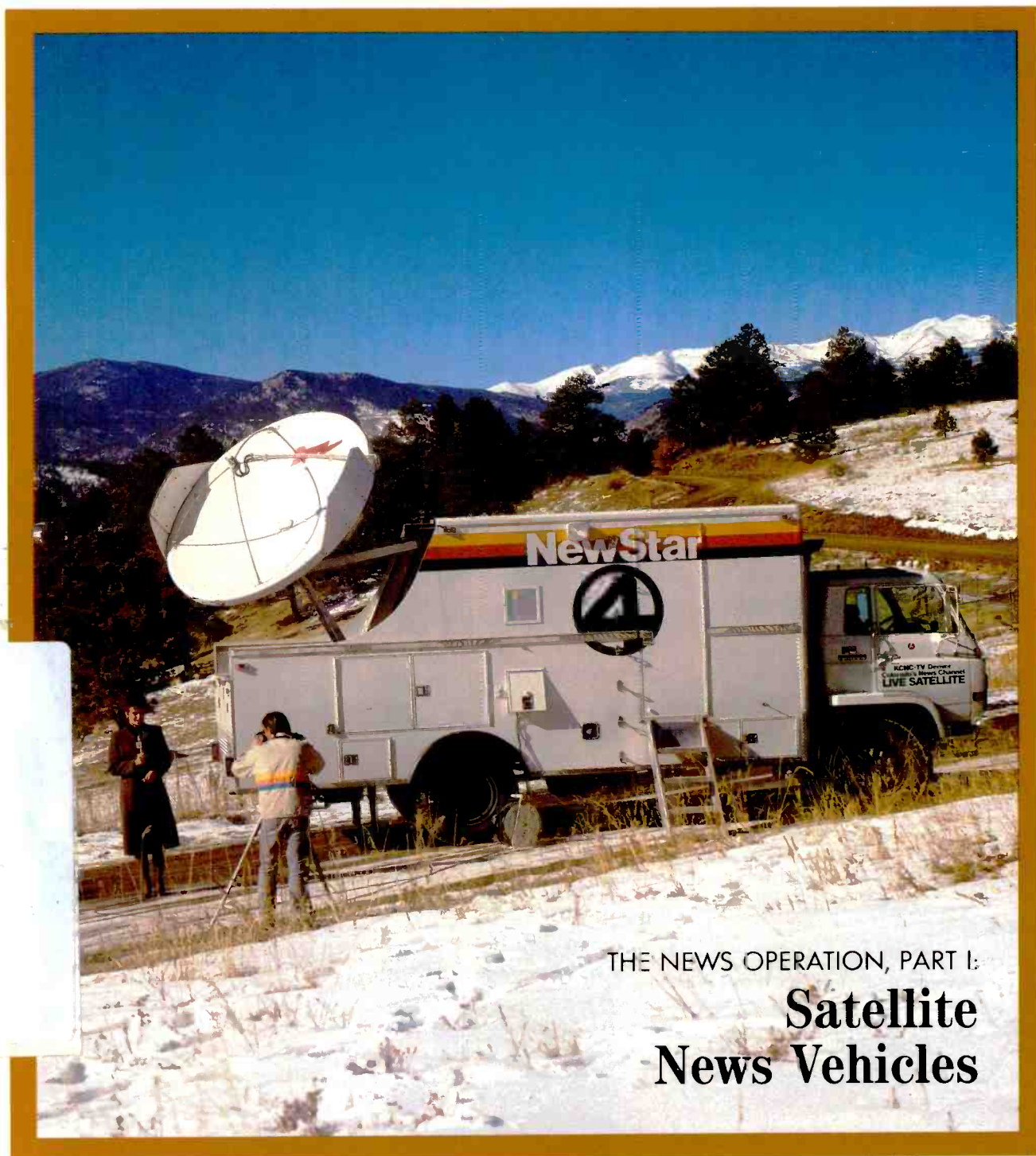


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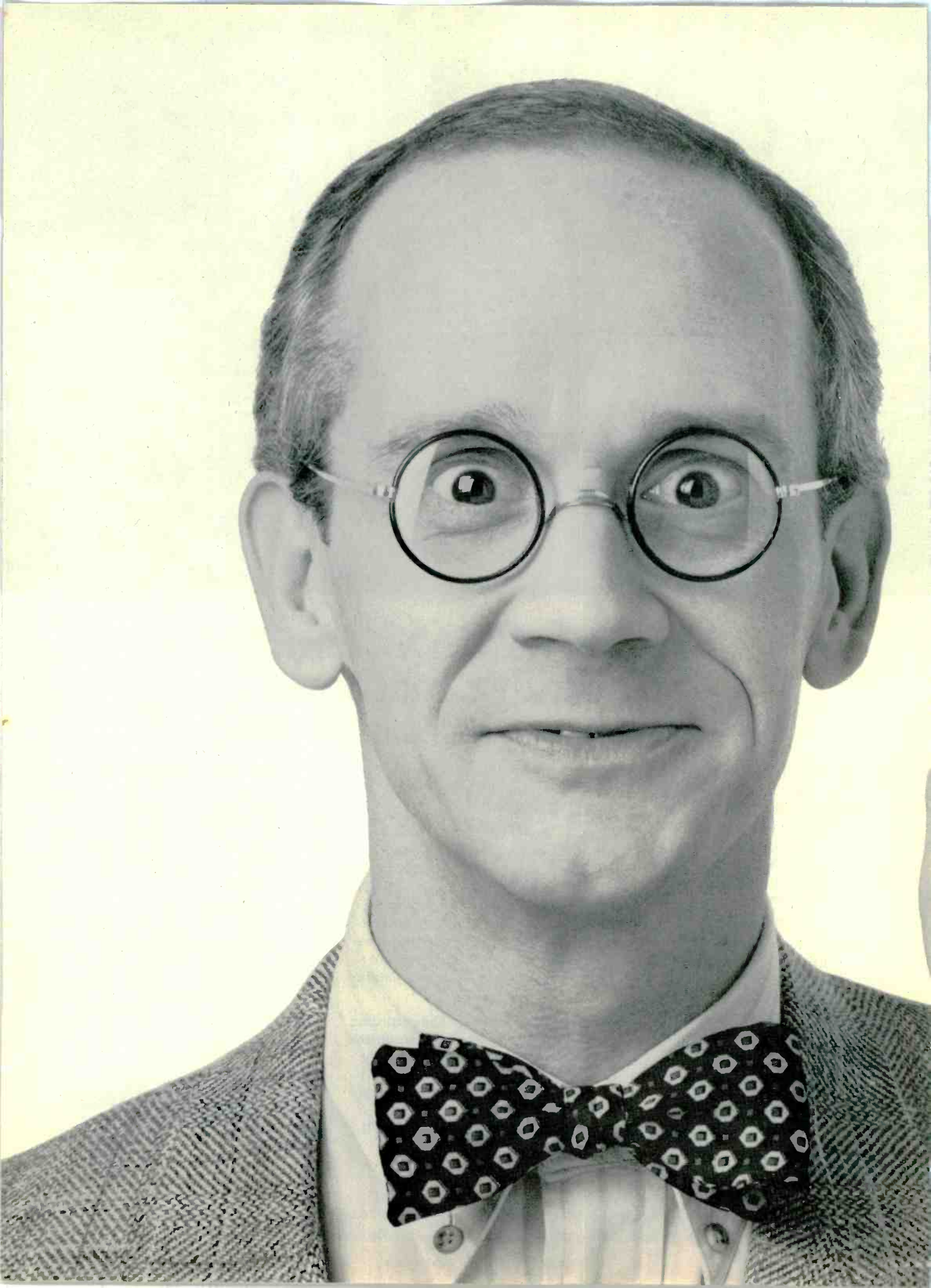
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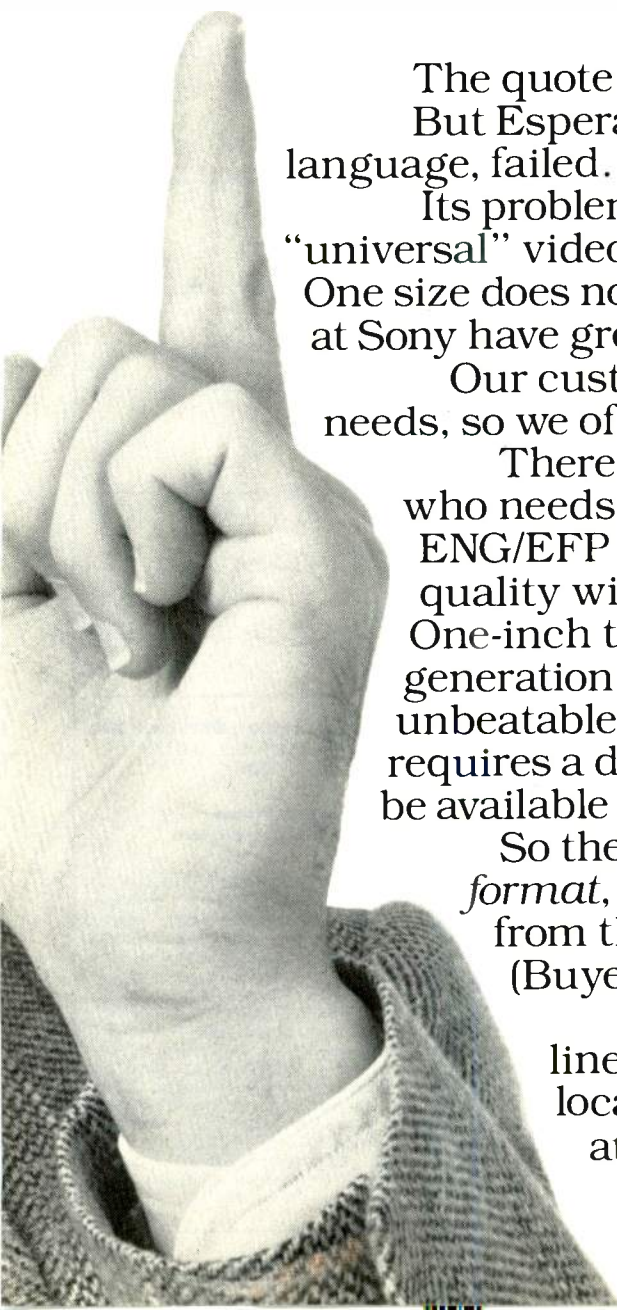
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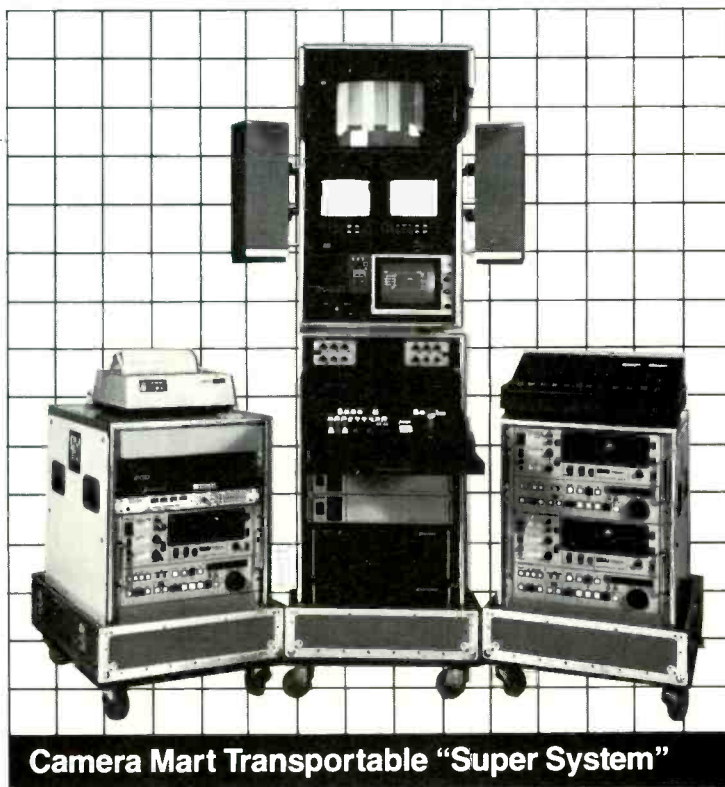
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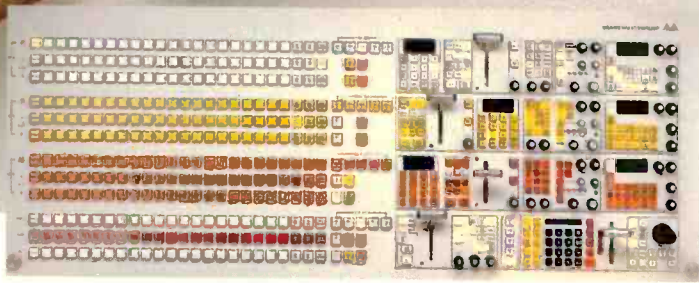
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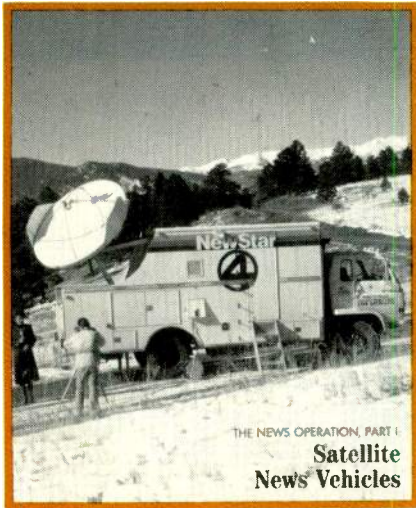
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AM Stereo Study Gets Good Response

Wherein the FCC Listens

“McKinney seemed to have ‘hit the wall’ of legal entanglements and was urging the FCC to stop hindering the process of mediation by delaying ruling.”

In our November 1986 issue, we took the time to praise the efforts of the FCC in appointing James McKinney to oversee the mediation process involving RKO's broadcast licenses. In starting off the new year, we will offer a little friendly advice regarding the same subject.

At the time of this writing (December 1986) McKinney seemed to have “hit the wall” of legal entanglements and was urging the FCC to stop hindering the process of mediation by delaying ruling, especially on the KHJ matter. McKinney's reported feeling was that the FCC was delaying specifically the KHJ deal, and, by association, the entire mediation process by simply not ruling an approval or disapproval of Group W's acquisition of RKO's Los Angeles broadcast property.

In our previous editorial, we praised the FCC for making a positive move to rectify a long-standing fiasco in the journals of broadcast business by “hiring” McKinney to conduct the unraveling of this deeply entwined legal mess. The feeling here is that they appointed the man (because he was qualified) to do the job, and they should then give him every assistance he requires. Perhaps they will, perhaps not.

We are urging that they go ahead and make the ruling, showing support for McKinney's position and allowing the negotiations and settlements of the other parties to progress. It seems clear now that every interested party is waiting for the resolution of the KHJ purchase before they will commit to any new kind of negotiation. The FCC's action would serve notice to those involved that they are really interested in seeing an end to this decades-long problem.

Since this is a clear case of failure in letting the “market” develop in its own way (70 parties involved in legal battles for over 20 years), and since the FCC has tacitly admitted this by appointing McKinney to direct the proceedings, the commission should clearly give force to the effort by meeting McKinney's requests. In addition, it was the Commission's own intended goal to solve the problem, and their “point man” tells them the only way to lift the cloud of fear and doubt is to act decisively on the premier issue (KHJ) to provide an incentive for further negotiation.

The commission should trust in their own man and do it. And quickly. Approval on the sale of another RKO license (WOR, Secaucus, NJ) has been obtained from the FCC. Why not continue the good work? McKinney's final report to the commission is due at the end of this month. It would be positive if he could report the completion of the KHJ sale and the rapid progression of the other license negotiations. Our feeling is that he would be able to do just that if the FCC will do the right thing and act on the proposed sale of the RKO Los Angeles property.



Tim Wetmore
Editor

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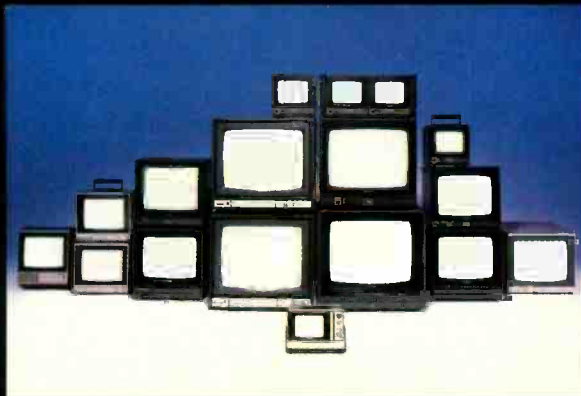


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Industry News

AM Stereo Study Gets Good Response

The National Telecommunications and Information Administration has gotten almost twice the number of responses needed from broadcasters for its study of AM stereo. The second part of the study, involving receiver manufacturers, is now underway, and results are expected sometime this month.

At the September Radio Show, Al Sikes, assistant secretary of commerce and administrator of the NTIA, told broadcasters that his office would conduct a study of AM stereo to see if a defacto standard for transmission and reception exists. He expressed hope that the study would help end the four-year-old controversy between the two remaining AM stereo standards: Motorola's C-Quam and the Kahn system. The only thing the industry agrees on with regard to AM stereo is that the standards war has kept conversions to AM stereo to a minimum: some 450 stations, or just under ten percent.

The broadcaster part of the NTIA's survey was sent out in November, and of 1400 questionnaires sent, an encouraging 900 responses were received. Stations were asked if they were using an AM stereo system, which one, the cost of converting, and reasons for choosing the particular system. They were also asked if they had had reason to switch to a different system or turn the stereo off. Stations not using stereo were asked about their future plans. The NTIA reports an eagerness on the part of stations to discuss the stereo issue, thus the reason for the large number of responses.

In December, the NTIA went ahead with the second part of the study, which was aimed at receiver manufacturers. The aim is to try to determine who is making AM stereo radios, how many can receive each or both of the systems, and the number of AM stereo radios being manufactured compared with the total number of AM radios being made. The survey went to the major consumer audio companies and also to auto



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manufacturers who make their own car radios.

