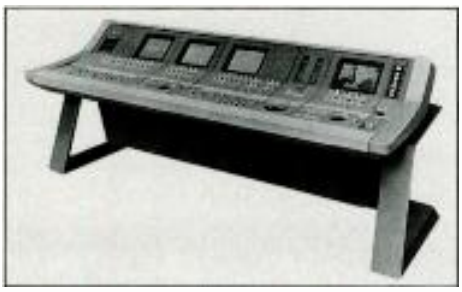
New Products

Digital mixing system
By TOA



• **ix-11000:** consists of a compact console and free-standing processing rack; the largest system is equipped with 64 inputs, 48 multitrack returns, 48 multitrack send buses and 256 inputs and outputs for patching analog and digital signal within the digital domain; four bands of parametric EQ, high- and low-pass filters, delays and dynamics are offered on each input and output; functions can be accessed with the use of color touch-sensitive LDC screens and motorized faders; control windows within the system provide high-resolution metering (80dB range) of up to 32 channels on a single screen, fade levels with gain, preset configurations, channel status and EQ curves.

Circle (254) on Reply Card

Expansion chassis
By Avid Technology, Inc.

• **NB4 4-slot expansion chassis:** a NuBus expansion chassis that expands range of Macintosh platforms capable of supporting Media Suite Pro 2.0 to include Quadra 800 and 650 systems.

Circle (294) on Reply Card

Wireless video system
TransVideo Systems, Inc.

• **ShotMaster 100:** uses microwave communications to link a 14-ounce transmitter with a handheld receiver for wireless monitoring of camera's video and audio output up to 100 yards; features time code window with on/off control, two channels on each system, and remote tally light to show camera is rolling; allows instant window dubs; transmitter attaches to most ENG-sytle cameras and the receiver provides video, audio, and timecode outputs to any monitor or recorder.

Circle (288) on Reply Card

Lens adapter
By Century Precision Optics

• **Nikon-to-½-inch-bayonet adapter:** a universal Nikon that enables 3-chip video cameras to accept Nikon SLR lenses, from wide-angle to telephoto; optically compensated to ensure that each lens' focal length remains unchanged.

Circle (253) on Reply Card

■

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CLOSED FROM MARCH 23 THRU APRIL 3

NRG

970 Power-MAX

The 970 Power-MAX is designed for power-hungry professionals who have high-current draw situations and long run times.

- Highest capacity quick-charge capable 12 Volt 14-AMP sintered mcad power pack (removable).
- Rugged high-grade, black leather belt case; chassis assembly with dual 3-pin XLR inputs for pack interchange without shutdown.
- 2,500-cycle cell life provides lowest cost per cycle.
- Microprocessor-controlled 5-step multi-colored power indicator display.
- Belt with cellpack weighs a comfortable 7.5 lbs.
- Charge in little over two hours with the optional 650-III Intelliquick Fast charger.
- Dual outputs allow simultaneous powering of two devices (eg., camera and light). Output configurations include cigarette lighter and 4-pin XLR in any combination.
- Includes Power-MAX belt and power chassis, 14-amp cell pack in 12V or 13.2 volt configuration, model 600 overnight charger, comprehensive owner's manual. Fits waist size 29"-44".

VARI-LITE PRO

Professional DC On-Camera Light

Thanks to on-board control IC's using NRG's Light-Gate technology, light intensity can be infinitely adjusted by the user within a range of 10% to 100% of the lamp's rated power. You can instantly adjust light output to exactly meet changing light requirements, all without changing hot bulbs or fussing with power rabbit diffusion filters. Best of all, the Vari-Light Pro virtually eliminates color shift and dramatically conserves precious battery power by using only the power required for the selected light level. Accommodates bulbs from 20W to 100W DC.

- Prismatic Pyrex dispersion grid provides smooth even light ouput and reduced glare without changing light intensity.
- Sturdy all-metal click tilt mounting bracket with unique ratchet action. Eliminates shake during action shooting.
- Front retainer assembly pops off for instant bulb access without the bother of screws.
- Rugged milled aluminum light head disperses heat and provides years of service under adverse conditions.

Power Station Series

Designed to replace expensive original-manufacture AC power supplies, the affordable Power Stations deliver precisely-regulated 12-volt DC power from AC sources worldwide. High-current capability allows for powering not only large camcorders, dockables, decks, and cameras, but lights, monitors, and other high draw 12-volt equipment as well.

The stations provide up to 9 amps of precisely regulated DC power eliminating the need for battery power in stationary applications where an AC source is available. The Power Stations exceeds all original manufacturer performance specifications.

- Available in different configurations: The 12560 features a single cigarette or 4-pin output and up to 5 amps of output current. The 129100 features dual outputs in any combination of cigarette or 4-pin and 9 amps of output current capability.

Features:

- High-current output
- Worldwide voltage selection
- Rugged steel case
- 4-pin or cigarette lighter outputs
- Lighted power switch

Power Station-2 Series

Just plug the PowerStation-2 into any AC outlet in the world and out comes perfectly regulated 12-volt DC power through four 4-pin XLR connectors and one cigarette lighter connector. It uses an advanced pulse-width-modulated power supply which allows for ultra-light weight and small size . It operates with little heat even at full output. The PowerStation-2 is the ultimate multiple-output professional power source for cameras, decks, lights, monitors, and a host of other video accessories.

- 85-264 volts worldwide auto-adjusting input (just plug in).
- Supply is fully protected from overcurrent.
- Ultra-light weight - under 3 lb.
- Outstanding 300,000 hour mean time between failure is far in excess of any other manufacturer.
- Ultra-efficient PWM regulation generates far less heat than linear type supplies.
- Provides the ultimate in performance and reliability in a universally compatible and compact package.