The NTIA has said it will aggregate the figures about product quantity when the study is released, to protect information each company might consider proprietary. Less than 100 surveys were sent to manufacturers, and the results are being tabulated. The NTIA also asked companies not making AM stereo radios how many station conversions it would take to get them into the AM stereo market, and the results of the study will also include information from Brazil and Australia, where the national communications agencies have selected a single AM stereo system.

The NTIA's study could become a catalyst in the AM stereo impasse by showing stations that one standard is the dominant one or by prompting the FCC to take some action in protecting one or more of the systems.

Recently, Texar, a processor manufacturer, asked the FCC to reconsider its "marketplace" decision on AM stereo and instead

select a single standard.

NBC/Group W Merger Off

Westinghouse Broadcasting has decided to keep its independence and not merge with NBC radio stations. An agreement between the two had been in progress, when Westinghouse broke off talks with GE, NBC's parent company. No formal proposal had been made to the FCC for the union, which would have joined NBC's eight radio stations and three radio networks with Group W's 13 stations.

GE had been hoping for the agreement as a way of keeping its radio networks healthy. When the company took over NBC, it was required to sell off five radio stations to comply with FCC cross-ownership rules. NBC feared that selling off the stations could weaken the three radio networks.

Group W referred to the breakdown in the agreement as an "internal business decision." NBC will be looking at other ways to maintain outlets for its radio networks.

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HDTV '87 Call for Papers

The third international conference on new television systems, HDTV '87, will be held this year in Ottawa, ON, from October 5 to 8, 1987. Cosponsored by the Canadian Department of Communications, CBC, National Film Board of Canada, and Telesat Canada, this year's conference theme is "From Studio to Viewer."

HDTV program officials have also announced a general call for submission of papers for the colloquium. Subjects of the HDTV and EDTV conference include, but are not limited to, image quality, new applications, signal processing, distribution and transmission, display systems, industry standards, and introduction strategies, with special consideration being given to transmission- and distribution-oriented papers.

Deadline for submission of a 250- to 500-summary is March 30, 1987, with acceptance notification mailed on May 1, 1987. The official languages of HDTV '87 are English and French.

To submit a summary, contact Dr. Metin B. Akgun, Program Chairman, Dept. of Communications, 300 Slater St., Ottawa, ON, Canada, K1A 2M4; (613) 990-4669; Telex: 053-3342. For general registration and information, call the HDTV '87 Secretariat at (613) 224-1741.

Radio Measurement Action

Could new technology electronically detect which station a listener is tuned to on the basis of receiver emissions? It sounds a little futuristic, or even "Big-Brotherish," but the NAB's Radio Audience Measurement Task Force has asked the Association's Science and Technology department to conduct lab tests.

The radio industry has been struggling with problems and inaccuracies that are generally perceived in current methods of audience measurement. In fact, many stations and networks, if they present audience measurement information at all, sometimes "curve it".

The RAMTF has been trying to

solve the problem by evaluating new proposals for audience measurement from three firms: Audits & Surveys; Birch Radio; and McNair Anderson.

But now the RAMTF wants to determine if a "high-tech" approach is possible by differentiating specific signals from radio receiver emissions. Of the 22 companies that originally responded

to the task force's request for new proposals, there were three that reportedly use such technology, although it's still only in the developmental phase. While the possibility of an electronic emissions measurement system is being investigated, the RAMTF is expected to make a recommendation on the proposals of the three firms by the end of the month.



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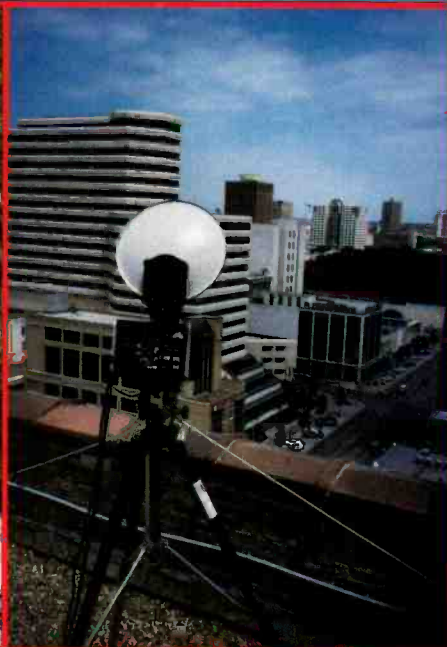
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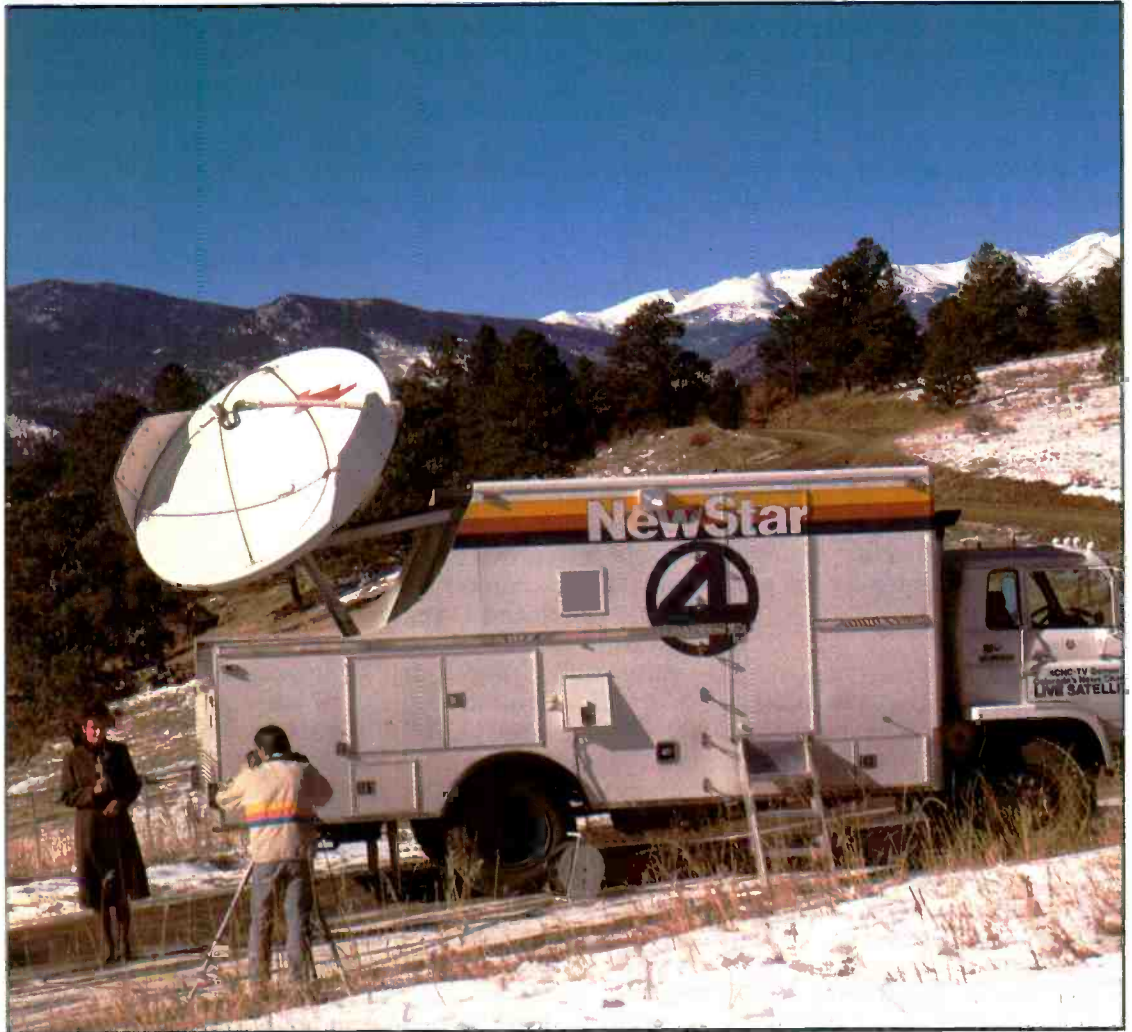
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STAR TRUCKS

Motor vehicles and space satellites meet in a new kind of mobile earth station essential to the modern television newsgathering operation.

By
Brian McKernan

Old sayings notwithstanding, it's good news that travels fast. And the faster news can travel, the better it is for television news operations. Speed has always been critical in newsgathering, and in today's television news operation that means using the mobile

earth stations made possible by Ku-band satellite technology.

Because the Ku-band—12GHz to 14GHz—is free from terrestrial interference, it affords virtually spontaneous transmission from any location, with no need for prior FCC clearance. This, along with the fact that Ku dishes aver-

age only eight feet in width, makes them perfect for transporting on public roads to the scene of news events. The key to achieving this mobility is a new type of truck appearing at more and more television stations each month: the satellite news vehicle (SNV).

SNVs offer unprecedented

SNV Newsgathering

newsgathering ability, and their impact on television news operations nationwide in just a few short years has been considerable. These self-contained mobile earth stations enable television news departments to report live from places once inaccessible with terrestrial microwave links. Consortia of SNV-owning stations—such as Conus—now make it possible for local news operations to coordinate with distant counterparts and arrange for live shots from almost anywhere in the country. Stations have united to form regional satellite news exchanges. And ABC, NBC, and CBS have all initiated their own satellite newsgathering systems, reimbursing affiliates for the purchase of SNVs.

The trucks

It is estimated that the number of television stations owning SNVs will total 100 by the middle of this year. The trucks come in a variety of makes and models, and manufacturers include BAF, Centro, Dalsat, Grey/Harris, Hubcom, Microdyne, and Midwest. Prices range from \$200,000 to \$500,000, depending on the size of the vehicle and choice of optional equipment. "Our standard offering is four vehicles," says Thomas H. Kidd, marketing manager of Hubcom, builders of the first SNV in the United States. "But every

station has its own applications for its SNV, and we try to fit the needs of each station."

Weighty matters

Because SNVs are self-contained mobile earth stations, they must be constructed on truck chassis to carry the necessary weight of equipment. Basically, the SNV consists of a driver's cab, equipment shelter, generator/battery compartment, and satellite antenna section. Each of those sections requires a specific equipment complement.

In addition to being an earth station, an SNV is also a motor vehicle that must operate safely on public highways. For these reasons it must comply not only with FCC regulations regarding its satellite transmissions, but with state and federal truck laws. Careful attention is paid to an SNV's gross vehicle weight (GVW) rating, which is the maximum weight that the chassis is designed to carry. The actual weight of an SNV—including driver and full fuel tanks—is known as its gross curb weight (GCW). The GCW must always be less than GVW. The difference between the two—the additional weight a truck can safely handle above its GCW—is its payload headroom.

The size of an SNV depends, of course, on what it will be used for.

"We bought our own GMC chassis with a GVW of 29,000 pounds, which is about 10,000 pounds above what is normally needed for an SNV," recalls Ken Highberger, news operations director at KCNC-TV, in Denver. "We drove it to Hubcom, in Florida, and they put their box on it. The reason we need a truck this large is for sufficient ground clearance for the heavy snow of Colorado winters."

A larger truck can carry more people and equipment, and a larger antenna, generator, and equipment shelter. SNV crews usually number three, a driver/operator, camera person, and reporter. But the size of an SNV depends on the needs—and budget—of the user.

Smaller SNVs, such as Midwest's S-18 and Centro's Satellite Networker, offer more maneuverability and speed than larger trucks.

Smaller SNVs usually run on gasoline, whereas their larger cousins—and heavy-duty trucks in general—require diesel engines, providing greater power for hauling heavier loads. Each SNV carries two engines, one to power the truck and one to generate the electricity needed for satellite transmission. An unwritten law among SNV builders dictates that using two types of fuels in the same vehicle is an expensive accident waiting to happen. An SNV with a diesel engine should always have a diesel-powered generator as well.

Choices

Standard and optional equipment for an SNV varies with each manufacturer. All SNVs, however, require certain basic components to function as self-contained mobile uplinks, including antenna, TWT amplifier, waveguide, and concomitant transmission and reception gear. Manufacturers include racks inside the SNV to house equipment for control, monitoring, and production. There are also built-in electric or hydraulic jacks for wind stabilization during transmission, and acoustic isolation of generator and equipment shelter



Centro's Satellite Networker is equipped with a 2.3-meter antenna that folds down into the vehicle's roof for an overall height of 11 feet.

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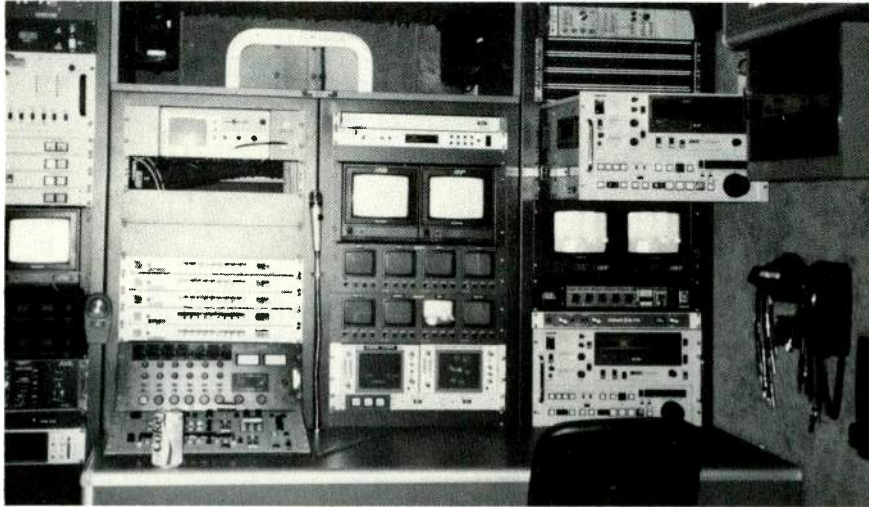
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A view of the equipment inside the shelter of KNBC-TV's Hubcom SNG-220.

to avoid noise during live shots and audio dubs. An HVAC system for the equipment shelter keeps the crew and equipment comfortable. And there's always an external interface panel with inputs and outputs for cameras and monitors.

There are choices to be made, however, even in the equipment that must be included in an SNV. There's less weight if one HPA is onboard, but a redundant unit can be switched on-line in case of failure. Two phase-combined HPAs allow for soft-fail redundancy; in case one goes down you're still transmitting, although at reduced power. Power output, whether it be from a phase-combined or single-thread HPA arrangement, is restricted by the FCC to 280 watts at the flange of the antenna.

Locating the TWT on the antenna versus locating it in the equipment shelter is also a matter of choice. A signal generated by a hub-mounted HPA doesn't suffer from the waveguide attenuation that afflicts signals generated by HPAs mounted inside the equipment shelter. On the antenna, a 300-watt HPA generates roughly the same power as a 600-watt HPA mounted inside the truck. This translates into less electricity that must be generated, less weight, and more room in the equipment shelter.

"We will do hub-mounted HPAs or rack-mounted HPAs, depending on what the customer wants," says Jack Moore, vice president of

Dalsat. "It's split roughly half-and-half among users, and some even have both for redundancy."

But there are arguments against hub-mounted HPAs. "I'd rather see HPAs kept inside the truck," says Joe Eicher, director of engineering of BAF Communications. "I wouldn't want to have to check a faulty hub-mounted HPA, with power going through it, on top of a truck in the rain."

And then there's choice among the antenna designs available for SNVs, although the satellite newsgathering organization you're affiliated with may make that choice for you so you'll conform to their specifications. Center-feed axis versus offset axis is one of the areas of debate regarding SNV antennas. The argument for offset axis is that the feed support equipment is not directly over the aperture of the antenna, so there's less possibility for disruption of the beam pattern of the radiated signal.

Midwest Communications' SNVs all feature offset-axis antennas. Center-fed axis antennas are also widely used by makers of SNVs.

Another area of debate centers on prime focus, where the feed assembly (LNAs, the feed) is positioned directly over the dish, and dual reflector, where a second reflector (the first being the antenna itself) is out in front, and the feed assembly further back. "A dual reflector, provides better illumination of the main reflec-

tor," explains Mike Perry, sales manager for Midwest's mobile unit group, which outfits its SNVs with dual-reflector antennas. Prime focus has its supporters also, and that configuration is available from various manufacturers as well.

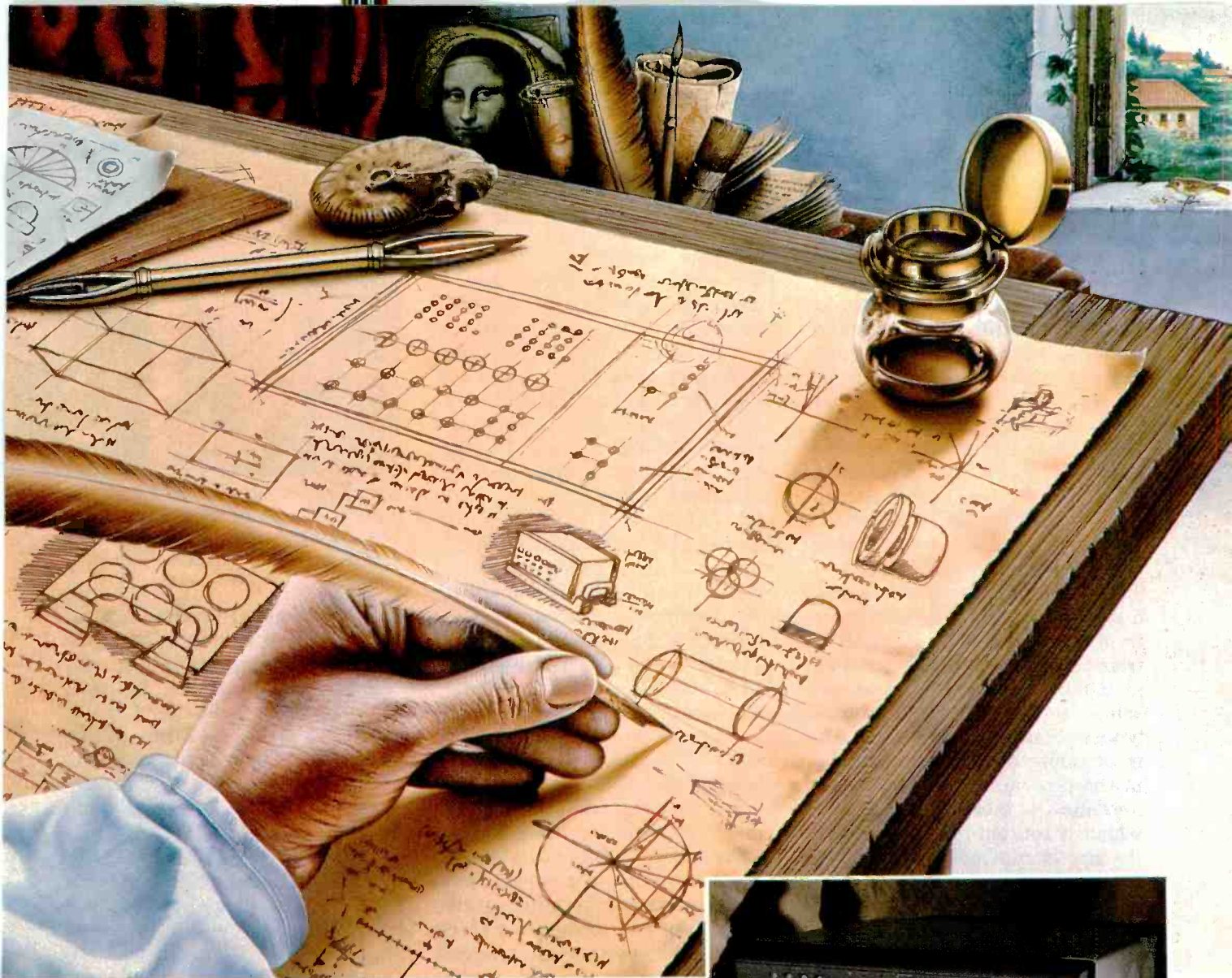
Then there's the issue of two-, three-, and four-port antennas. Each "port" can either receive or transmit. With a two-port antenna you can do both, and on opposite polarities (horizontal or vertical). With a three-port antenna, two ports can receive, one can transmit, or vice versa. Four port provides for two transmissions, two signals received. The importance of four-port antennas is examined further in the section on voice communication systems.

Taking aim

Transponder time for SNV use can be obtained in two basic ways. The first is membership in a news-exchanging consortium—such as Conus or CNN Newsbeam—or a major network that owns the rights to and manages one or more transponders. The second approach is to contract directly with satellite vendors for transponder time, as in the case of GTE Spacenet's News Express or Comsat General's Skybridge, both suited for the occasional user.

Either way, every SNV crew uses generally the same procedure when accessing a satellite at the scene of a news event. A navigational compass in the driver's cab is used to orient the truck so its antenna faces the southern sky. "After you've found the satellite a couple of times you get pretty good at it," comments KCNC's Highberger.

Setup time is minimized if the operator/driver doesn't have to leave the equipment shelter; so full control of the uplink process from inside the truck is preferred procedure. A view of the antenna is provided by a window in the shelter, where remote controls lower the stabilizer jacks, raise the antenna to its elevation height, and adjust pan and tilt for proper azimuth and elevation. Re-



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SNV Newsgathering

ception of known signals from the satellite to be accessed aids in peaking the antenna, as does a spectrum analyzer, necessary also for setting of cross polarization.

Frequency re-use, an FCC-mandated technique to maximize Ku-band satellite transponder capacity, allows for two transmissions on overlapping frequencies, provided their polarization is not the same. Setting the proper cross polarization is therefore a necessity with most Ku-band satellites used by SNVs, including Satcom K-1 and K-2 and GSTAR 1 and 2.

Cross pole is set using a spectrum analyzer, which receives—from the satellite to be accessed—a known signal of opposite polarity from the one to be transmitted from the SNV. The analyzer is adjusted to “null out” the signal, solid proof for the operator of which polarity is to be used. The most important component of all in the procedure, however, is the antenna’s motorized feed horn, which is rotated to change polarity and is controlled from inside the truck.

“The feed horn could be rotated by hand from outside,” observes BAF’s Eicher, “but that’s troublesome, especially in bad weather, and motorized cross polarization is more precise.”

Microdyne’s Quicklink SNV features an automatic acquisition package, a computer that calculates the longitude, latitude, compass heading, and the satellite to be accessed, and automatically peaks the antenna and checks cross polarization.

Communication packages

After setting up, the next step is voice communication. It provides a means for the all-important video transmission coordination between the SNV operator and the transponder management entity, and for SNV-to-station communication for director cueing, IFB, and—if need be—computer-generated scripting.

There are two basic techniques for achieving two-way voice communications with an SNV in the field: use of the band edge of a

video transponder, with the truck’s side of the conversation riding as a subcarrier on its own video beam; or use of dedicated SCPC transponders separate from that which carries the video. A lively argument can be made for the merits of both techniques.

Currently, ABC, CBS, and CNN are using the Skyswitch Satellite Communications system, which employs a dedicated transponder but can also be used with band edge. Known as a demand-assigned multiple access (DAMA) system, it assigns frequencies for both voice communications and the video uplink as soon as an authorized SNV sets up and establishes low-power contact—on a dedicated SCPC transponder—with GTE Spacenet’s DAMA master control computer, in McLean, VA. No prescheduling of transponder time is required before that. Skyswitch hardware onboard the SNV automatically tunes the transmitter and receiver to the proper frequencies.

Three-digit numbers dialed into the onboard phone gives the SNV operator access to satellite service technicians for coordination of the uplink. The operator can also call another truck, or can dial into the nationwide telephone system—via GTE Spacenet’s PBX in McLean—and call home base or any phone number in the world, for that matter. Skyswitch provides—in all—four duplex audio lines for communication, cueing, and IFB.

NBC’s Skycom satellite newsgathering network uses the band-edge technique for its Harris model 7-10 communications system. It provides three digital duplex business phones for cueing and IFB, all of which connect with AT&T nationwide via a downlink in Melbourne, FL. The Harris system also provides an order wire, a push-to-talk circuit for uplink coordination with Skycom in New York, and also a data circuit for electronic mail/scripting.

Conus’ voice communications system is another band-edge arrangement and provides for a data channel, two one-way IFB circuits; a duplex private line (Conus



Florida News Network member station WJXT, Jacksonville, uses the Skyswitch communications system in its Dalsat SNG-25 vehicle.

chose traditional terminology already familiar to broadcasters) for director cueing, scripting, and technical coordination between SNVs and Conus Master Control Station (CMCS), in Minneapolis; and a two-way radio that’s independent of the video signal, useable at any time, and connectable to AT&T via CMCS.

The need for flexibility with voice communication systems may make four-port antennas a necessity. The possibility exists that an SNV with a two-port antenna could be deprived of voice communications if the voice transmission isn’t of the same polarization as the video. A four-port feed eliminates this problem, providing instant switchover in polarity. A four-port antenna is a requirement for membership in ABC’s Absat system, and in CBS’s Newsnet satellite newsgathering organization, and may become the standard for SNV antennas.

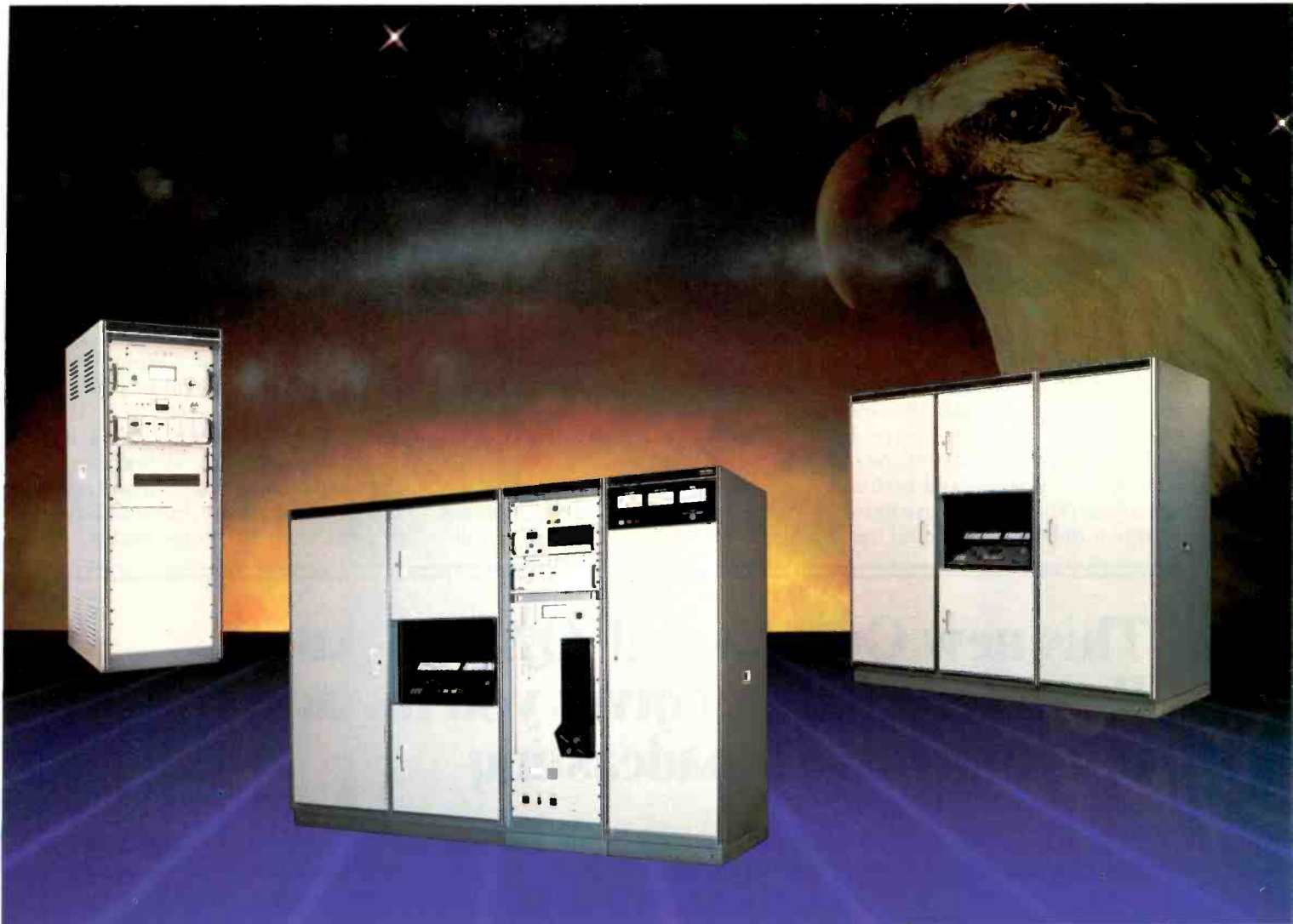
On the air

When an SNV crew is finally ready to transmit, the transponder coordination entity authorizes that the SNV commence an unmodulated transmission at low power. A second cross-pole check is performed by the control facility, after which full power is permitted. The procedure ensures avoidance of interference with other satellite signals.

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SNVs on the nation's highways is the reimbursement plans offered by the three major television networks. NBC will subsidize an affiliate's purchase of an SNV up to 50 percent of \$300,000. To comply with the NBC Skycom system, the requirements include a 2.4-meter antenna, feeding two audio channels (for MTS) even if the uplink has mono audio, and a source identification (SID) generator, which uses the vertical interval to identify the uplink.

The FCC has issued a notice of proposed rulemaking on uplink identification, and indications are that the Commission may also require a formal test procedure prior to every SNV transmission. "When you hear about full-time transponder people getting hits a couple of times a month, that indicates a real problem," says Ed Williams, staff engineer of the department of science and technology of the NAB. "SNVs are part of a large number of occasional users

swinging from satellite to satellite every day. There's a great opportunity for error. Vertical interval codes don't solve the problem, operator training solves the problem. But if you have an identifier you'll probably think twice before transmitting incorrectly."

ABC's Absat system offers affiliates a maximum of \$180,000 for the purchase of an SNV. The requirements include allowance for any size antenna as long as it meets the FCC requirement for two-degree spacing between satellites. CBS's Newsnet affiliate news exchange will pay affiliates half of the cost of an SNV, up to \$150,000. Each network, of course, wants something in return, which could include surrender of commercial time, freezing of network compensation fees, or higher service fees to participate in news services.

Is it largesse that motivates the networks to offer such generous deals to their affiliates? It de-

pends on who you ask. "This policy will act as the glue to keep the network together," says Julius Barnathan, president of broadcast operations and engineering at ABC. "Satellite newsgathering allows us to do more things for the viewers, and we'll increasingly rely on affiliate stations for fast-breaking news. There's a mutual understanding that affiliates will share stories with the networks, but nothing that says they have to immediately drop what they're doing and serve the network."

"We scared the networks because they were taking their affiliates for granted and not giving much in return," comments Conus' Conover. "Their monopoly on the pipeline is fading, and they'll have to re-evaluate what their strengths are. But the broadcast television networks have a strong established base, and an overseas news advantage. They won't go away, but will have to treat their affiliates better."

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Loyalty and news

Ticklish problems of allegiance can occasionally arise for network affiliate news directors whose stations are also members of other satellite newsgathering networks. There are many services an affiliate can belong to, in addition to his own network's. These include Conus, CNN, Group W's Newsfeed Network, and N.I.W.S.

If an exclusive story is given to one particular service you belong to, can your competitor in the same market wind up getting it as a result?

"Sometimes there are hurt feelings," says Randy Covington, news director of KYW-TV, in Philadelphia. KYW is both a Westinghouse station and an NBC affiliate.

"Informal arrangements can take precedence over the formal ones. If the networks had been more aggressive ten years ago in servicing their affiliates, I'm not sure the Conuses would exist."

Breaking away

Satellite newsgathering has enhanced station independence, with regional news cooperatives forming to cover areas that news directors felt had been inadequately served by the regional news feeds of the major networks. The best example of this is the Florida News Network (FNN), founded by television stations from the state's four largest markets: WJXT, Jacksonville; WPLG, Miami; WFTV, Orlando; and WTSP, Tampa. Mel Martin, news director at WJXT, describes FNN's genesis: "Covering the entire state is too big a job for local stations, too small for the major networks. So we made a commitment to see what technology would allow for a daily, real-time news exchange."

"We studied fiber, microwave, and satellite. Florida is an island on three sides, narrow but long. Rain is a factor with microwave; fiber is expensive. There are environmental concerns with microwave and land-acquisition problems with both. C-band isn't easily transportable, and there are interference problems. Ku-band was the answer."

"FNN includes affiliates of all three national networks, and we don't consider ourselves to be a threat to them. The networks do a good job with national and world news, but we can cover our region better than they can. We should all do what we do best."

"Having an SNV is not a prerequisite to being in FNN. Some members use fixed earth stations, such as WTXL, in Tallahassee, which covers the state capital for the network. We are doing more and sharing in the cost. FNN is run like a small network."

Bucks for trucks

Even with network reimbursement plans, an SNV is a very ex-



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pensive piece of equipment. Tradeoffs may have to be made. "We don't plan to add staff and are delaying replacement of the ENG van because of buying an SNV," states Stan Hopkins, news director of WBZ-TV, in Boston. "There are financial limits; we sold our helicopter and bought an SNV," recalls Tom Mitchell, technical operations manager for news at KUTV, in Salt Lake City. "When I need a helicopter, I can rent one, but I'd rather have the truck. Our helicopter pilot now drives and operates our SNV."

Final analysis

After all is said and done, the central question remains regarding the vehicle: Does an SNV benefit a station's newsgathering operation? Some news directors respond:

"Our competition didn't have a truck; so we didn't desperately need one. But we got one anyway, and now I can't imagine doing business without it," says KYW's Covington. KYW shares its SNV with Westinghouse sister station WJZ, in Baltimore. "We don't let the truck go too far in case of emergencies, but we use it for field anchoring portions of our 5:30 newscast in areas outside of our microwave range. Those communities are happy to see themselves on TV."

"The SNV has allowed us to be more aggressive about total coverage of our ADI, which is quite large," states Peter Langlois, of KCRA, in Sacramento. "We can go live from anywhere. When we relied on our helicopter, we had to land, shoot, take off, and gain enough altitude to beam the signal back to the station."