See us at NAB in Las Vegas March 21–24 Booth #13428

Panasonic

Broadcast & Television Systems

WV-F500

3-CCD Digital Processing Camera

- Three 1/2" high sensitivity 380,000 pixel CCDs with on-chip optics, plus precision f1.4 high resolution prism deliver 700 lines of horizontal resolution and excellent signal-to-noise ratio of 60dB.
- Achieves a sensitivity of f8.0 at 2000 lux and minimum object illumination is 4 lux at f1.4 with +24dB gain.
- *Emmy Award-winning Digital Signal Processing DSP technology:*
  - Dark Detail Circuit enhances contours under varying lighting conditions. Uses luminance sensitive algorithms to determine the optimum degree of enhancement in dark areas of the picture without altering the brightness of other areas in the picture. Enhances contours of objects as fine as strands of human hair, even under challenging lighting conditions.
  - Chroma Detail compensates for poor resolution in high chroma areas of the picture. Provides a wide dynamic range image with clear reproduction in the chroma area.
  - 2-Dimensional Low Pass Filter reduces cross-color caused by high level brightness signals mixing into the sub-carrier. Reproduces fine stripes and lattice patterns with a minimum of color blur.
  - Highlight compression circuit expands the dynamic range of highlighted areas and prevents halation. Produces detailed images when viewed against a bright backlight or daylight.
- The WV-F500 features detail enhancement through 5 stages of switching: Two levels of hand switching (High and Low) and two levels of details switching within each of the bands. And for further flexibility, the detail enhancement circuit can be turned off when shooting close-ups, special graphics or scenes in low light.
- Switchable R-Y, B-Y, or Y/C system allows direct docking to S-VHS and MII VCRs.
- *To further enhance operational speed and flexibility, a total of five easy to use Scene File modes are available.*
  - Scene File One is the Standard Mode which sets the WV-F500 to adjust to studio lighting.
  - Scene File Two is the Illuminance Mode, which provides for different shades of black to be reproduced clearly in dark locations without requiring lighting alterations.
  - Scene File Three is the Fluorescent Mode, because under fluorescent lighting conditions certain color hues tend to be reproduced slightly in the blue spectrum. When switching on Scene File Three, these hues are adjusted while using the white balance to provide natural tones.
  - Scene Files Four and Five are the User Modes for flexible data setting. Twenty different digital adjustments can be set including gamma, knee-point, chroma detail, detail, matrix and shading. Individual settings are available for 11 of the 20 items at gains of 0dB, +9dB, +18dB and +24dB. These digital adjustments also allow the WV-F500 to be matched to other color cameras in a studio environment for quick set-ups.

DS5050 S-VHS Dockable Package:		
	• WV-F500 3-CCD color camera	• AG-7450A S-VHS Hi-Fi VCR
	• WV-VF40 1.5" viewfinder	• WV-DKT700S Docking Kit
	• Canon 13:1 servo zoom lens	• WV-CC500 system case
	• WV-MH500 mic holder	• WV-QT700 tripod adapter

WJ-MX50 Digital A/V Mixer

- Four input switcher and any two sources can be routed to the program busses.
- Two-channel digital frame synchronization permits special effects in each o fthe A/B busses.
- Combination of 7 basic patterns and other effects creates 287 wipe patterns.
- External edit control input for RS-232 or RS-422 serial controls. Also has GPI input.
- Wipe boundary effects: soft/border (bold, 8 back colors available)
- Digital effects including strobe, still, mosaic, negative/positive, paint, monochrome, strobe, trail, and AV synchro
- Real-Time compression - the entire source image is compressed inside a wipe pattern.
- "Scene Grabber" makes it possible to move a pattern, upholding the initially trimmed-in picture integrity.
- Non Additive Mix (NAM): selects between A and B sources, passing only the signal with the highest luminance value
- Fade-in and fade-out video, audio, titles individually or synchronously faded.
- Down Stream keyer with selectable sources from character generator or external camera.
- Incorporates 8 separate memories that enable virtually instant recall of frequently used effects.
- 8 preset effects include: Mosaic Mix, Position Stream, Corkscrew, Bounce, Flip, Shutter, Vibrate, and Satellite.
- Audio mixing capability of 5 sources with 5 audio level adjustments.

AG-7650H/AG-7750H

S-VHS Player / S-VHS Edit VCR

Editing machines truly designed for professionals

- Built-In Digital 3-Dimsional type full field (262.5 line) Time Base Corrector eliminates even small amounts of jitter, skew, head impact error, and color blurring. The precise time base correction is invaluable for A/B roll editing, maintaining high picture quality through multiple generations. Also provides full field drop-out compensation.
- Laminated amorphous video heads that provide higher magnetic coercivity than conventional ferrite heads. The expanded color signal frequency response from the amorphous heads minimizes color blurring and noticeably improves color reproduction.
- A "logical" comb filter featuring an advanced 3-line delay line system, enables a huge improvement in crosstalk cancellation during playback. The result is significantly higher picture quality, with reduced color and luminance blurring.
- High-precision aluminum die-cast chassis and extra large impedance roller assures exceptionally stable transport.
- Advanced AI capstan servo control provides for high speed search at 32x normal speed.
- Built-in RS-422A 9-pin serial interface - the standard control protocol for professional broadcast components.
- Both machines provide two Hi-Fi stereo audio channels with a dynamic range of 90dB plus two linear audio channels with Dolby NR(Noise Reduction). Each audio channel has its own input and output with separate individual channel level setting capability.
- Professional 7-pin dub output (AG-7650H) and 7-pin dub input and output (AG-7750H) help to keep the quality of your images during editing. The AG-7750H features manual adjustment of video recording level.
- Optional AG-F700 Time Code Reader/Generator Card lets you perform LTC/VITC (Longitudinal/Vertical Interval) recording and playback for high-precision time code editing. The AG-7750H edits with VITC on one of its audio channels.

LEADER

Model 5850C

Vectorscope

An ideal companion for the 5860C Waveform Monitor, the 5850C adds simultaneous side-by-side waveform and vector monitoring. Featured is an electronically-generated vector scale that precludes the need for fussy centering adjustments and eases phase adjustments from relatively long viewing distances. Provision is made for selecting the phase reference from either (A or B) inputs or a separate external timing reference.

Model 5860C

Waveform Monitor

A two-input waveform monitor, the 5860C features 1H, 1V, 2H, 2V, 1 µs/div and 2V MAG time bases as well as vertical amplifier response choices of flat, IRE (low pass), chroma and DIF-STEP. The latter facilitates easy checks of luminance linearity using the staircase signal. A PIX MON output jack feeds observed (A or B) signals to a picture monitor, and the unit accepts an external sync reference. Built-in calibrator and on-off control of the DC restorer is also provided.

Model 5864A

Waveform Monitor

A fully portable waveform monitor for field use, the Model 5864A is a two-channel unit that provides 2H and 2V sweeps with MAG, FLAT and IRE response, and normal and X4 gain.

Model 5854

Vectorscope

2-channel portable vectorscope is ideal for field use and features A and B phase reference, fixed and variable gain. Both units shown with optional battery holder and NP-1 type battery.

MAGNI

MM-400

- The MM-400 is a combination waveform and vector monitor especially configured for the cost-conscious producer. A low-cost alternative to CRT-based waveform monitoring the MM-400 produces a video picture of the input signal's waveform and displays it on any video monitor. It provides a simple, affordable and accurate way to set camera levels before a shoot, or to check time base correctors and color fidelity in editing. Problems like hue shift, smearing, muddy contrast and loss of detail are easily identified for correction.