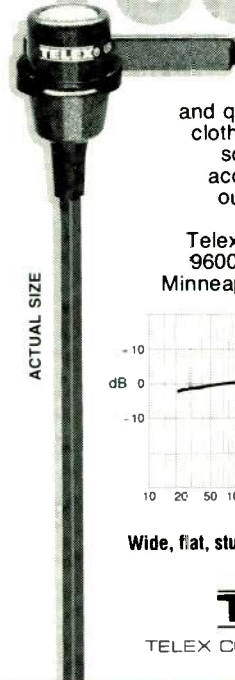
"Weather is a serious topic in Denver," says Ken Highberger, of KCNC. "The storms come through Utah, and we can call KUTV in Salt Lake City and get a live shot of the weather we'll be getting tomorrow morning. Our SNV provides good public image and overnights. There's one important thing to remember, though. The public is smart, and if you don't use your SNV effectively they know it." **BM/E**

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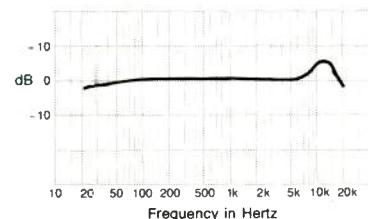
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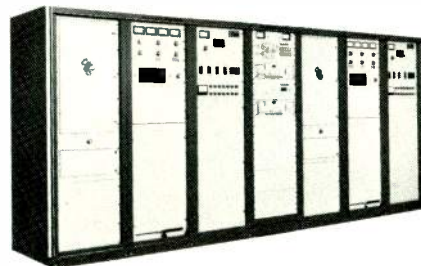


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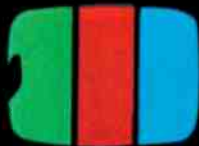
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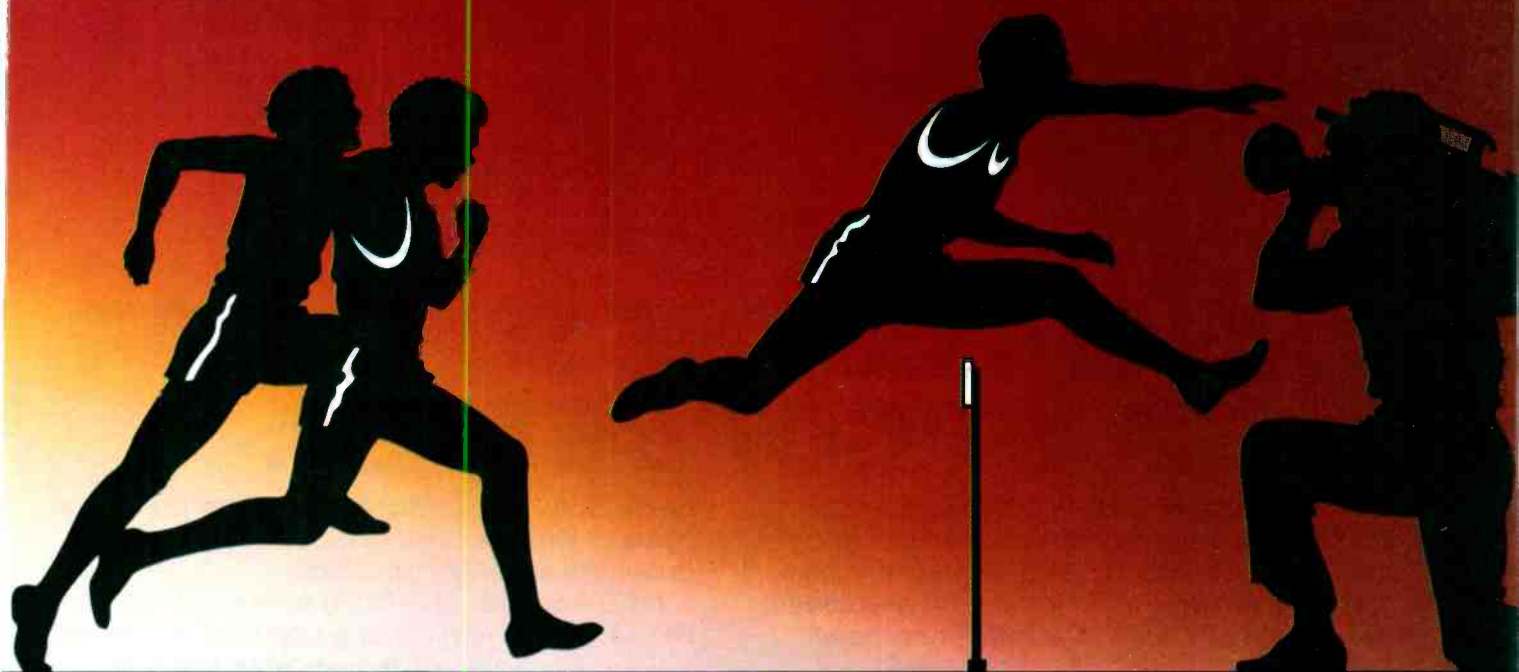
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Evaluating the ENG Camera

What makes one ENG camera different from the next? The differences may be subtle, but they can have a great impact.

By Eva J. Blinder

Line up a dozen ENG cameras of different makes and models. What differentiates one from the next? The body color may be different, the shape may vary somewhat, but in general they all look pretty much the same. Set them up and watch their output on a monitor, and, with the same slight variation, they all make pretty good pictures. Read the spec sheets—all are impressive, with maybe a dB or two difference in either direction.

With such high quality and so little apparent variation, how can broadcasters make intelligent choices when the news department needs new cameras? How can an engineer or news director determine which of the many seemingly small differences will become significant in a particular application or department?

As with any other equipment purchase, the first step is to deter-

mine the needs of the operation. This will eliminate many inappropriate choices. For a television station news department, for example, the range of acceptable cameras would be limited at the outset to three-tube or three-chip models with certain minimum resolution and noise specs. If integrated operation is deemed necessary, only cameras with the ability to take an on-board recorder would be considered.

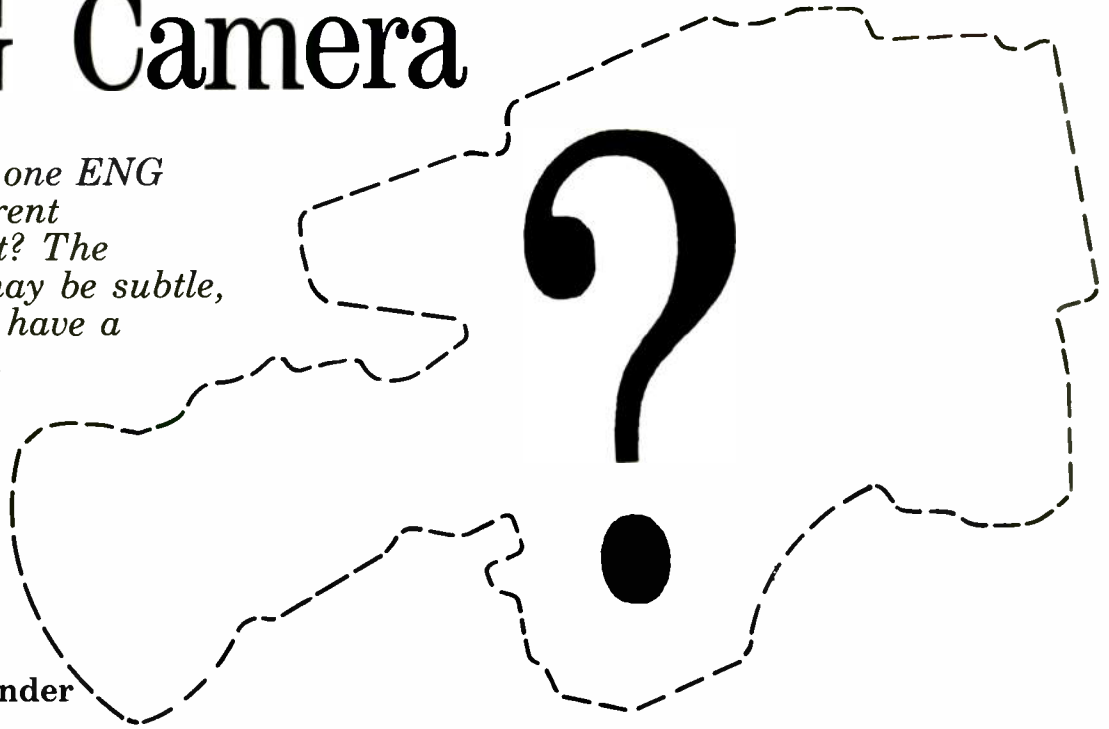
Once these basic parameters are established, however, thoughtful, detailed evaluation is the only way to differentiate meaningfully among the wide range of cameras remaining.

According to Brent Robinson, senior engineer at KSL-TV in Salt Lake City, UT, the first step in evaluating a camera before purchase is verifying the manufacturer's spec sheet claims with careful measurements and double-checking that the camera

meets NTSC requirements. In addition, the station will test the camera under varying light and temperature conditions to make sure that focus, registration, and color balance are stable. Other important factors, Robinson adds, are comet-tail suppression (on tube cameras), the amount of noise added by high-gain functions, and maintenance of color balance in high-gain settings.

"The older ENG cameras had a very bad problem with that," Robinson comments. "The technology of the newer cameras has improved tremendously."

KSL chief engineer Talmage Ball and head photographer George Griner agree with Robinson on the importance of rugged construction. ENG cameras are subject to rough use and difficult operating conditions, and proper construction can make a big difference in how long a camera lasts. Ball believes that the latest



ENG Evaluation

generation of ENG cameras is less durable than its heavier predecessors.

"Our old [RCA] TK-76s were heavy cameras," Ball comments. "They could take a real beating. One time one got caught in a ditch during a flood and carried 600 feet. We cleaned it out and got it going again."

Testing durability

Nevertheless, durability remains one of the biggest concerns in ENG cameras. Testing a camera for durability, however, may be tricky. What dealer, after all, will let a prospective buyer drop the camera on the floor to see how it responds?

Fortunately, dropping the camera is not the only way to determine if a camera is likely to stand up to hard use. Phil Godfrey, who was intimately involved in camera selection during his years in a variety of technical management positions at ABC, is now director of development and engineering at Ikegami.

"When I was evaluating cameras at ABC," Godfrey recalls, "we would look at the type of construction the manufacturer used, for example, whether the frame of the camera was a one-piece, die-cast body or simply straight sheet metal bolted together. If it was sheet metal, we would check if it had any thickness or strengthening dimples. Even the type of screws used to hold the covers in place can be an important consideration. Some manufacturers use miniature screws, which are very difficult to remove and replace in field service and maintenance.

"Obviously, you can't drop the camera on the floor, but we've put cameras on tripods and banged them with rubber mallets to see if everything stood in place." In general, the camera should be constructed to withstand the bounces and bumps that are a normal part of ENG work. Door latches and screws should provide easy access while at the same time preventing accidental opening of the body. The lens mount should also be secure.

"Hold the camera and the lens,"



CCDs already influence broadcasters' ENG departments. WPLG, Miami, bought 13 Sony BVW-105 Betacam.

suggests Phil Livingston, service and training manager for Panasonic Industrial Co. "See that a moderate amount of pressure on the lens doesn't make the camera flex and that the lens is securely fastened to the camera body, because sometime during its life the camera is going to get picked up by its lens."

Other critical considerations include adequate RFI shielding and proper internal construction. Mike Messerla, national sales manager for U.S. JVC's Professional Video Division, notes that vertical mounting of circuit boards protects the electronics from the effects of gravity, allowing the camera to be laid down on its side or accidentally knocked over with no danger of a short.

Tube cameras should provide easy access to the tubes so that tubes may be electronically and mechanically adjusted as needed.

Balance and weight

A related concern is how well the camera handles physically. To a certain extent, perceptions of balance and weight vary with the individual photographer's preference. In general, though, lighter is almost always better, especially when the camera is to be used primarily on the shoulder. Every ounce of extra weight decreases the photographer's endurance. For this reason, interest in the new CCD cameras is increasing in television news departments.

Balance is a potential area of contention, especially with the

rise of integrated recorder/cameras. Both Griner and Ball of KSL expressed concerns that on-board VCRs could cause a rise in back problems among news photographers because the entire weight of the ENG package rides on one shoulder. Many photographers have become acclimated to balancing a camera on one shoulder with a VCR slung over the other, and for this reason, some have shown resistance to the integrated units.

Ball adds that the added length of a recorder/camera can make shooting out of a helicopter awkward. "The added length of the camera makes it hit the roof," he says.

Compatibility

Another "physical issue" concerns how well the camera will interface with existing news department equipment. If the department is replacing all its cameras at one time, this may be of little concern. But cameras that function similarly, with more or less the same configuration of switches and controls, smooth the transition from one to another.

If a station has a large selection of lenses, it may be important to ensure that all cameras use the same lens mount. Sony and Ikegami cameras, for instance, are notably incompatible in terms of lens mounting. Even if the lenses mount in the same manner, however, each camera manufacturer maintains its own pin configurations for motor drives, servos, viewfinder electronics, and other information exchange between the lens and camera body. Adaptor pins are available to overcome these differences.

Performance specs

Spec sheets generate high interest and controversy in almost any equipment area, and ENG cameras are no exception. While no one denies the importance of specifications, broadcast engineers and camera manufacturers alike agree that relying solely on printed specs can be confusing.

"In the past, specifications really meant something," asserts

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ENG Evaluation

Peter Gloeggler, manager of product planning for Sharp Electronics. "Now all the cameras' S/N figures are sitting in the high 50s and another dB is of little significance. The same is true of resolution."

Commenting on resolution specs, Larry See of Sony adds, "The only resolution that counts for anybody is the resolution you actually see on the picture. That's predicated on how good the device is that's displaying the signal." For comparisons to be valid, cameras must be tested on the same output devices under similar conditions.

"The best way to test resolution is in terms of modulation transfer functions," See continues. MTF, which measures the relationship between frequency and amplitude in a signal, can be a more accurate indication of actual resolution than horizontal lines because it allows the user to take into account all the devices that a signal passes through.

"The interesting thing about MTF is that everything has an MTF curve," See continues. "Since they're all starting at unity, each MTF curve will add algebraically. If the camera tube has 40 percent MTF, and the lens



Thomson's TTV 1023 Betacam ENG camera package is another example of modern, light, and rugged units.

has 60 percent at 400 lines, the real resolution is 24 percent of the possible ideal resolution."

Gamma is another factor that can affect the picture noticeably, especially in the amount of detail the camera pulls out of dark areas. Manufacturers have developed different ways of compensating for gamma, which is a nonlinearity in the beam current.

Both See and Gloeggler agree that relying exclusively on printed specs is a mistake. "I think what you look for in an ENG camera is good, accurate, and stable fundamental signal processing," See states. "Buzzwords have less and less value the farther out they get."

Gloeggler comments, "Performance today is so good that 400 horsepower is really no better than 350 when in fact you only need 200. Actual performance in use is determined largely by the adjustment of the enhancement circuit, which differs widely from camera to camera." He further advises, "Don't rely on your memory even for a minute. The only positive comparison of two cameras is split-screen."

Industrial v. broadcast?

With such excellent specs at all ranges of the camera spectrum, why spend the extra money for a "broadcast-quality" camera when an "industrial-grade" model might do just as well? In fact, many broadcasters, especially outside of the major markets, do just that. Manufacturers note, however, that while their industrial-line ENG cameras may make excellent pictures, at least on subjective tests, there are differences in construction and quality that can affect a broadcast operation.

See notes that in Sony's industrial line, the circuits are mounted onto larger boards that are mounted with screws and wires, the easiest and most cost-

NBC Transfers Film Archive to Video

NBC News is in the process of transferring one million feet of archive film to videotape.

This priceless collection of news footage documents nearly 40 years of world history, including historic films of the Kennedy assassination, the 1968 Democratic Convention, and the war in Vietnam. The library's film formats vary widely (16 mm, 35 mm, positive, and negative), and the condition ranges from mint to severely scratched.

In order to utilize the vast resources of current news programming, these clips must first be transferred to video. And it was for this purpose that the NBC technical managers selected the Rank Cintel CCD-based ADS 1 to handle all transfer assignments for the NBC Electronic Journalism (EJ) Department as well as for the many broadcast news organizations to whom NBC News sells stock footage.

According to NBC News technical manager Steven Pequignot, the new archiving process began in 1978, when a disorganized and overgrown film library of 6 million feet of film was whittled down to the current one million feet. The contents of this Fort Lee, NJ, film vault was also placed on the NBC computer so the news producers and researchers could instantly

access all clips, to be transferred to videotape at NBC headquarters for editing purposes.

By 1985, it became apparent that NBC's Videola was no longer suited to the film-to-tape transfer needs of the network news programmers. "The design of the Videola system was dependent upon the camera that was used," Pequignot explains. "We had the best cameras available, but it was inadequate for the task... particularly in direct transfer of negative footage. Besides, the machine simply couldn't do gamma correction."

Advantages of the new system include the ability to handle all film formats, and no day-to-day setup is required due to the stability of the CCD pickup device. This system's automatic color corrector allows the ADS 1 to operate virtually unattended.

Pequignot says he was impressed by the picture quality of the ADS 1, but admits that the CCD systems' unique dirt and scratch concealment technology was the prime attraction. The device detects signals generated by dirt and scratches on film surfaces and then electronically replaces the defects from information sampled from the surrounding picture area. This feature thus enables the transfer of film that would otherwise be unusable by network standards.

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effective method. For broadcast cameras, however, Sony uses a motherboard with plug-in boards so the camera doesn't have to be disassembled for maintenance. In addition, he says, a great deal of attention is paid in the broadcast line to such elements as how batteries attach and the ability to take an on-board recorder. Other small details, such as a polarization filter in the optical system, missing in Sony industrial-grade cameras, may add up to big differences for a television station. A very inexpensive camera may not take the right kind of battery, or may have a limited selection of lenses due to a nonstandard optical system.

"Obviously, economics is a very important factor in deciding on any piece of equipment," adds Godfrey. "But you have to decide on how the equipment is being used and how rugged it is. There's a good chance that the more you pay for it, the more rugged and sturdily built it is. Why does a film photographer buy a Nikon?"

In fact, ABC bought Ikegami industrial-line ITC-730s for certain limited uses during Godfrey's tenure at the network. The cameras were used for such applications as fixed "beauty" shots at racetracks or mounting high up in a stadium's gridwork. Godfrey cautions,

however, that such cameras lack the full range of features found on a broadcast camera, such as high-quality triax remote control.

The CCD alternative

The recent upsurge in introductions of broadcast ENG cameras with solid-state pickups has shaken up a relatively stable camera industry. With their many inherent advantages, CCDs make a lot of sense for ENG—so much so that NBC recently signed a major order for SP-3A CCD cameras from NEC's Broadcast Equipment Division, for use by NBC news and O&O stations. In evaluating CCD cameras, however, their differences from their tube-based relatives must be taken into account.

The advantages of CCDs are well-known: low power consumption, excellent low-light performance, light weight, absence of lag and burn-in. These advantages, however, bring with them attendant disadvantages. For example, the physical configuration of the chip itself, divided into a discrete number of very small photosensitive elements, eliminates registration error while at the same time limiting actual registration. This is one reason it has taken so long for CCD cameras to reach the broadcast market, and why a studio-quality

CCD camera is still several years from realization.

CCDs' imperviousness to burn, which gives them tremendous advantages over tubes in high-light handling, is accompanied by a susceptibility to streaking or smearing in bright-light situations. Unlike the tube, which can be damaged by an over-bright high light, the CCD is merely overloaded temporarily and quickly recovers. The overloading, however, creates a solid vertical line in the picture, which can be observed by holding a lighted match or cigarette lighter in front of the lens.

Another problem with CCDs is geometric distortion, especially when panning up and down or diagonally. These distortions, however, are coupled with flat registration performance edge-to-edge, with none of the falling-off toward the corners inherent in tubes, and excellent dynamic resolution when panning.

Different transfer techniques, such as frame transfer or interline transfer, give different results with these geometric distortions. Another technique that helps to mask geometric distortion is the electronic shutter, which also optimizes slow-motion performance. These two results are accomplished essentially in the same way: by exposing the chip to the image for a very brief moment, preventing any actual movement in the picture.

Essentially, a CCD camera is still evaluated in the same way as a tube camera. There are, at present, no standardized tests for dynamic resolution, one of the major areas where CCDs shine.

"Other than dynamic resolution, you would evaluate a CCD camera and a tube camera the same way," comments Godfrey. "You would look at the human engineering, resolution, signal-to-noise. All the performance specifications that describe a tube camera are pretty much identical to those that describe a CCD camera."

"You have to use the same tests because those are the only ones available," agrees Jeff White of



The AU-400 Camcorder from Panasonic shows the M-II format VCR mounted to the camera head.

NEC. His company is as close to "veteran" as possible in this infant field. "But when you are doing that, you have to keep in mind the differences between CCD and tube cameras." The resolution charts, he notes, have no way of measuring dynamic resolution. In addition, they are designed to establish the resolution in three picture zones, "whereas, in a CCD camera, everything is Zone 1."

Because of the flat response of the CCD-generated image, the pictures a CCD camera produces will more closely approximate film than a video tube camera, White adds. Some tube camera tests, such as registration and geometric distortion, are meaningless when applied to CCDs.

Such CCD-specific problems as smear, ringing, and aliasing can be affected by the transfer technique and the arrangement of the clips, White notes. NEC uses an unusual arrangement, with two chips dedicated to the green channel and one shared by red and blue, designed to increase luminance resolution while controlling aliasing and ringing. Its disadvantage is a loss of bandwidth in the red and blue channels. The interline transfer chips used by some other manufacturers have inherently higher luminance resolution, allowing the use of one chip per channel, but have greater problems with ringing, aliasing, and smear, according to White.

Subtle differences

In the end, what differentiates one ENG camera from the next may come down to small, subtle differences and even personal or market preferences. One of the biggest factors, which all the testing in the world will not reveal, is the kind of support the manufacturer is able to supply.

"There's a dramatic difference between the manuals of one company and another, and the response you get from their technical support," states Talmage Ball. Are parts available locally, or must they be ordered from overseas? Is a loaner camera available if one goes out of service? Is the manual written in

clear, easy-to-understand English? The best way of ensuring good support may be to talk to colleagues in the industry and find out their experiences. A reputation for speedy and helpful support is a strong selling point.

Ultimately, the perfect camera for one operation may be inadequate for another. The only way to buy the right camera is to define in advance what the station's re-

quirements are and to insist that those requirements be met. In the words of Peter Gloeggler, "A lot of the important information is not captured on the specification sheet. All of the cameras nowadays make a good picture. The difference between buying a camera that is going to do a good job and one that's going to do a bad job is, did you buy the camera to meet your needs?"

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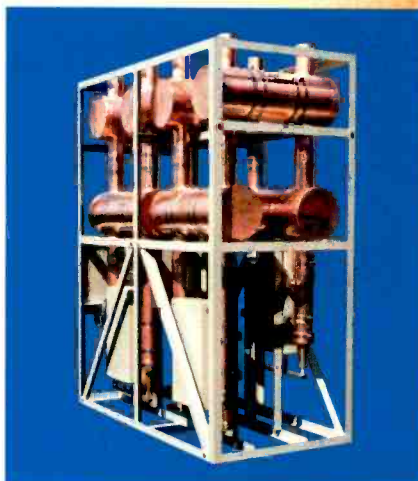
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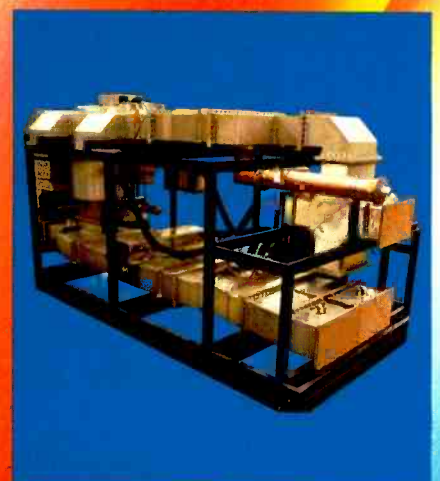
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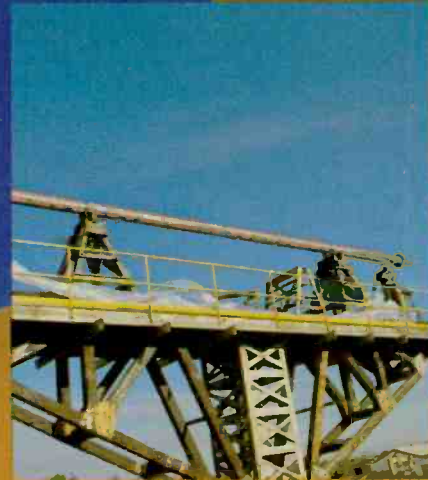
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A Roscor-built van featuring a telescoping NuraLink unit.

Outfitting the ENG Vehicle

By Eva J. Blinder

With satellite dishes sprouting everywhere these days, the simple microwave-equipped ENG van might seem an anachronism. It's true that relaying a news story back to the station over a standard terrestrial link lacks the glamour of bouncing the news off a satellite. But as news is the bread and butter of so many local television stations, so is the ENG vehicle a broadcast staple.

Even though it may be modest and unadorned—and not all are—the ENG vehicle is affected by current trends in technology just as any other area of broadcast en-

In an age of the SNV, the lowly ENG van seems boring and pedestrian. But a well-designed van can make the difference between getting and not getting that crucial story.

gineering. The effects are subtle but significant. Smaller, more versatile equipment can enhance a van in different ways, permitting a smaller, more mobile vehicle with the same capabilities or

adding production and even post-production capabilities in the same-size van.

Nevertheless, the ENG vehicle market stands paused at a crossroads in its history. Several factors have combined to make broadcasters think twice before buying, and some manufacturers report sluggish sales.

First, many broadcasters are hesitant because of the apparent trend toward SNG. If uplinking capability will soon become a competitive requirement, why spend money on a truck that lacks it? Although not all manufacturers are bullish on SNG, most are

TV Engineering & Production

ENG Vans

keeping close tabs on the trend, and many are already offering SNG-equipped trucks, vans, and other vehicles.

Secondly, the avalanche of station acquisitions and group mergers has put many managements into a holding pattern. Instead of buying this year, many stations and groups are looking closely at their needs and budgets and postponing purchases.

"We find right at this time that most stations, with all the selling and acquiring of new stations, are not buying at all," comments Jack Harris, president of E-N-G Corp. "Everybody is now rebudgeting. Instead of orders, we are getting calls saying, 'What is this going to cost for next year?'"

No excuses

Buyers' hesitancy, however, may prove a boon in disguise for manufacturers and users alike. Technologies and budgets in flux breed caution in an already careful and conservative industry. Now, more than ever, there's no excuse to buy a poorly equipped or constructed van.

Agreement is widespread on what constitutes a quality ENG vehicle. "For the majority of customers, the basic things are a generator, a 42-foot mast, a roof deck for shooting and for mast and microwave maintenance," says Jack Vines, president of Television Engineering. "The critical thing to us is the balance of the vehicle—does it drive and handle well so it's not overloaded on one side or in the rear. I think we've gotten that down to a well-engineered end result."

"Generally speaking, what people want is the most for their money," states Paul Roston of Roscor. "That means a vehicle that meets the basic requirements of storage, layout, adequate seating and placement for the personnel that are going to be using it, and quality construction at the lowest possible price."

More production?

One notable trend in ENG over the past few years has been user's desire for more production ca-



SCN-TV's Pierce-Phelps built van. According to Pierce-Phelps' Mike Dillion, outfitting a vehicle is "almost like [using] a Chinese menu."

pability in an ENG vehicle. No one doubts that more users are requesting the addition of small switchers, audio mixers, and even small edit controllers in what were once bare-bones camera vans. The controversy, such as it is, concerns whether or not these capabilities actually find use.

According to Gary Unterborn, fabrication supervisor at Centro Corp., "The ENG market is changing in the regard that even in the smaller affiliate areas, in the middle of America's heartland, all the stations are looking at more production capacity—what we call ENP, or electronic news production.

According to Unterborn, Centro has been building its ENP vehicle for several years and expects the basic design to remain viable for another two or three years. Centro's ENP truck, built on a small, heavy-duty Ford chassis with a galvanized steel body, is slightly larger than the standard ENG van and has greater storage capacity and more rack space. It also has four passenger/operator seats, as opposed to three in the ENG van. As with the ENG van, the electronic equipment complement is determined by the purchaser.

Another company that has noted a trend toward more capability is Midwest Corp. Executive vice president Jay Adrick

says, "One thing we have seen recently is the addition of editing or the addition of interformat capability, where one machine is Betacam and the other is U-matic. We recently built two vans for Scripps-Howard that had both formats available and were set up so you could interformat edit.

"We're seeing typically one camera as standard," he continues. "However, customers want the capability of providing a genlock signal and signal inputs for more cameras, usually a maximum of four. This necessitates a sync generator, DAs, and a switcher capable of handling multiple inputs. Several vans we've recently built have had this capability."

Powering up

Besides the camera itself, probably no requirement is more basic to an ENG van than a clean, reliable source of power. Because the ENG crew goes where the news is, not where the power is, it must carry its own. The 6.5 kW on-board, gasoline-powered generator is more or less standard, but some manufacturers report variations on the theme.

"We're still utilizing generators," says Vines. "In the early days, people went to generators that were not so reliable. Dissatisfaction with them drove some customers to battery-powered systems. Now the trend is back to generators and has been for some time. We are incorporating, for those who desire it, a backup inverter so in the event they lose generator or shore power they can switch automatically to the inverter."

At Midwest, the emphasis is on flexibility in the power design. Adrick says, "We have the capability in our design to power from three different sources: shore power, generator, and from dc via a transistorized power inverter. We put in typically four deep-cycle batteries that allow us to run the inverter with the truck fully powered up for two hours.

"We first did that for one of the Taft stations about four years ago," Adrick recalls. "Since then

it has really caught on. There are certain situations—let's say it's a SWAT team staking out a guy who has a hostage—where they don't want extra noise from a generator that would interfere with the actual news situation." The inverter is ideal for this kind of situation because it is silent.

Working designs

The very nature of the news business dictates that an ENG vehicle, whatever its other attributes, must be practical in design and convenient to use. Especially if the vehicle is to be used for coverage of breaking stories, it must be convertible from a conveyance to a working environment within seconds of reaching the scene. Not only must the equipment be within easy reach, but the mast must be quick to set up and accessories and connectors be accessible and well placed.

"All our customers want a connector panel to tie in equipment, as opposed to the old boot that lets you stick cables through the side," says Vines. "The panel is more convenient and allows quicker access."

Television Engineering is at work now on the third of a trio of custom vans for KNBC in Burbank. "Their requirements are different from most stations," Vines notes. "They have eight two-way radios because the station has quite an elaborate relay system from San Diego almost to

San Francisco. In addition, we built for them a means of sliding out the camera and tape recorder that's a little different than most. Their operators want to have a minimum of 'hit the ground' running time. The cameras and recorders are on sliding trays near the door, so the cameraman can slide the tray out, put the recorder strap over his shoulder, put the camera on his shoulder and move away from the vehicle in minimum time."

Notes Adrick, "In terms of the interior, customers are looking for things such as storage space, space for two-way radio communications equipment, and a third seat, like a jumpseat, in the back area that's usable not only at the location but for seating while going out to a story." Such a seat needs seatbelts and proper anchoring just as the front seats do.

"People do quite a bit of work inside the vehicle," Vines adds. "They may preview a tape and write their copy inside. There's got to be enough room in the work area for a couple of people." Normally, the front passenger seat swivels so it can be used by a director or TD at the site.

Safe and comfortable "seating" for the equipment is just as important. "It's essential to set up the design so there's proper storage for the equipment so it travels in a compartment that's properly padded, yet easily accessible at the site of the story," Adrick com-

ments. "We design custom mounts for cameras and for VTRs. We also set up the storage area so batteries can be charged en route."

"When we sit down with the customer and he talks about his requirements, you start to get snapshots in your head about how this should lay out," says Mike Dillon, sales manager of Peirce-Phelps. "For the most part, the position of the racks is kind of cast in stone in terms of how much space you can get and where you can put it. But there are some variations on a theme." In fact, Dillon has noted very little consistency in the finished trucks' equipment complements. "It's almost like a Chinese menu, where the customer says, 'I want one from column A and one from column B,'" he quips.

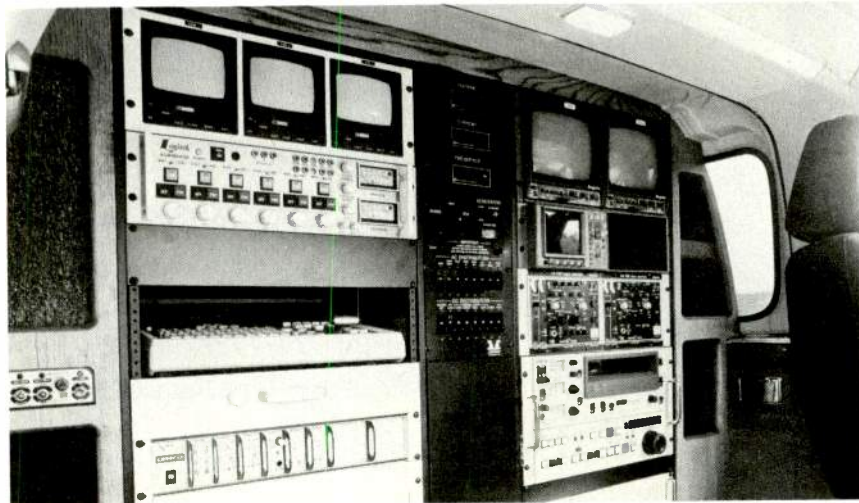
Safety considerations

Any time a news crew erects a 40-foot microwave mast or climbs up on the roof of the van for a better shot, it courts a certain degree of danger.

"The manufacturer is really limited in how much he can do to prevent those accidents," Vines asserts. "It still takes operator common sense. Nevertheless, Vines and other manufacturers take pains to augment that common sense with equipment safeguards wherever feasible.

For example, TV Engineering now incorporates a light at the top of the mast that shines straight up. The operator can turn the light on and off with a breaker, but a special circuit overrides the breaker and turns the light on automatically any time the mast contacts an obstacle.

Adrick describes the safety measures incorporated by Midwest as follows: "First of all, we have lighting on the roof of the truck that illuminates the antenna pole as it's going up so the operator can see what obstructions are above the vehicle. We're also very thorough with the lock-out system on ignition. It's impossible to start the truck while the mast is up. Next, we put the pan/tilt controls and the mast raise/lower switch out on the sig-



The interior of a Midwest ENG van reflects a growing trend in on-board production capability.

nal panel so the operator is able to look at the mast as it's going up. He's forced to be outside the truck and watch rather than doing it inside in a blind situation."

Safety of the roof platform is another crucial consideration. Adrick notes that Midwest's newest roof platform, made of fiberglass, has a nonskid surface and also incorporates "a very substantial set of safety handrails" that meet the specifications of the Occupational Safety and Health Administration.

"A lot of customers don't like the height of the rails and will cut them down," Adrick admits. "But we will not deliver a truck with rails that do not meet OSHA specs." He adds a cautionary note: some customers have been cited by OSHA for not having proper railings.

Classy chassis

Whatever equipment goes into it, the chassis itself is a crucial consideration. ENG work can

hardly be called delicate, and whether travelling is over rutted back roads or potholed city streets, wear and tear necessitates a sturdy, chassis and body.

Vines says, "We use the Ford Superstretch van with the largest engine and heaviest suspension and cooling systems and a large alternator. We even throw in cruise control, power locks and power windows." A relatively new feature is a step bumper on the back to make getting in and out more convenient.

"We're adding things like an extra oil cooler, extra transmission cooler, heavier alternator, or additional suspension, meter or gauge packages to show oil pressure, etc.," notes Adrick. "All of those are pretty much becoming standard." He adds, "A prospective purchaser should look beyond base price and ask questions about those options. Air-conditioning in our vehicles typically is done with a rooftop-mounted,

usually 13,500 BTU device. Most of our customers want that in addition to the basic vehicle air-conditioning so they have comfort in transit as well as adequate additional cooling when they're at the site." Other extras include additional gas tanks.

"We're very careful to make certain that you cannot deplete all of the gas with the generator," he adds. "We use a fuel feed that keeps usually about a 10 percent fuel reserve so the vehicle can be driven away. Also, we provide complete isolation of the vehicle electrical system from the production electrical system, so you won't deplete the battery."

"If you go four-wheel-drive, the only thing sensible to us is a Suburban," Vines asserts. "We have done some Broncos, but the end result in terms of work area and storage is too limited. Also, the wheelbase is so short. We have had people request 42-foot masts for Broncos, but you almost have

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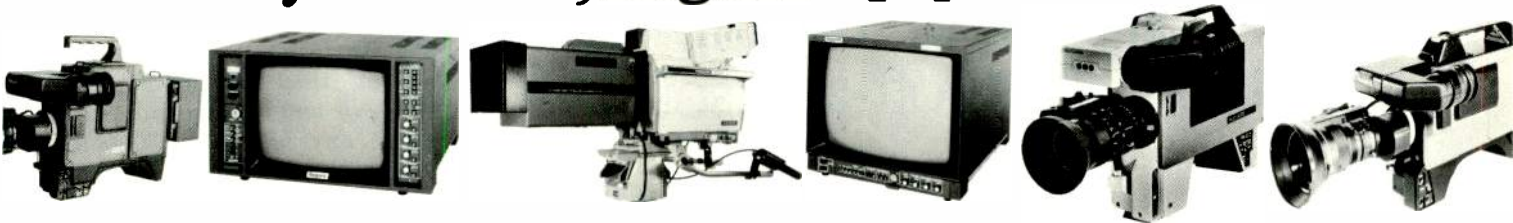
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ENG Vans

to put leveling jacks to steady it.”

In fact, the smaller vehicles for ENG are attracting increasing interest, especially as equipment size shrinks. Harris suggests that the next wave in terrestrial ENG will be small, two-person cars with compact microwave units. According to Harris, E-N-G Corp. recently built some very small units for KGO that were equipped with microwave units designed to

fit in a car trunk. A specialty of the company is the Backpack, a portable, 40-pound microwave unit that comes complete with antenna, monitor, and audio control.