FEATURES:

- Converts waveform or vector display information into a standard video signal which can be displayed on a video monitor or routed around a video facility, no need for additional expensive monitors. Switch between pictures and waveforms at the push of a button.
- Incorporates an advanced SC/H phase and color frame indicator that is a must for editing and post production. At a glance it tells you if a signal's subcarrier-to- horizontal phase is properly adjusted and if the signal's color frame matches the house black burst connected to the MM-400 external reference input.
- Works anywhere and with any analog video format—NTSC, PAL, Component or S-Video. It has automatic detection between NTSC and PAL formats.
- Three loop-through inputs can accept three composite signals or one component, or RGB signal.
- No complex displays or special test signals are required for component video monitoring.
- Interchannel timing and amplitude display make component analog monitoring easy, has color bar limit markings for Betacam, M-II and SMPTE formats.
- Waveform and vectorscope controls, including channel, sweep speed, position control, phase rotation are on easy-to-see dedicated pushbuttons.
- Besides instant toggling between picture and waveform, a mix mode combines waveform and picture displays for simultaneous viewing.
- The MM-400 can be readily used by even novice operators. It has easy-to- understand set-up menus for display color, interchannel timing, SC/H phase alarm.
- Usable in any video facility of any size for displaying signals. Its low cost makes it affordable by the smallest studio, while its features and performance make it ideal for monitoring in high-end facilities as well.

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H471S S-VHS Double Coated

ST-30	7.69	ST-60	8.49
ST-120			8.99

M221 Hi 8 Double Coated

Metal Particles		Metal Evaporated	
P630HMP	4.99	E630HME	8.79
P660HMP	7.19	E660HME	11.29
P6120HMP	9.69	E6120HME	15.79

AMPEX

187 KCA 3/4" U-matic Broadcast (In Box)

KCA05	6.49	KCA10	6.89 KCA15 7.29
KCA20	7.69	KCA30	8.49 KCA60 11.79

197 BCA 3/4" U-matic Master Broadcast (In Box)

BSC10 (mini)	8.49	BCA10	8.54 BCA20 9.59
BCS20 (mini)	9.59	BCA30	10.20 BCA60 14.39

297 SPA 3/4" U-matic SP Master Broadcast (In Box)

SPS10(mini)	10.21	SPA10	10.20
SPA20	10.85	SPS20(mini)	10.85
SPA30	12.40	SPA60	16.20

208 Betacam Master Broadcast (In Box)

BC-5A (small)	4.89	BC-10A (small)	5.89
BC-20A (small)	7.59	BC-30A (small)	9.69
BC-30LA	12.69	BC-60LA	23.49 BC-90LA 30.99

398 Betacam SP Master Broadcast (In Box)

BC-5A (small)	15.99	BC-10A (small)	18.49
BC-20A (small)	20.49	BC-30A (small)	22.39
BC-5LA	15.99	BC-10LA	18.49
BC-20LA	20.49	BC-30LA	22.39
BC-60LA	29.95	BC-90LA	46.95

maxell

BQ Certified 8mm High-Grade

P6-60 HG BQ	4.99	P6-120 HG BQ	6.49

BQ Certified HI-8 Metal Cassettes

P6-60 HM BQ	6.49	P6-120 HM BQ	8.49

P/I PLUS Expitaxial VHS

T-30 Plus	2.29	T-60 Plus	2.59
T-90 Plus	2.69	T-120 Plus	2.79

HGX-PLUS Expitaxial VHS (Box)

HGXT-60 Plus	3.49	HGXT-120 Plus	3.79

BQ Broadcast Quality Expitaxial VHS (Box)

T-30 BQ	5.49	T-60 BQ	5.99
T-120 BQ			6.39

BQ Certified Professional S-VHS (In Box)

ST-31 BQ	6.49	ST-62 BQ	6.99
ST-126 BQ	7.69	ST-182 BQ	14.99

KCA 3/4" High Grade w/Album & Sleeve

KCS-10 HG (mini)	6.99	KCS-20 HG (mini)	7.69
KCA-5 HG	7.29	KCA-10 HG	8.29
KCA-20 HG	8.99	KCA-30 HG	9.49

KCA 3/4" Broadcast w/Album & Sleeve

KCS-10 BQ (mini)	7.49	KCS-20 BQ (mini)	8.49
KCA-5 BQ	7.69	KCA-10 BQ	8.29
KCA-20 BQ	8.99	KCA-30 BQ	9.99

SONY

HI-8 Professional Metal Video Cassettes

P6-30 HMPX	5.99	P6-30 HMEX	8.49
P6-60 HMPX	8.59	P6-60 HMEX	11.99
P6-120HMPX	11.69	P6-120HMEX	15.99

PR Series Professional Grade VHS

T-30PR	2.49	T-60PR	2.79 T-120PR 3.29

PM Series Premier Grade Professional VHS

T-30PM	3.49	T-60PM	4.09 T-120PM 4.99

BA Series Premier Hi-Grade Broadcast VHS (In Box)

T-30BA	3.79	T-60BA	4.29 T-120BA 5.29

MQ Master Quality S-VHS (In Box)

MQST-60	8.19	MQST-120	8.59

BRS 3/4" U-matic Broadcast Standard (In Box)

KCS-10 BRS (mini)	7.99	KCS-20 BRS (mini)	8.69
KCA-10 BRS	7.89	KCA-20 BRS	8.39
KCA-30 BRS	9.29	KCA-60 BRS	12.99

XBR 3/4" U-matic Broadcast Master (In Box)

KCS-10 XBR (mini)	8.49	KCS-20 XBR (mini)	9.79
KCA-10 XBR	8.99	KCA-20 XBR	10.29
KCA-30 XBR	11.49	KCA-60 XBR	14.99

KSP 31/4" U-matic SP Broadcast (In Box)

KSP-S10 (mini)	9.19	KSP-S20 (mini)	10.69
KSP-10	9.69	KSP-20	10.99
KSP-30	12.49	KSP-60	16.39

BCT G Betacam Broadcast Standard (In Box)

BCT-5G (small)	4.99	BCT-10G (small)	5.89
BCT-20G (small)	7.39	BCT-30G (small)	9.39
BCT-5GL	9.29	BCT-10GL	10.39
BCT-20GL	11.69	BCT-30GL	12.89
BCT-60GL	23.99	BCT-90GL	30.90

BCT Metal Betacam SP Broadcast Master (Box)

BCT-5M (small)	16.99	BCT-10M (small)	19.29
BCT-20M (small)	21.29	BCT-30M (small)	23.29
BCT-5ML	16.99	BCT-10ML	19.29
BCT-20ML	21.39	BCT-30ML	23.49
BCT-60ML	31.99	BCT-90ML	49.95

SANYO GVR-S950

S-VHS Single Frame Recording VCR

- Single-Frame Animation Controller eliminates the need for separate or computer plug-in animation controllers. Industry-standard protocols, make it compatible with most popular graphic and animation software packages.
- SMPTE Time Code Generator and Reader with Built-in Drop and Non-Drop Frame Read/Write is fully programmable from an external computer and resettable from the front panel.
- Video and Audio Switcher with Two independent Video and Audio Channels. Each video channel contains both composite and S-Video inputs. Each audio channel contains two linear and two Hi-Fi inputs. Switching can be performed either manually, or under RS232 or RS422 control. Video and audio channels are switched independently letting you perform break-away edits.
- Auto-Sensing Single RS422/RS232 Input eliminates the need for optional external interfaces. Interface requirements are automatically sensed and adjusted within the recorder.
- Input and Playback Video Processing allows adjustments to the video level of the incoming signal. Signal levels and hue can be adjusted during playback.

BTS

Broadcast Television Systems

Betacam SP-2000 PRO Series

PBC 2600 Player

- Superior picture quality to any other professional system.
- Brings virtual Betacam SP quality within the budgets of professional users.
- More than 90 minutes of playback time using L-size Metal or Oxide cassettes.
- High-speed picture search provides recognizable color pictures at up to 10 times normal speed in forward and reverse (24 times normal speed in monochrome).
- Two longitudinal audio channels with Dolby C-type NR (Noise Reduction) system.
- Equipped with RS-422 9-pin serial interface which is broadcast standard protocol.
- Built-in Time Base Corrector with advanced high quality digital dropout compensator.
- Optional BVR-50 provides remote control of the TBC.
- Built-in LTC/VITC/User Bits reader, and character generator.
- User friendly dial menu operation, enhanced serviceability with built-in self diagnostics.
- Y/R - Y/B-Y component signal outputs via BNC or 12-pin Betacam DUB connectors. Also has S-Video output.
- Optional BKW-2020 provides U-matic DUB output capability.

PBC 2650 Player with Dynamic Tracking (DT)

Same as PBC-2600 plus–

- Dynamic Tracking (DT) provides broadcast quality noiseless playback within -1 to +3 times normal speed.

PBC 2800 Player/Recorder

Same as PBC-2600 plus–

- Built-in comprehensive editing facilities.
- Dynamic Motion Control with memory provides slow motion editing capability (when used with a player VTR equipped with DT function).
- More than 90 minutes of recording/playback time using L-size Metal (for both recording and playback) or Oxide (for playback only) cassettes.
- Built-in LTC/VITC/User Bits generator and reader, also built-in character generator.
- Y/R - Y/B-Y component signal inputs and outputs via BNC or 12-pin Betacam DUB connectors. Also has S-Video input and output.

SONY

PROFESSIONAL S-VHS SYSTEM

SVP-9000 S-VHS Player **SVO-9600** S-VHS Player/Recorder

The SVP-9000 S-VHS player and SVO-9600 recorder are designed as multi-purpose machines with the use of various optical interface boards. By selecting one or more of a particular board, they become dedicated machines for satellite recording, office viewing, video library, sports analysis and editing. At the same time, they adhere to Sonys professional VTR concept of reliable mechanism, rigid construction and easy operation, ensuring reliable and reliable operation in the industrial and professional environment.

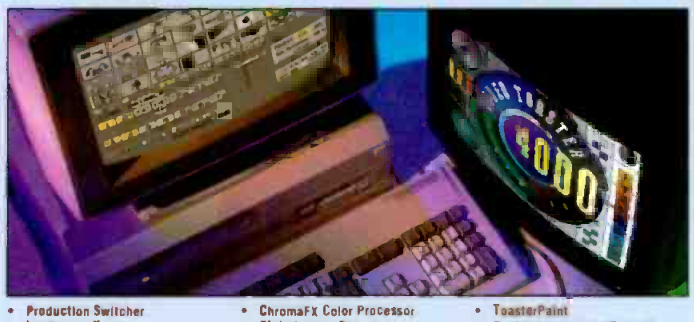
They both feature:

- Using the S-VHS format, they deliver superb picture playback and recording. With newly developed Digital Y/C separator maintained picture quality even in composite.
- Newly developed video cross talk canceller eliminates color blur providing more accurate color and sharper images.
- Four channel audio system – Two Hi-fi with a dynamic range of 90dB and two linear channels with Dolby NR.
- Two direct-drive reel motors provide rapid response and smooth operations. Mode transitions such as STOP to REC, FAST FWD to PLAY, STOP to REWIND are instantaneous.
- Picture search from -10 to +10 times normal speed.
- SYNC IN for synchronizing with other video sources.
- Automatic repeat and automatic rewind can be accomplished with programmed operation.
- There is a TIMER switch for either REC or PLAY (SVP-9000 PLAY only) when selected automatically executes the selected mode when the power is turned on. This is very useful for unattended operation such as satellite recording.
- Auto head cleaner – each time a cassette is loaded or ejected, a cleaning roller automatically passes over the video/FM audio heads removing tape residue and providing preventive care of the tape heads.
- The SVO-9600 features sensor recording. When video signals are input, it automatically starts recording.
- 19" EIA rack mountable plus adjustable front controls.

Optional Interface Cards:

- **SVBK-100** 33-pin interface board allows remote control of basic VTR functions.
- **SVBK-120** RS-232 interface board allows for machine control from a computer.
- **SVBK-140** RS-422 interface board allows either machine to be configured into any professional system.
- **SVBK-150** Digital Noise Reducer board reduces jitter, noise and Y/C delay and provides clear, crisp still frames.
- **SVBK-160** SMPTE Time Code interface board (can only be used with SVBK-140 board).

NEWTEK VIDEO TOASTER 4000



- Production Switcher
- Luminance Keyer
- Frame Grabber/Frame Store
- ChromaFX Color Processor
- Digital Video Effects
- Character Generator
- ToasterPaint
- Dual Frame Buffers/Genlock
- Lightwave 3D

NOVA SYSTEMS, INC.

NovaBlox

VIDEO PROCESSING SYSTEM

The NovaBlox Video Processing System is comprised of individual function modules called NovaCards. The range of NovaCard modules includes time base correctors, frame synchronizers, sync generators, encoders, decoders, transcoders, distribution amplifiers and routing switchers. NovaCards have the flexibility of plugging into either a computer or one of four NovaChassis that hold from one to 15 modules. NovaCards fit into an IBM or compatible expansion slot including Amiga. Most of the NovaCards utilize RS-232 serial date for operational control and include DOS, Windows, and Amiga software. For desktop and portable applications, the C-2B chassis hold two cards. There is also the C-4 single rackmount chassis that accommodates up to four NovaCards and the three rack C-15 NovaFrame, which features 15 slots. To provide operational control when using one of the NovaChassis there are two NovaTrol Serial Control Units to choose from. They provide LCD status display with four button operation or the NovaTrol/2 which has enhanced operation with dedicated function controls and LCD status display.

NOVAMATE TBC/Frame Synchronizer

One of the NovaCard modules of the NovaBlox system, the NovaMate is a unique TBC/Frame Synchronizer that satisfies a wide range of VCR signal correction and video interface requirements from desktop video to satellite systems. NovaMate plugs directly into a computer or one of several chassis configurations. Control is performed either by software or NovaTrol control units. The flexibility of its modular design and microprocessor control plus its superior quality make NovaMate the ideal alternative to stand-alone and computer based TBCs.