“Quality equipment is coming down in physical size,” notes Tom Canavan, vice president and general manager of A. F. Associates. “The one-piece Betacam combo is very easy to take into the field, you don’t really even need a true

ENG vehicle. If you are going to use microwave or live feeds, nowadays all you need is a vehicle with microwave equipment and a monitor. You don’t need the multiple racks of equipment that you needed four or five years ago.”

Looking up

With the straight ENG market at a plateau, it seems clear to most observers that the next big leap will involve satellite uplinking capability. It seems likely, however, that SNG will spell metamorphosis but not death for ENG.

“The major general trend we’re seeing is that people are at least considering that an ENG van should have satellite uplink capabilities,” says Canavan. “That’s on everybody’s mind. But the market has not grown for that product the way everybody thought.”

“What customers really are looking for today is a unit that will do just about everything for them—SNG, some post-production—but they still want the unit to be basically news,” says Harris. His company’s Econoline SNG vehicle has editing capabilities, and it can also receive and transmit all terrestrial microwave frequencies in addition to its uplink communications capabilities.

Advances in satellite technology, especially Ku-band, promise to make SNG as compact and easy to include in a few years as microwave is now, Unterborn adds.

“In the major marketplaces you are probably going to see the networks outfit their vehicles both ways, and little stations that are out there will probably start budgeting for that kind of equipment in 1988 and look at actually buying them in 1990 or 1991 as more satellites go up,” Unterborn continues.

“It’s a technology that breeds more technology. The first television network, the BBC, only went on line 30 years ago. The first satellite, Sputnik, was only launched in October, 1957, and the first Ku-band satellite was SBS-1, launched in 1980. Nobody even dreamed of all this when the first network went on line.” **BM/E**



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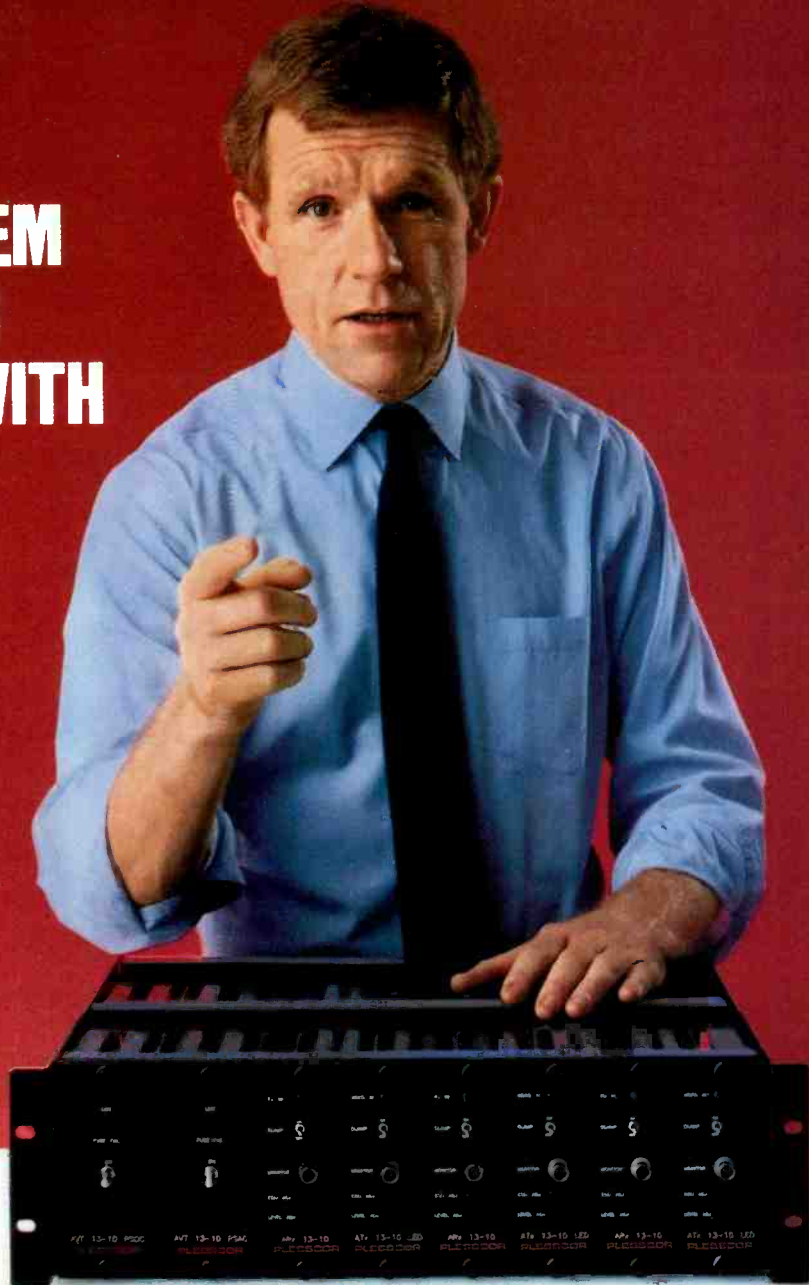
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An MCI board and two Ampex 24-track recorders are part of the equipment on board Westwood One's Concertmaster truck.

Live On-Location Audio

By Judith Gross

The techniques behind the audio in live remotes are as individual as the audio engineers who spell their success.

Trying to dissect the artistic techniques behind successful audio productions is a difficult task. To most audio veterans, the methods they use to capture the sound of a live event are second nature, and it's hard to pin down what particular blend of pick-up, mixing, and recording goes into the finished product. It's not so much a brand of mixing

console, or type of microphone or recorder, as it is a total mixture of fairly ordinary equipment used in extraordinary and sometimes unique ways.

The one common thread in remotes for both radio and TV is the desire to give the feel of the event as it happened, with little or no enhancement, except what is felt to be needed to overcome the

built-in transmission limitations of the medium. For example, there will be less need for enhancing the sound of a live concert for stereo FM than for TV, which is still heard mostly in mono. But live productions in stereo for TV are beginning to become more numerous, and frequently it is the live extravaganza that a network decides to broadcast in stereo, because music and theatrical production scenes can show off MTS better than everyday sitcoms and drama shows.

Stereo for TV

"My own impression of stereo is that it's terrific, it really makes a difference in a show," notes Ed Greene of Greene-Crowe and Co. Greene is the chief audio mixer, engineer, and person responsible for the sound on such prestigious events as last year's Statue of Liberty dedication closing ceremonies, and he also works on the Grammy Awards. Greene cites a recent study on the impact of audio on TV as a good reason to use stereo.

"If there's good audio, viewers will stay with poor video, but the

Audio Engineering & Production

Audio Remotes



A 45-foot semi based in Los Angeles is one of three production vehicles used by Westwood One to produce live radio concerts.

minute you lose the audio, you lose the audience," he says.

Greene has been producing TV shows in stereo for a number of years, because he feels that it doesn't cost any more than pro-

ducing in mono, and it enhances a show's potential for later replay. Production companies sometimes call him and ask if a past show can be remixed for stereo, only to find no remixing is needed.

M-S, or mid-side, miking is one stereo technique Greene has been using more for TV shows recently. It's one that's been around for some time, but has only recently begun finding favor for TV audio. Instead of the wide stereo mic placement, M-S miking uses a single mic location with a double pick-up in a close-capsule configuration, and a matrix box that allows a mixer to alter the stereo spatial characteristics.

"We use it when we feel it will sound better, and for any kind of pick-up where there's a concern about mono compatibility, because you end up with a single-mic point pick-up," Greene explains.

A lot of Greene's work on an event's audio goes into the planning process. He divides the audio for a TV program into four categories: audience, music, dialogue, and effects, and each takes on a different importance depending on the type of show. "One of the

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most important things in getting the feel of a live show is the reaction of the audience," says Greene. Another important element, he says, is the feel of the location—where the event is taking place.

To mike the audience, Greene will generally use shotgun or omni-directionals, PZMs, Countryman hypercardioids, Sennheiser, or AKGs. He will add a pair of mics to pick up ambient sound and "mic mice"—mics that sit in the footlights to pick up sound from the stage. The "mice" will generally be hypercardioids.

For the music portions in a show being broadcast live, Greene will mike instruments the same way he would in a recording studio: with multiple mic techniques. Often the appearance is a key factor, and he chooses mic size and position accordingly.

For vocals, including dialogue, the choice is either hand-held or lavalier RF or wireless mics. But

Green cautions that a wireless lavalier has to be used in an appropriate situation, since there are limitations to the feedback level. Vocals and dialogue can also be miked with wired hand-held mics on booms and fishpoles.

"With wireless mics, interference can be a problem," Green notes. "However, the technology has been improved recently, and we're also more careful in using them.

Greene-Crowe has its own large 45- by 8-foot production trucks, but he supplements his own equipment with on-location rentals. For a show such as the Grammy Awards, he uses a truck from the well-known Record Plant. The Grammys are one of the largest live productions he handles, and Greene says the seven to ten live musical acts each have their own mic setups, which are put together beforehand and wheeled into place as their turn in the show comes up.

Creativity in the mix

The part of the job that appeals to Greene the most is the mixing, and it's where the most creative or artistic considerations come into play. But it's hard for him to outline specifics, because once all the planning and setting up has been done, the rest comes almost instinctively.

And he explains that there are no pat formulas: "There are no rules. You go into a project with an idea of what it's supposed to look like and sound like, and you do what you need to get the job done."

Experimentation is a large part of the creativity, according to Greene, especially now when the audience for stereo is so limited. He says, "Now is the time to experiment with stereo."

Green starts the mix by building the room atmosphere, and then strives to give motion to the music by panning or with shifts in the stereo perspective.

wired or wireless feed to the sportscaster for his cue phone.

But with the AT4462 and Modu-Comm, cue is fed through the announcer's mike cable already in place. Add a small accessory decoder to the end and plug both the cue phone and the microphone into the same cable. Cue can be program, an outside line, or "talk over" from the mixer. No extra wires, no crosstalk, and no change in audio quality! Nothing could be simpler or more efficient.

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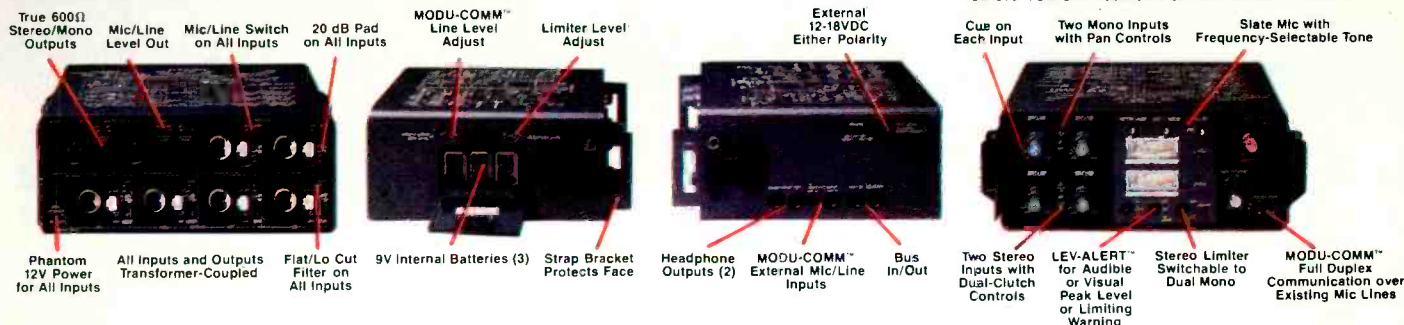
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With several hundred mics at a single event, Greene sometimes uses more than 24 tracks. His truck can handle two 24-tracks, and, if he needs backup capability, he will end up with as many as four 24-track recorders.

What about enhancements? Greene says the idea is to keep the sound natural in live shows and those taped for later use. This may involve nothing more than piecing together different parts of a recording, as is.

It may come as a surprise that audio sweetening is used in live remotes, just as it is in produced shows. Most of the time, sweetening involves audience reactions, and, for live shows, it's done with a tape loop and a special sweetening device. But Greene says the overall effect can still sound natural.

"These operators are specialists, and if they're doing their jobs, the home audience won't be able to tell it's been sweetened," says Greene.

In addition to producing a natural sound that gives the true feel of a live event, there is always the

potential for later playback to consider. A good mix, and a successful multitrack recording, has to be ready to turn over to the post-production crew.

While Greene feels fortunate to be at a level that allows him to see events through from start to finish, the post-production mixing is the one part of the job he enjoys the most. It's also the part that lets an audio person put his individual stamp on a production.

"If you send out ten competent mixers to do the same project, they will all turn out a good product," says Greene, "but each one will be different."

Concerts for radio

Westwood One Radio Network/Mutual Broadcasting produces some 250 live radio concerts each year. Most are taped for airplay by affiliate stations, but some are transmitted live via satellite. Some are later used as master recordings for live albums by a particular group. Most of the concerts are rock music or pop, but Westwood One also airs country, Spanish, and black music

concerts.

"Capturing the event is really important to us," says Richard Kimball, director of artistic relations and remote recording. "The idea is to avoid sounding as if it came from a recording studio."

Kimball notes that each act, each concert has its own sound, and the goal is to capture that sound at that particular concert.

The preplanning involves a lot of "homework," according to Kimball: listening to the group live, if possible, or on records, if that's the only available way to hear their sound. And a "good, long sound check" before the concert helps.

It also helps, he says, to know the concert hall. "We don't have to worry about the sound of the hall too much, because we take a direct feed from the stage," Kimball says. "But we'll try to record the artist at a good venue on a concert tour. If there's a city where the group's record is selling well, we'll try to record the show there."

Westwood One's three units help the network keep up with a busy schedule. There's the 40-foot MCI bus based in Cleveland, OH, which boasts a 50-input custom Sound Workshop board and two MCI 24-track and two MCI ¼-inch mixdown recorders, that is used mostly for recorded concerts. Then there's the older 35-foot GMC bus based in Boston, with smaller radio boards, a broadcast booth, and satellite transmitting capabilities, which is used for the concerts that air live.

But the mainstay of the network's concert production is the 45-foot semi truck based in Los Angeles. It boasts a 600 series MCI board, Neve submixer, and several other pieces, which add up to a total of 74 inputs if needed, and it also has two Ampex 1200 24-track recorders. In addition, some 50 to 60 percent of the concerts produced also end up a video, so there are time code capabilities.

Biff Dawes is the CE in charge of remote recording; he does all the mixing. Dawes says the pickup comes directly from the artists' mics.

PR #	POSITION/INSTRUMENT	MICROPHONE	NOTES
1	Bass Drum	Senn 421	
2	Snare	SM-57	
3	Hi Hat	SM-77	
4	Hi Tom	SM-57	
5	Mid Tom	SM-58	
6	Lo Tom	Senn 421	
7	L Overhead	452 w/20db pad	
8	R Overhead	452 w/20db pad	
9	E/Bass	Direct	
10	A/Bass	Senn 441	
11	A/Pf	452 w/10db pad	
12	E/Keys	Direct	
13	Conductor		
14	Harp	452 w/10db pad	
15	E/Guitar	SM-78	
16	A/Guitar	SM-57	
17	Perc 1	Senn 421	
18	Perc 2	Senn 421	

Ed Greene pre-plans particular microphones for the orchestra split with the PA system to tape *The Kennedy Center Honors*, which was broadcast on CBS in December.

"We take a direct split off all the existing mics," says Dawes, "we look at what they're using then supplement it with audience mics."

He adds that there might also be additional mics on stage, probably Sennheiser shotguns, if needed. He also likes the benefits of M-S miking. "We try to use M-S when the room can accommodate it acoustically. We use a stereo Schoeps mic with an M-S box," Dawes explains.

He says, on the average, he's used to working with about 40 mic feeds, but it may be as few as 30 for a four-piece rock band, or as many as 70, which was recently the case with a Neil Young concert. And, sometimes, as was also the case with Young, Dawes has to combine mic feeds just to get down to a workable number. With miking, Dawes points out that there is no substitute for experience.

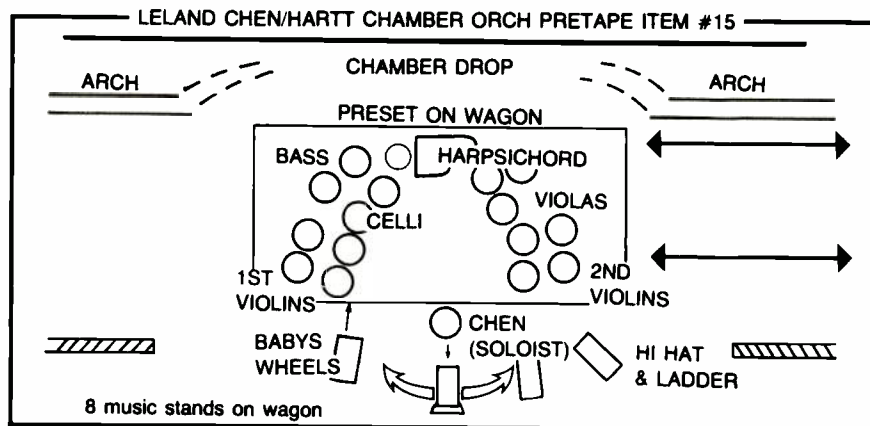
"Our mic technique comes from having had a lot of experience. It's relative to the music being recorded, as well. A lot of it these days is in drum miking; you'll add inside or outside mics, overheads, or tom mics. That's really the only thing that changes."

Dawes doesn't do anything to enhance or alter the sound of the hall itself, preferring it to sound natural. He uses six mics on the audience, no matter what the size, to help convey room size and, of course, provide reaction and ambience.

Dawes keeps the processing to a minimum, consistent with the philosophy of capturing the event's actual sound. He will add EQ if needed, or peak limit keyboards and vocals, and maybe add a bit of echo and delays to help control the room sound over the vocals, but he generally stays away from noise reduction.

"If you try to clean it up too much, it will sound too perfect, so, unless the group wants me to, I don't use noise reduction," Dawes says. The same is true of overdubs, unless there is a problem with the concert's audio.