WE CARRY ALL OTHER NOVACARDS: ENCODERS, DECODERS, TRANSCODERS, DISTRIBUTION AMPLIFIERS AND ROUTING SWITCHERS

HORITA

BSG-50

Blackburst/Sync/Tone Generator

The BSG-50 provides an economical means for generating the most common RS-170A video timing signals used to operate various video switchers, effects generators, TBCs, VCRs, cameras and video edit controllers.

- 6 BNC video/pulse outputs
- Now available: 6 blackburst, 4 sync, 2 subcarrier
- Each sync output individually settable for composite sync, composite blanking, H-drive, or V-drive.
- Separate buffer for each output–maximum signal isolation
- 1KHz, 0dB sinewave audio tone output, locked to video
- Outputs can easily be configured to meet specific user and equipment needs

$269

CSG-50

Color Bar/Sync/ Tone Generator

- Generates full/SMPTE color bars, blackburst and composite sync signals.
- Built-in timer can automatically switch video output from color bars to color black after 30 or 60 seconds. Easy and convenient for producing tape leaders and striping tapes with color bars and black.
- Front panel selection of full-field or SMPTE color bar patterns or colorblack (blackburst) video output.
- Includes crystal-controlled, 1KHz, 0dB audio tone output.
- Outputs: video, sync, ref frame, 1 KHz, 0dB
- Audio tone switches to silence and color bars change to black when using 30/60 second timer.
- Fully RS-170A SC/H phased and always correct. No adjustment required.

$349

WE STOCK THE FULL LINE OF HORITA PRODUCTS INCLUDING:

WG-50 –	Window Dub Inserter
TG-50 –	Generator/Inserter
TRG-50 –	Generator/Inserter/Search Speed Reader
TRG-50PC –	Has all of the above plus RS-232 control.
VG-50 –	VITC Generator, LTC-VITC Translator
VLT-50 –	VITC-To-LTC Translator
VLT-50PC –	VITC-To-LTC Translator / RS-232 Control
RLT-50 –	Hi8 (EVO-9800/9850)TC to LTC Translator
TSG-50 –	NTSC Test Signal Generator
SCT-50 –	Serial Control Titler "Industrial" CG, Time-Date Stamp, Time Code Captioning
SAG-50 –	Safe Area, Convergence Pattern and Oscilloscope Line Trigger and Generator

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MILLER

Fluid Heads & Tripods

The silky, smooth action of each Miller Fluid Head is the product of the finest quality cast and machined parts functioning together in a fluid environment. They are engineering masterpieces, built to operate even under extreme conditions. They are engineered to exceptionally fine tolerances and their mechanisms are protected effectively against ambient moisture and dust.

Miller 20 - Series II Fluid Head

- Continuously adjustable fluid drag control
- Sliding/Quick Release camera platform
- Weighs only 4 lbs. will handle cameras up to 22 lbs.
- Counterbalance system designed to compensate for nose heavy or tail heavy camera configurations, and permits fingertip control of the camera throughout the tilt range.
- Includes independent pan and tilt locks, bubble level, dual pan handle carriers and integrated 75mm ball levelling.

#440 - Lightweight Tripod

- Weighs only 4.5 lbs., supports up to 30 lbs.
- Minimum height down to 24", maximum height to 57".
- Extremely portable, folds down to 33"
- Engineered from thermoplastic moldings, diecast alloy and hard anodized tubular alloy.
- Fast one turn, captive leg locks
- Includes 75mm (3") ball levelling bowl

#420 - 2-Stage Tripod

- Two extension sections on each leg. Operates at low levels as well as normal heights without the use of mini legs.
- High torsional rigidity, no pan backlash
- Weighs 6.6lbs., supports 50 lbs.
- Very portable, folds to 27"
- Includes 75mm (3") ball levelling bowl with model 420 model 402 includes 100mm (4") ball levelling bowl

System 20 Catalog #338

- Miller 20 II fluid head
- 440 Lightweight tripod
- 410 tripod spreader with foot pads 1549.00

System 20 ENG Cat. #339

- Miller 20 II fluid head
- 420 2-stage tripod
- 410 tripod spreader with foot pads 1895.00

Vinten

Vision SD 12 and SD 22

Pan and Tilt Heads with Serial Drag

The Vision SD 12 and SD 22 are the first heads with the "Serial Drag" pan and tilt system. The system consists of a unique, permanently-sealed fluid drag and an advanced lubricated friction drag. So for the first time, one head gives you all the advantages of both fluid (viscous) and lubricated (LF) drag systems – and none of their disadvantages. Achieve the smoothest pans and tilts regardless of speed, drag setting and ambient temperature.

- Simple, easy-to-use external control for perfect balance.
- Patented spring-assisted counter-balance system permits perfect "hands-off" camera balance over full 180° of tilt.
- Instant drag system breakaway and recovery overcome inertia and friction for excellent "whip pans".
- Consistent drag levels in both pan and tilt axis.
- Flick on, flick off pan and tilt caliper disc brakes.
- Greater control, precision, flexibility and "touch" than any other head on the market.
- Touch activated, time delayed illuminated level bubble.
- Working conditions from as low as -40° up to +60°C.
- SD 12 weighs 6.6 lbs and supports up to 35 lbs.
- SD 22 weighs 12.7 lbs and supports up to 55 lbs.

Vision Two Stage ENG and LT Carbon Fibre ENG Tripods

The ultimate in lightweight and innovative tripods, they are available with durable tubular alloy (Model #3513) or the stronger and lighter, axially and spirally wound carbon fiber construction (Model #3523). They incorporate torque safe clamps to provide fast, safe and self-adjusting leg clamps.

- "Torque Safe" requires no adjustment. Its unique design adjusts itself as and when required, eliminating the need for manual adjustment and maintenance and making for a much more reliable clamping system.
- New hip joint eliminates play and adds rigidity.
- They both feature 100mm levelling bowl, fold down to a compact 28", and support 45 lbs.
- The #3513 weighs 6.5 lbs and the #3523 CF (Carbon Fibre) weighs 5.2 lbs.

Vision 12 Systems

All Vision 12 systems include #33643 SD 12 dual fluid and lubricated friction drag pan/tilt head, single telescoping pan bar and clamp with 100mm ball base.

SD-12A System

- 3364-3 SD-12 Pan and tilt head
- 3518-3 Single stage ENG tripod with 100mm bowl
- 3363-3 Lightweight calibrated floor spreader.

SD-12D System

- 3364-3 SD-12 Pan and tilt head
- 3513-3 Two-stage ENG tripod with 100mm bowl
- 3314-3 Heavy-duty calibrated floor spreader

Vision 22 Systems

All Vision 22 systems include #3385-3 SD-22 dual fluid and lubricated friction drag pan and tilt head, single telescoping pan and clamp with dual 100mm/150mm ball base.

SD-22E System

- 3386-3 SD-22 Pan and tilt head
- 3219-52 Second telescoping pan bar and clamp
- 3516-3 Two-stage EFP tripod with 150mm bowl
- 3314-3 Heavy-duty calibrated floor spreader

SONY

EVW-300

Hi-8 3-CCD CAMCORDER

The EVW-300 is a complete one piece camcorder which includes a variety of innovative and advanced operational features. So, whether your shoots require basic recording capabilities or premier performance, the EVW-300 offers a wide range of features and remarkable recording quality to best suit your needs.

Features:

- Equipped with three high density 1/2" IT Hyper HAD image sensors. Has an excellent sensitivity of F8.0 at 2,000 lux, high S/N of 60 dB, and delivers over 700 lines of horizontal resolution.
- Provides high quality PCM digital stereo and single channel AFM Hi-Fi recording. Has XLR balanced audio connectors.
- Quick start 1.5" viewfinder with 550 lines of resolution plus Zebra pattern video level indicator and color bar generator
- Quick-start recording – takes only 0.5 seconds to go from REC PAUSE to REC MODE for immediate recording in the field
- Built-in 8mm Time Code generator records absolute addresses. (Either non-drop frame or drop frame mode may be selected.) Furthermore the EVW-300 incorporates a variety of time code features such as Time Code PRESET/RESET, REC RUN/FREE RUN and User Bits.
- A variety of automatic adjustment functions for different lighting conditions are incorporated into the EVW-300: ATW (Auto Trace White Balance) – when ATW is turned on optimum white balance is always ensured during recording, even for changes in color temperature. Conventional white balance adjustment is still provided with the Auto White Balance. AGC (Automatic Gain Control) – in addition to manual Gain Up AGC provides linear gain up in the range of 0 dB to 18 dB. Intelligent Auto Iris – for situations where the lighting between subject and background is different (subject is underexposed) the Intelligent Auto Iris automatically examines the scene and adjusts the lens iris for proper exposure.
- Selectable Gain-up from 1 dB to 18 dB in 1 dB steps for Mid & High positions.
- Clear Scan function – provides a variety of selection of shutter speeds ranging from 60-200 Hz allowing recording of almost any computer display without flicker.
- Compact, lightweight (12 lbs with NP-1B) ergonomic design provides well balanced and extremely comfortable operation.

JVC GY-X2

3-CCD S-VHS CAMCORDER

- Three 1/2" CCD image sensor delivers 650 lines of horizontal resolution
- New micro-lens technology provides exceptional sensitivity of F7.0 at 2000 lux and new LOLUX mode lets you shoot with almost no light! Now you can shoot superb footage with excellent color balanced at a mere 3 lux illumination
- Variable Scan View allows flicker-free shooting of a computer monitor.
- Quick Record Mode - when turned on the camera is set to the auto iris even if lens is set at manual. Also activated is (ALC) Automatic Level Control and EEI Extended Electronic Iris which provides both variable gain and variable shutter. Now you can shoot continuously from dark room to bright outdoors without having to adjust gain, iris or ND filter.
- Full Time Auto White circuit lets you move from incandescent to fluorescent to outdoor lighting without changing white balance or the filter wheel.
- Genlock input allow synchronization with other cameras.
- Dual output system allows camera output to be connected directly to an external recorder

TOSHIBA

TSC-200

3-CCD Hi-8 Camcorder

- Three 1/2" CCD chips mounted with spatial offset technology delivers superb resolution of 700 horizontal lines.
- Low noise design provides extreme sensitivity of F8.0 at 2000 lux. Min. illumination 7.5 lux with excellent color reproduction
- New LNA (low noise amplifier) delivers a S/N (signal-to-noise) ratio of 62dB - the highest achieved for this type of camera
- 26-pin connector outputs Y/C or component video signal allowing hook up to a portable S-VHS, MII or Betacam recorder and simultaneously record with Hi-8.
- Quick-start 1.5" viewfinder needs no warm up time so you never miss a shot. Zebra pattern in the viewfinder alerts operator to excessive video levels.
- Genlock capability allows synchronization with other cameras. Also full calibration functions are built-in as well as color bar generator.
- Variable high speed shutter from 1/60 to 1/2000 second
- Built-in 8mm time code generator records an absolute address to every frame.
- High-performance back electret condenser mic records to all three audio tracks. Low cut filter eliminates wind noise.
- Sports very low power consumption. The TSC-200 draws only 16 watts per hour allowing 100 minutes of recording time with a single NP-1B battery.
- Camera body is made of magnesium alloy previously found only on broadcast cameras. Still, lightweight at only 13 pounds in standard configuration.

HITACHI

Z•ONE•C

3-CCD Dockable Camera

- Using three 2/3" CCD chips and high accuracy CCD technology the Z-One-C delivers 750 lines of horizontal resolution.
- The +24dB high gain mode and new Super High Sensitity (SHS) function provide operation down to 1.5 lux at f1.8.
- Permits contrast control for better reproduction of dark areas when shooting high contrast scenes.
- Six-memory auto white balance provides two memories for each optical filter position.
- Auto Knee circuitry compresses extreme highlights preventing white clipping of those areas.
- In addition to the standard 5-step electronic shutter, the new lockscan feature permits the continuous adjustment of the shutter speed in 1H steps to shoot a computer monitor without flicker.
- Four built-in scene files. Seven items memorized in these scene files including, white balance, master gain and detail level.
- Viewfinder display of self-diagnostics during auto white and STATUS display of operational control settings.
- Flare correction maintains black balance during changes in scene contrast.
- Very high resolution viewfinder (600 lines) allows easy, fast and accurate focusing.
- Displays "safe title" electronic markers which indicate the effective picture area of home televisions.
- Generates SMPTE color bars with ID numbers so that when recorded the camera can be later identified.
- Movable shoulder mount allows camera to be correctly balanced with different docking VCRs or portable VCRs.
- Can be genlocked even with VCR docked to it.
- Real-time auto white balance continuously adjusts white balance according to the surrounding light source.
- Directly docks to Betacam SP (BVV-5) without need for adapters.
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- Heavy duty shoulder strap & comfortable leather hand grip.
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- Lid closes with Velcro for quick-opening or secure with full-length zippers.
- Two trim exterior pockets and clip board pocket.
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The Logic Series DIGITAL batteries are acknowledged to be the most advanced in the rechargeable battery industry. In addition to the comprehensive sensors integral to all Logic Series batteries, each DIGITAL battery has a built-in microprocessor that communicates directly with Anton/Bauer InterActive chargers, creating significant new benchmarks for reliability, performance, and life. They also complete the communications network between battery, charger and camera. With the network in place, DIGITAL batteries deliver the feature most requested by cameramen: a reliable and accurate indication of remaining battery power.

DIGITAL PRO PACS

The Digital Pro Pac is the ultimate professional video battery and is recommended for all applications. The premium heavy duty Pro Pac cell is designed to deliver long life and high performance even under high current loads and adverse conditions. The size and weight of the Pro Pac creates perfect shoulder balance with all camcorders.