Kimball says that to avoid problems, Westwood One tries to



Also for *The Kennedy Center Honors*, Greene blocks out exact mic placement for the Leland Chen & Hartt School of Music.

record takes from several concerts for a particular group, then take the best take in its entirety. But he adds that they could "fix it in the mix" if there is a severe problem. Some concerts however, are only recorded once, and, of course, there is no leeway with those that air live via satellite.

Once the recording process is finished, Dawes tries to keep the mixdown simple; he tries not to overmix.

"I'll do one mix, and get the group's approval. Most of the time that's enough. I'll only do a second or third mix if absolutely necessary," he says.

The concerts are mixed down to a two-track master and then pressed onto vinyl for distribution. Kimball says the affiliate stations still prefer vinyl, although Westwood One is toying with the idea of distribution via CD for the future. Kimball generally doesn't believe the age of digital for radio stations has quite arrived. He says a digital recording of a concert will be made if requested by the artist or the record label, usually for mastering a CD later on. This was done for Neil Young, with Young's own digital recorders. But Kimball points out that most radio stations are not yet equipped to handle digital broadcasts, and that "by the time it's transmitted, the benefits of digital aren't really noticeable."

Call-ins to the coach

The only ingredient missing from *The Bill Parcells Show*, broadcast live from Gallagher's

Restaurant in New York by WNEW-AM radio each week, is Giants head coach Bill Parcells himself. Well, he's there, but he isn't actually *there*.

Parcells, preferring the comfort of his office at Giants' stadium to the frenzy of midtown Manhattan, is heard on the show through the magic of remote audio, just as if he were at Gallagher's.

The program is reminiscent of the old days of radio, when broadcasts from well-known restaurants and watering holes were commonplace. The eatery's guests are the "studio" audience, WNEW sports director John Kennely is the host at Gallagher's, usually with a player from the Giants, and there are phone-in callers as well as the audio from Parcells.

WNEW-AM is the Giants' radio station and broadcasts all of the team's games. Parcells' show is broadcast the day after a Giants game, usually a Monday night, although if the team plays Monday night, the show is broadcast Tuesday. It's heard, live, from seven to eight p.m.

Coordinating the multipart audio production is the work of CE Alan Kirschner; the engineer on duty during the broadcast; and producer Tom Tracy, and it's a complex task.

The feed from Parcells' office is done with an 8 kHz telephone loop, which goes to the station's studios in Manhattan. From there, a feed of Parcells is sent to the restaurant, so Kennely, guests, and the audience can hear it. The only equipment Parcells

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needs is a mic and amplifier and headsets to monitor the show. His level is fixed by the engineer back at the studio.

The studio takes all incoming calls, and plays all commercials. This is fed on a cue line to Gallagher's. Everything from that point on is a double mix of sorts.

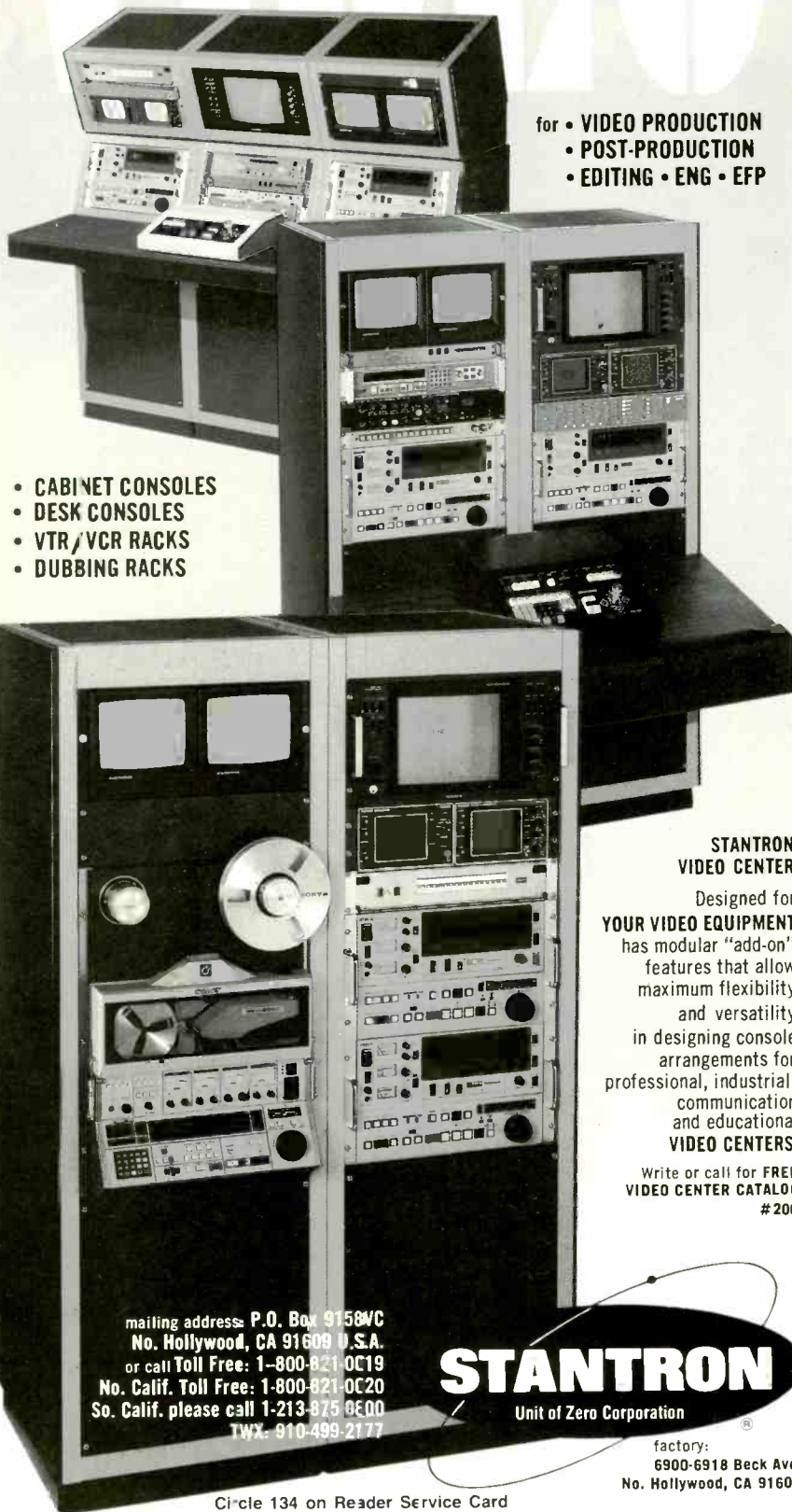
At the restaurant there are two fixed mic locations, for host and guest, and a roving wireless Swintek mic, which Ed Croake, media director for the Giants, takes into the audience for questions.

The mix at the restaurant is done with an eight-channel Panasonic portable mixer. The engineer on location mixes the audio going from the restaurant, including Kennely, guest, and audience questions, and sends it back to the studio, and mixes in the cue feed coming from the studio, which includes phone-ins, commercials, and, of course, Parcels. One side of the board feeds the house, the other, the studio. The mixer uses two separate VU meters, one for each mix.

Communications might seem to be a tricky part of all of this: how do all the participants get their cues? Kirschner says there is a dial-up phone from producer Tracy back to the studio, but the rest is done the old-fashioned way, via written notes and on-air cues between the technicians and talent. Producer Tracy supplements the process with notes. Of course, mistakes can be corrected by the engineer on duty at the studio, who controls the entire show from a McCurdy board in master control.

For call-ins, WNEW uses a technique that has found favor among increasing numbers of stations recently: a modified speaker phone. A standard speaker phone is adapted to plug into the audio chain, and the board feeds it incoming calls, which then go out over air. When the show is aired, all the separate parts somehow come together, and all but the restaurant audience believe Parcels is actually at Gallagher's doing the show live.

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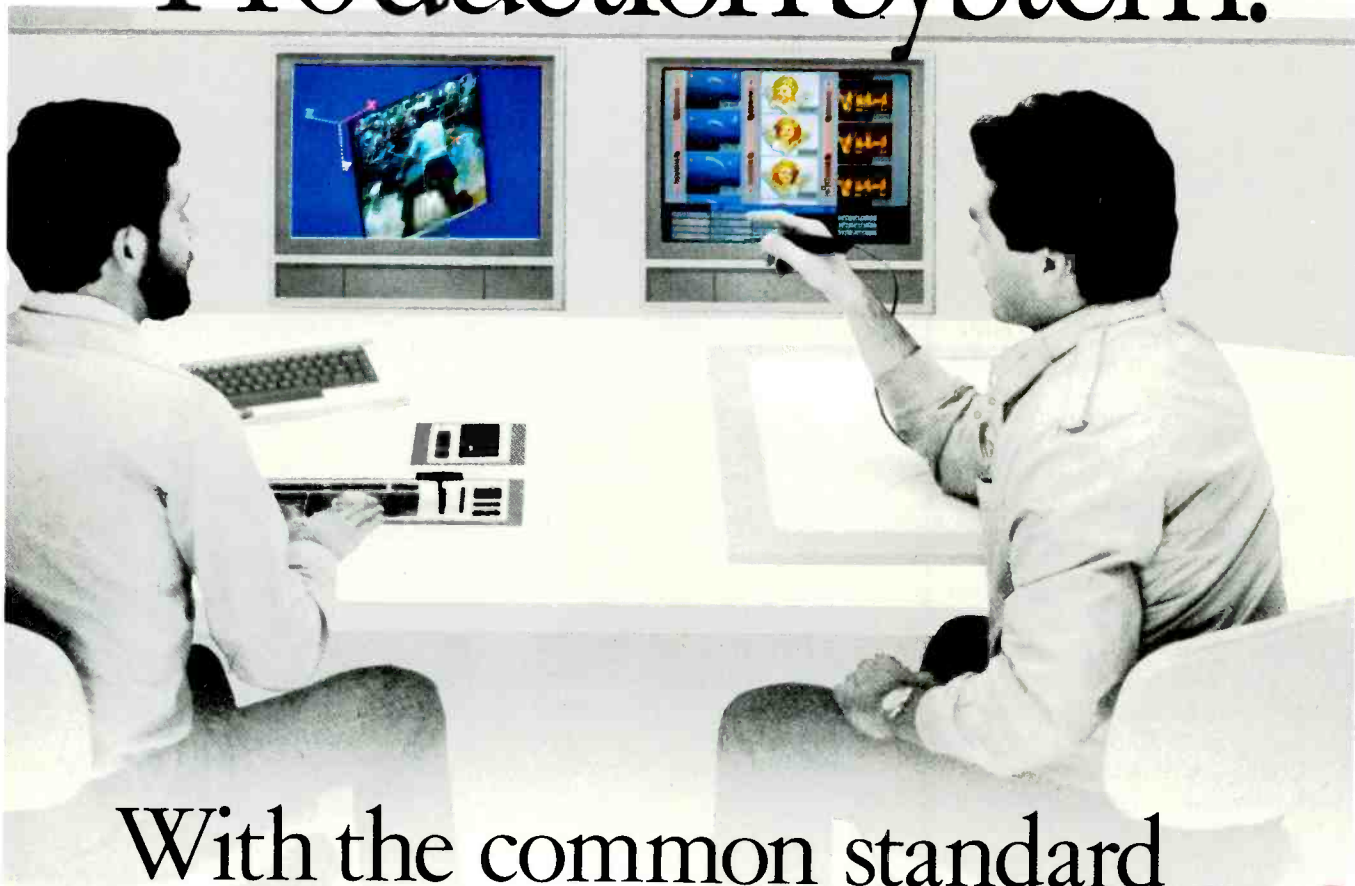
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SMPTE

STANDARDS DOMINATE SHOW

Staff Report

At the new Jacob Javits Center in New York, where the 128th SMPTE show was held last fall, a record number of attendees (16,812) were treated to intense discussions on standards and their impact on technological development. Also standard was the relative lack of new product introductions; most manufacturers preferring to hold off the big announcements until the next NAB show. Though this seems to have become a habit in recent years, there were some important new product and company announcements made at this most recent show, and SMPTE remains the second most important confab in the broadcast industry.

Areas of heavy activity included digital video, analog component video, MTS, with HDTV assuming a rather low profile. In the midst of all of this, SMPTE engineering VP Richard Streeter once again addressed the opening crowd with a discussion on the importance of standards and how lack of cooperation among manufacturers could easily backfire due

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to the cost of developing nonstandard hardware. Meanwhile, on the exhibit floor, format wars and nonstandard product introductions proceeded apace.

Significant debuts were made at the show in the areas of video graphics, cameras, camera control, test and measurement, and post-production. Naturally, recording formats again drew notice and called closer attention to the question of standards and how they affect the development and marketing of technology and the practical implementation of that technology. Thus, the show's theme, "Today's Technology—Tomorrow's Reality?" was pervasive not only in the meeting rooms, but on the convention floor.

There were surprises on the audio side, with new players entering the fray, but the overall volume of audio companies and the number of new revelations were fewer than expected. Perhaps the most interesting demonstrations were in the wireless intercom and always changing digital domain. For specific information, refer to the contents box. **BM/E**

SMPTE

Red-Hot Graphics Cool Down (a Little)

After a sizzling NAB, things seemed just a bit calmer in the graphics arena at SMPTE. True, there was at least one all-new (and very exciting) 3D animation system—that of Vertigo Systems. Bosch showed networking capabilities and an ultra-high-resolution mode for the FGS-4000, and Quantel had its Paintbox integrated with Harry, Encore, and the Sony DVR-1000 in an all-digital suite. Many enhancements were in evidence, too. But the fireworks that went off in April had dimmed in intensity.

Attendees confused by the recent explosion in graphics, especially on the 3D end, would have done well to attend Dean Winkler's presentation of a paper written by him and Post Perfect partner Pat Howley. Both writers are veterans of video postproduction and graphics, and their new New York City facility promises to be a major force in high-quality graphics production.

The paper recommended a series of criteria for evaluating three-dimensional graphics systems. Winkler opened by defining a "3D" system as one that contains at least the following capabilities: fractals (which he called "a class of pseudo-random numbers that have characteristics found in nature"), three-dimensional objects, transparency, reflection mapping (which maps reflections of environmental objects onto a 3D object), and texture mapping. He differentiated between paint systems, which require each pixel to be colored individually on each frame, and a 3D system, which uses mathematical models to describe all possible views of an object so it can be manipulated by the computer.

Winkler proposed a range of criteria for evaluating these systems, beginning with image quality. This can be measured first by resolution—both spacial (lines) and temporal (number of frames per second and "cleverness" in filtering out temporal effects)—and secondly by bits per pixel. Related



John Streets at the Merlin booth with an original Ampex VTR, now 30 years old.

to image quality is antialiasing capability and a frame buffer of full analog video quality. His next criterion was ease of use, typically a tradeoff for power and flexibility. Is the system menu-driven or command-driven, or are both available as options? As a rule of thumb, the system should help the novice while not holding back the expert.

The third test is the degree of real-time feedback. How many polygons can be moved around the screen in real time? "The minimum we seem to put in a scene is five to ten thousand," Winkler said; one clip he showed involved 350,000 (!) polygons. Is there a materials editor? A lighting editor? Next, consider the system's modeling capabilities. The most standard method is polygon-based models, but some systems offer solid or spline-based systems. Does the software support smoothing groups and automatic object generation?

Winkler listed a number of other criteria, among them 2D paint capabilities, choreography and rendering capabilities, open architecture, compositing and matte generation, and the ability to interface with other video and photographic devices. Also important—as with most other studio equipment—are such considerations as maintainability, sup-

port, quality of documentation, systems integration, and the track record of the vendor.

Armed with Winkler's criteria, a broadcaster or facility owner can expect to ask intelligent questions of the manufacturers of the dizzying array of 3D systems. And not a moment too soon, because the field has another new entrant.

Vertigo Systems, which at NAB had representatives armed with literature but no booth, showed its V-2000 3D animation system to broadcasters for the first time. (The system made its debut a few weeks earlier at SIGGRAPH.) The system uses an Iris workstation with bit pad and mouse as the input device and a Sun computer as the renderer. The cost for this base configuration is \$120,000 complete.

For faster rendering speed, the user can plug in up to 12 Vertigo-built render/accelerator cards, each with two processors, at \$8900 each. Up to six of these boards (for a total of 12 processors) can go into the Sun chassis. According to a Vertigo spokesman, each card has the rendering power of 2.5 VAX 11780s. All those processors result in mighty fast animation; according to the spokesman, an impressive full animation script demoed at the booth, complete with multiple light sources, took only 1.5 min-

utes per frame to render on a full 12-processor system.

The V-2000 boasts a full array of features, including an easy-to-use user interface and a versatile extruder for creating 3D shapes from a 2D object.

Already a major force, Bosch had a couple of announcements about its well-established FGS-4000 3D modeling and animation system. The off-line modeling system introduced at last April's NAB has greater capabilities and is now tied to the FGS through Ethernet. According to the company, there is no practical limit to the number of off-line workstations that can be integrated. The biggest news is that the off-line workstation, which had no rendering capability last spring, now can function as a high-resolution renderer, rendering output from the FGS so the main unit isn't tied up.

The modeler itself is like a streamlined version of the FGS, although it is not standalone. It has a simplified user interface and is designed to ease the burden on the main unit by allowing artists to construct objects quickly at a remote workstation. The system has both 2D and 3D editors with similar interfaces and many features.

Another recent introduction from Bosch, also seen at NAB, is the 3D Illustrator, a full-color paint system for the FGS-4000. The user can incorporate FGS-created 3D objects into a painted frame, along with user-defined light sources and fonts, all located in three-dimensional space.

For those interested in hardcopy output of graphics, Bosch introduced ultra-high-resolution of up to 4000x4000 with 4x antialiasing from the FGS-4000, ideal for slides and print. Expect additional graphics developments from Bosch (soon to be under the BTS name) at NAB.

Speed was the news at the Artronics booth, where the company announced impressive speed increases of up to 150 percent for the VGS Video Graphics System. A company spokesman attributed the large jump to a combination of

hardware speed increases, rewritten code (with whole sections replaced), a faster user interface, and a much faster renderer. The new version, known as the VGS Turbo xi, is still under \$30,000 despite the speed boost.