- **DIGITAL PRO PAC 14 LOGIC SERIES NICAD BATTERY**
  14.4v 60 Watt Hours, 5 1/8 lbs.
  Run time: 2 hours @ 27 watts, 3 hrs. @ 18 watts
- **DIGITAL PRO PAC 13 LOGIC SERIES NICAD BATTERY**
  13.2v 55 Watt Hours, 4 3/4 lbs.
  Run time: 2 hours @ 25 watts, 3 hours @ 17 watts

DIGITAL MAGNUM COMPACS

Extremely small and light weight (almost half the size and weight of a Digital Pro Pac), the powerful Compac Magnum still has more effective energy than two NP style slide-in batteries. The high voltage design and Logic Series technology eliminate all the problems that cripple conventional 12 volt slide-in type batteries. The Compac Magnum is the professional choice for applications drawing less than 24 watts. Not recommended when using an Ultralight.

- **DIGITAL COMPAC MAGNUM 14 LOGIC SERIES NICAD BATTERY**
  14.4 v 43 Watt Hours. 2 3/4 lbs.
  Run time: 2 hours @ 20 watts, 3 hours @ 13 watts.
- **DIGITAL COMPAC MAGNUM 13 LOGIC SERIES NICAD BATTERY**
  13.2v 40 Watt Hours. 2 1/2 lbs.
  Run time: 2 hours @ 18 watts, 3 hours @ 12 watts.

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digital switcher and an Axial 2020 editor with two Accom RTD (real-time) disk drives complete with RAVE software. The software caches segments in optimum positions on the disk drives during an auto conform, giving the editor some nonlinear capabilities in a linear environment.

The suite also features three Ampex DCT component digital VTRs selected for their excellent motion-control capabilities and their ability to serve as robust editing machines, as opposed to D-1 machines, which are primarily used as component archive devices. Other equipment includes a Graham-Patten D/Esam mixer (twin to the Edit 4 system) and a Quanta Delta character generator. The spacious (28' x 17') room has a high ceiling and a living room atmosphere. It will enable Editel to produce high-end compositing and effects work as well as more straightforward projects where clients prefer to remain in the component domain.

Coming up for air (conditioning)

Above all this concentrated technological and physical renovation, Editel's entire roof was being replaced, and an outdated air-conditioning system was being supplanted by a modern one.

Over the past 20 years, 55 air-conditioning units had been stacked on the roof. It was an inefficient setup that required extensive maintenance and operating costs. Air-conditioning specialists Kimmel-Motz were asked for a solution. The company recommended a system that houses multiple compressors (up to eight), which cycle on and off to provide the cooling. Because of the new system, 39 individual units were removed from the roof. The redundancy also serves as protection against a compressor failure causing a loss of air-conditioning.

The component digital suite houses an array of new technology.

The new compressors are sizeable, and finding a place to house them presented a considerable challenge. The solution was to build a porte cochere, which, in addition to housing the air-conditioning compressors in a 24-foot-high, 50-foot-long structure over the parking lot, also provides clients with protection from the elements.

As it turned out, the $300,000 air-conditioning investment is already proving cost-effective. The system works on 3-phase power, which is considerably less expensive than the single-phase power used for the original 55-unit setup. That savings, added to a dramatic reduction in maintenance and replacement costs, should pay back the entire investment within four to five years.

The downside

To Claudia Baker, Editel's vice president of operations, fell another essential position on the redesign team: keeping the facility running and putting out a quality product in the midst of heavy physical construction and rewiring. Clients have accepted the inconveniences and are really excited about the changes. The construction has caused some disruptions, but, in light of the improvements, they have been relatively minor.

Supervising full-time post-production projects and monitoring construction simultaneously can result in management and staff stress, but everyone is genuinely enthusiastic because of how much things have improved and will continue to improve. It hasn't been easy, but within a 2-year period, 80% of Editel will have been renovated or reconstructed. ■

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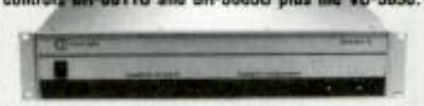
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BROADCAST OPERATIONS ENGINEER. The Univision Television Group, Inc. seeking self starter for Dallas station. Minimum 1 year experience operating/maintenance of Broadcast Television equipment. FCC General and SBE certified a plus. Basic Spanish a must. Good company benefits. Send Resume to: Richard Craig, Chief Engineer, KUVN-TV, 3720 Marquis, Garland, Texas 75042. EOE

BROADCAST TELEVISION ENGINEER The Univision Television Group, Inc., Dallas station seeking self starter. Minimum 5 years experience repair/maintenance component level: Ampex 1", Sony 3/4", Sony cameras, Grass Valley switcher, and UHF transmitters. FCC General License, SBE Certified. Knowledge of Microwave and Spanish speaking a plus. Good company benefits. Send Resume to: Richard Craig, Chief Engineer, KUVN-TV, 3720 Marquis, Garland, Texas 75042. EOE

MAINTENANCE ENGINEER. KUHT Television, an auxiliary enterprise of the University of Houston System, is seeking an experienced Studio Maintenance Engineer. Successful applicants will be able to install, calibrate, operate and repair analog and digital audio, video, and radio frequency equipment. A BSEE or BSEET is required (Equivalent professional experience and education may substitute.) as well as a General Class FCC Radio Telephone Certificate and knowledge of current FCC rules and regulations applicable to a network television broadcasting environment. Also required: SBE certification or equivalent professional recognition of technical accomplishment and three years demonstrated maintenance success to the component level, in a professional broadcast or production environment. This is a full time position with a good benefits package which is currently open. Minimum starting salary: $38,000. Interested candidates should send a letter of application, including resume and three professional references, to: Ms. Flor Garcia, KUHT-TV, 4513 Cullen Boulevard, Houston, Texas 77004, postmarked by March 31, 1994. Minorities and women are encouraged to apply. The University of Houston is an Equal Opportunity Employer.

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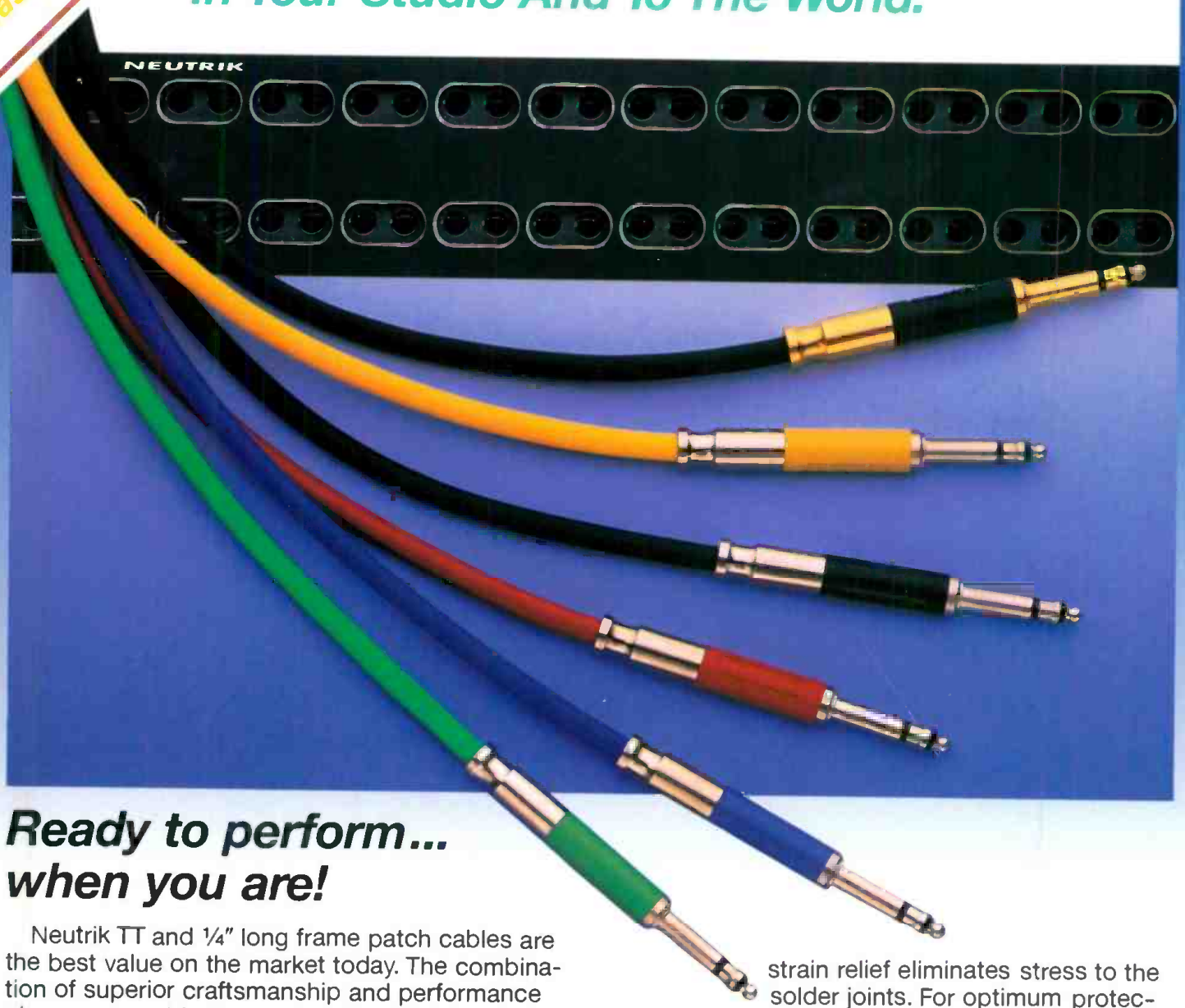

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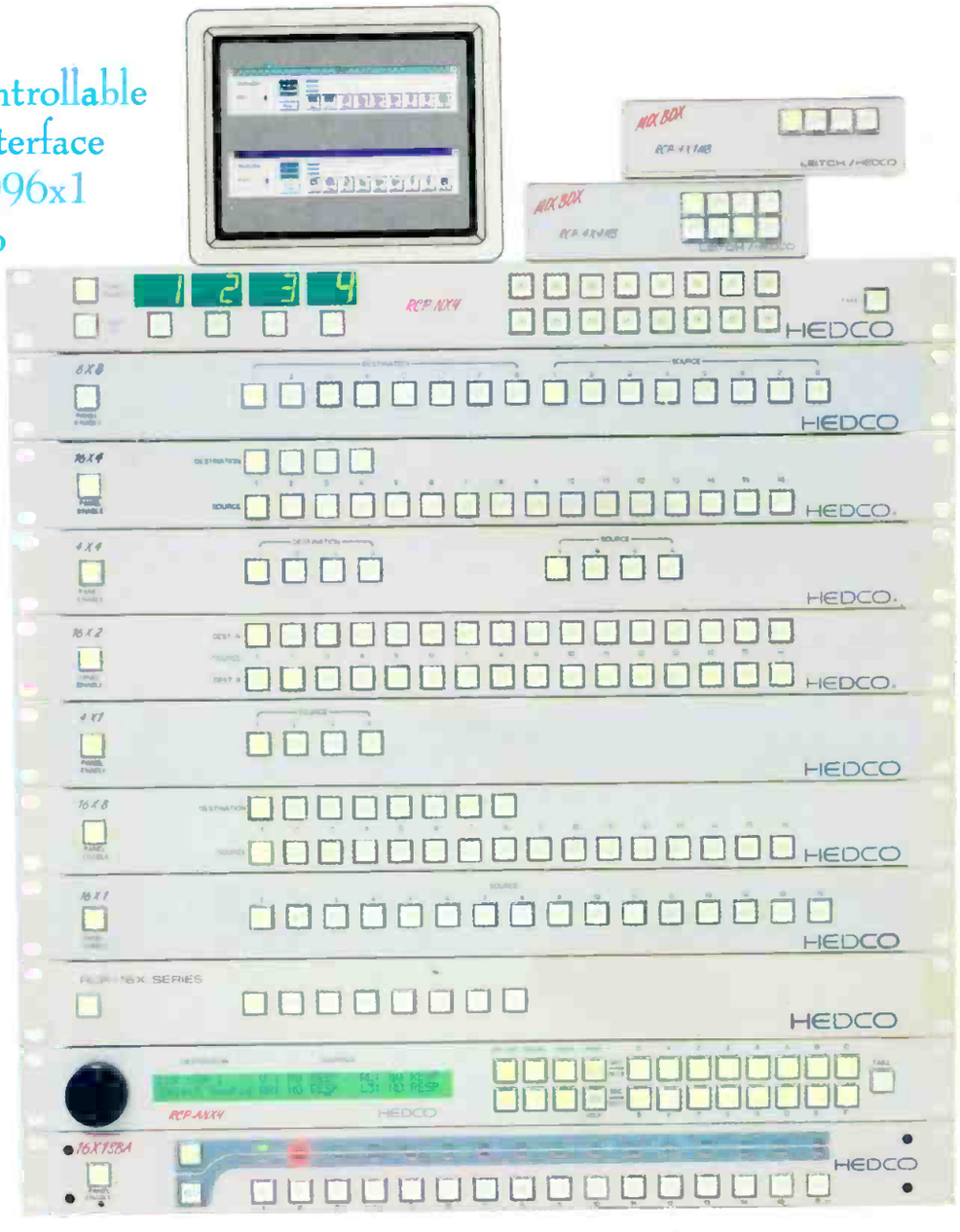

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