The Artronics 3D modeler was undergoing final polishing at SMPTE time and was scheduled to be ready about three weeks after the show closed; it comes packaged with the 24-bit paint system. Deliveries were scheduled to start December 1.

Artonics' VPL Video Paint Library is now undergoing beta testing at Telesis Productions in Rochester, NY. The system features full-frame real-time animation, high-resolution paint with dual buffers, an "undo" function, and up to 1200 frames of still storage.

Several big names in 3D graphics were notably absent from the SMPTE floor: Cubicomp, Wavefront, and Alias. Other recent entrants to the 3D arena were there but keeping relatively low profiles. Integrated Technology announced a new location and additions to the management team. The company is leaving its home in North Carolina for Santa Clara, CA, "to be in physically closer touch with the technological end of our business," according to vice president and general manager Jesse Blount, formerly of Aurora Systems.

Quanta, which also premiered a 3D graphics system at NAB, opted

against bringing it to SMPTE. Development on the system is complete, however, and deliveries are targeted for early this year. Several orders have been taken, according to Quanta's Bill Park. The booth featured the company's well-established Q8 and Quantafont character generator systems.

Aurora also was camera-shy about its new AU/280 graphics system with optional 3D capability. According to a company spokesman, development was still underway at SMPTE time. The company expected a speedy completion, however, and planned to deliver the first 280s in November, right after the show.

The booth featured the AU/220, also introduced at NAB. Unlike the 280, the 220 has been deliverable since just after NAB, and a number of systems have been delivered. This full-color paint system is based on the IBM AT with a standard 40-megabyte hard disk. Disks as large as 112 megabytes are available optionally. The 220 will also have an optional 3D modeling package; standard features include antialiasing, full-color video input, transparency, and two full picture buffers.

Ampex showed a significant new advance for its AVA-3 video graphics system, a computer-aided tracing option called SpeedTrace. The new capability enables rapid automatic input of symbols and fonts, saving literally hours of operator time while greatly enhancing the precision of



Microtime's new entry into digital video effects, the RP-1 3D system.

the input. It operates on a proprietary software algorithm that detects boundaries between the light and dark areas of the image. (The user can define the exact luminance transition point.) By scanning the boundaries, the system creates an exact wireframe reproduction of the image in minutes. Once the image has been captured, it can be edited to smooth out any imperfections in the original.

Speedtrace has two operating modes, font scan and symbol scan. Font scan functions, in essence, as an electronic typesetter for custom fonts. If the user needs a custom font for any purpose, the individual letters can be scanned in from flat art and converted into a permanent digitized typeface. Symbol scan allows the creation of digitized symbols from a full-screen video image.

Another high-end graphics system, the ArtStar from ColorGraphics, has a new add-on software package for real-time cel animation. Shown in prototype at NAB and enhanced since then, the program is produced by an outside company, Interactive Picture Systems, based in New York City. It's called Action and is compatible with ArtStar II and 3D systems. (With a hardware add-on, it can also be used with ColorGraphics' LiveLine IV weather systems.)

The package boasts some impressive capabilities, such as the ability to animate still graphics on multiple planes in real time. Full record and preview capabilities are included, along with a choice of frame-by-frame or real-time editing and animation. Video output is also real-time or frame-by-frame, as desired.

Paths of motion may be generated simply by specifying start and end points; movement may be previewed and edited by altering any point between the specified points. ips services and supports the software, which is fully documented and comes with sample animations. The basic package is \$15,000.

Dubner showed its full line of graphics, animation, and charac-



Model DPS-1 from Dubner attracted interest in the competitive paint system market.

ter generator systems, well known to the television graphics community. The newest family member, the DPS-1 NTSC paint system, is worthy of special mention. Dubner is positioning this \$20,000 painting tool against the Quantel Paintbox, and a demonstration at the show indicated impressive quality and capabilities. One obvious difference between the DPS-1 and the Paintbox is that the former is only one channel, while Paintbox is a dual-channel system. Subjective quality is very high, however, amply illustrating how advances in technology have made top performance available even at such low prices.

For example the device features real-time frame capture and four-field color frame storage. It is available with a four-, two-, or one-field NTSC frame buffer. It has a full array of brushes, including hard and soft transparency, wash, and stamp, all antialiased and all in multiple sizes. A few of its many other features include cut and paste, embossing, cropping, antialiased spline curves, frame averaging, motion suppression, and *x*, *y*, and *z* axis tilt, scale, and perspective.

Dubner is presently at work on animation and true 3D rendering for the DPS-1, which could make it a powerful contender. Introduced at NAB, the DPS-1 has

been delivered over the past six months, with about 40 in the field.

An interesting variation on a theme is Rank Cintel's Art File, an outgrowth of that company's Slide File still-storage system. Announced but not exhibited at NAB, the Art File moves Rank Cintel squarely into the graphics arena. The system is already well established in the U.K., with about 60 Art Files installed at the BBC.

The Art File/Slide File's hard disk system holds up to 400 still images. With the added graphics tablet, the user can easily select and modify stored pictures in a variety of ways, painting on them, cropping them, combining them, all immediately before going on air. The system is very straightforward, flexible, and easy to use.

Adcom Communications, a New York City-based dealer, took a booth to introduce (among other products) the Lumena-16 micro-computer-based graphics system. Essentially a software package, the Lumena requires an AT or compatible PC with an internal Targa graphics board. The board comes in two varieties: the Targa-16, with 32,000 colors, and the Targa-32, with over 16 million. Other hardware additions include an image memory module, graphics tablet, and graphics display monitor.

The system has a full array of paint capabilities, including cut and paste, multilevel transparencies, "watercolor" blending, and character generation. A 3D module is under development; a beta version was on display at SMPTE. A basic Lumena-16 system, including software, IBM-compatible computer, Targa-16 board, image memory module, 8.5x11 graphics tablet, and RGB monitor, comes to \$17,275 total.

Thomson has added two important features to its Vidifont Graphics V character/graphics system. The first is a new downstream linear keyer that allows keying from the paint plane to the background plane to external video. (The old keyer only allowed keying from the text plane to external video.) The new keyer will

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be standard equipment on new systems and retrofittable to those already in the field for about \$6000. Shipments start this month.

The second, highly significant new feature is the ability to read foundry-based fonts. Thomson evidently plans to give Aston, Quantel, and Chyron a run for their money with this one. The company is in the process of buying licenses and has already established working relationships with type houses Compugraphic and Bitstream. User response has been very good so far, according to Thomson's Tom Hindle.

Another major advance at Thomson is that the Vidifex full-frame 3D system, introduced at NAB, is now deliverable. This system grabs and extrudes a multi-color 2D object, light-sources it, defines a 3D axis of rotation, and does frame-by-frame off- or on-line rendering and merges the final animation with a background plane with antialiased edges. Al-

though it is not a true 3D modeling system, it gives the Vidifont excellent 3D capabilities. Output can be transferred into the Vidifont's GraphicStore or onto tape (or both simultaneously).

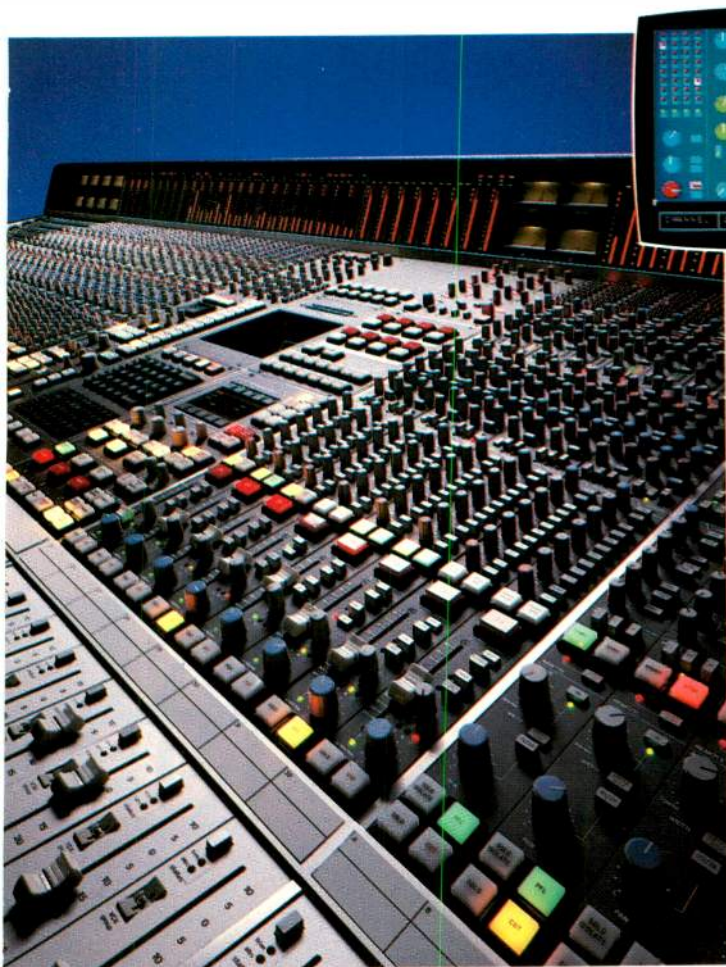
Chyron took the wraps off new software for its Scribe high-quality character generation system at SMPTE. An advanced font utility (\$1075) allows logos and alphanumeric characters to be modified in a variety of useful ways. Some examples include metalizing effects, light-source shading, and patterning (marble, wood, etc.). The font utility also provides floating viewpoint control, which allows the viewer to "move" around the type.

Quantel's booth featured the Cypher character generator, which combines top-quality type with "unparalleled" manipulation of characters. Anyone who's seen the Cypher in action can attest to its capability and flexibility. The really hot ticket at Quantel, however, wasn't on the show floor at all; it was the All-Digital Produc-

tion Suite set up in conjunction with Sony and demos throughout SMPTE at nearby Teletronics. For a complete description, see accompanying sidebar.

Speaking of high-quality character generation, the Aston 4 was at SMPTE interfaced with a new combined linear keyer/coder from Acron Video. The new keyer, the Acron 610N, prevents the quality deterioration possible with antialiased characters during keying, allowing true, clean transitions. Only the background picture is keyed, allowing the natural transitions on the characters to mix perfectly with the keyed background. Compensation circuitry keeps pedestal constant. The keyer/combiner itself sells for \$4200; the Aston 4 is \$32,500 for a single-channel unit and \$48,000 for a dual-channel one.

Despite the sexiness of high-end captioning systems and sophisticated graphics, the lowly character generator continues to play a vital part in broadcast operations.



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An established name in character generation, 3M, showed a range of previously introduced equipment at SMPTE, including the D-3600 character generator and the D-5000, which has additional graphics capabilities. 3M's most recent (and most sophisticated) CG system was not at SMPTE, however: the D-6000 Panther, introduced at NAB.

Mycro-Tek brought three NAB-introduced CGs to their first SMPTE: Max, a straight information display; Ernie, a combination information display and titler; and Supra, with all features of the first two plus one edit channel and one delay channel, allowing some production capability. The systems are very user-friendly and fast.

Although Mycro-Tek is presently aiming at the non-production market, the company is trying to establish an identity for a future line of broadcast CGs, under development at this time. Current products run \$2995 to

\$5995.

Comprehensive Video Supply, which has attracted favorable notice with its Edit Lister PC-based EDL option for edit controllers, showed another addition to its software-based production line: the PC-CG microcomputer-based character generator. This software-based system runs on a customer-supplied IBM or compatible PC and wraps a full range of capabilities into a \$2995 package. The PC-CG comes with four standard fonts (more can be added) and features include programmable roll and crawl, 40 ns resolution, and a full editor allowing automatic centering, left or right justification, character insertion and deletion, and full cursor movement.

2D EFX Capture SMPTE Spotlight

In an industry dominated by 3D, it is a surprise to see a 2D effects system capture the spotlight.

That's exactly what happened at SMPTE, however, when Pinnacle Systems unveiled two brand-new effects boxes that brought some real excitement back to 2D. Pinnacle, a new company based in Santa Clara, CA, has designed a clean, simple-to-use system with excellent capabilities and a full range of effects.

The basic system, the 2010, takes advantage of the kind of open architecture found in personal computers to create a capable system that is easy to upgrade. Two 3.5-inch floppy disk drives store data and provide for software upgrades. In addition, the system provides spare expansion slots for future hardware enhancements. Enough on-board RAM is provided to store 6000 keyframes.

All internal processing is in component digital form. Pictures were clean and sharp, with no discernible edge noise. The system is menu-driven, with menus quickly selectable by a pushbutton. Help

The Abekas A53-D Digital Special Effects System

The innovative tradition of Abekas continues with the A53-D—the most cost-effective, high-quality three-dimensional effects system available today.

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ing and GPI control, and smooth linear motion and trajectory with variable tension.

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keys and a joystick further streamline operations.

In terms of effects themselves, Pinnacle has given careful thought to the needs of the user. Borders, for example, are outside the frame, not inside as with some other effects systems. All effects can be done with frozen pictures as well as with moving video. Full interpolation allows trailing free of flicker. Wipes include moving blinds, splits, and transposes. Other effects include posterization, true mosaics, mirrors, and "montage," which creates a background composition out of one or more frames.

Price for the 2010 is a very reasonable \$23,500. Pinnacle also introduced the 2020, which combines all the features of the 2010 with a 60-frame still store, expandable to 160 frames within the box and beyond that with external expansion. Both systems were scheduled for delivery 90 days after the show. A 3D upgrade will be released sometime this year.

In the realm of 3D effects, Microtime premiered a new, high-performance system, the RP-1, with a full range of sophisticated features. For example, the RP-1 has a built-in downstream linear keyer, and the system's full bandwidth eliminates any aliasing at the edges of keys. Dual-channel systems will have a plug-in digital compositor.

The system has a built-in 3.5-inch disk drive, with a second external drive available as an option. An impressive range of effects is built in, including 3D variable axis rotation and variable perspective with simultaneous rotation, continuous compression and expansion, full 3D manipulation of a frozen image, linear or curvilinear trajectories, and many more. Software is menu-driven for ease of learning and use.

Microtime is initially introducing the RP-1 in its 3D, NTSC configuration, but development will not stop there. A PAL version will be available shortly, and the company plans to introduce a 2D version that will be fully upgradeable to the 3D system. In addition, the RP-1 will be interfaced in the future to CCIR/SMPTE 4:2:2 digital video systems. List price for the 3D RP-1 is \$56,995; the 2D version will be \$29,995. Both will be sold through Microtime's dealer network.

Another striking new effects system was the Eclipse from DSC, which offers unusual, exciting curved effects as an optional add-on. The curved effects option includes an automatic cube builder and "picture twist."

In addition to the curved effects, Eclipse has a full complement of features, such as picture cropping, rotation, perspective, simulta-

neous rotation and perspective, smooth trajectory, and optional shape manipulation. An A/B switch simulates dual-channel operation. The control panel features an internal 3.5-inch floppy disk drive for data storage.

DSC also featured its other digital effects systems, the component version of the Illusion and the SX-2000D programmable on-air effects system.

Component video was the word at NEC, which introduced a component version of its DVE System 10, the new DVE System 10C. The new system has all the power of its namesake, including full eD rotation and perspective, plus added features designed to appeal to the off-line production market. The success of the System 10, with close to 200 systems sold since its introduction, should ensure a high level of interest in the 10C.

The System 10 itself had some new features at SMPTE, with a new software package offering some creative and unusual effects designed to give the look of 3D effects in a 2D system. These new preprogrammed effects, retrofittable to systems already in the field, include "curl," essentially a Mirage-like page turn; "roll," similar to curl except that the edge of the image is tightly rolled like a rug or diploma; and "fold" or "peel," also a variation on curl in which the edge of the curl is creased—reminiscent of a piece of tape being pulled off glass. These effects were still in prototype at SMPTE and the company planned to smooth out some minor rough edges before delivery early this year.

No longer must the broadcasting industry wait for Grass Valley Group's Kaleidoscope to become a reality. The first production models of this classy digital effects system were scheduled to be shipped very shortly after SMPTE, and by this time a number should be in the hands of eager users. Over 100 have been sold so far, mostly to production houses, networks, and television stations.

According to Peter Symes, product manager for the system, GVG



The A42 slide system, and the A62 digital disk recorder, from Abekas contributed to the excitement in the graphics and effects categories.



A new company, Pinnacle Systems, introduced a software-based effects system, the 2010, whose basic architecture is its most unique feature.

has completely redone all the interpolation for the Kaleidoscope, resulting in "much nicer" moves and animation. A single-channel system is \$160,000; a dual-channel system with combiner and a host of effects (including intersecting planes) is \$305,000.

Other previously introduced digital effects systems reappeared at SMPTE. Abekas, for example, showed its full range of digital products: the A62 digital disk recorder; the A42 video slide projector; the A52 digital special effects device in component and composite versions; and the A53D three-dimensional digital effects device. The A53D, the most recent entry, is a full-bandwidth system designed for both on-air and postproduction applications. It can be interfaced directly to the A62 digital disk recorder for top-notch production work, allowing unlimited layers of video with no generation losses.

James Grunder exhibited the CEL line of digital effects system. The most recent addition is the EFX IV, a multichannel system with an integral combiner/mixer. Like the other CEL systems, it has a touchscreen controller. Also on view were the EFX II single-channel effects system and the EFX III, a dual-channel, dual-TBC/framestore synchronizer effects system that allows two simultaneous live inputs.

SciTech, a company new to SMPTE, introduced two items: a special effects generator with built-in genlock, designed primarily for live effects use with two cameras and offering such effects as dissolves, cuts, wipes, and re-

verse video in plug-in cartridges; and the Model 142B dual-channel TBC, designed to correct time base error in two VCRs and to equalize and genlock them for special effects. It accepts any video source as reference, even unstable, noninterlaced video, and allows A/B roll with a single TBC, since one VCR can be the reference for the other. The 142B lists for \$3995.

ALTA Group had a new PAL version of its Cygnus single-channel production system/TBC, one of those hard-to-classify products that seems to do everything. The Cygnus offers infinite window time base correction, digital picture freeze, variable picture freeze strobe, variable posterization, variable mosaic, and dropout compensation. Deliveries begin this month.

At the show, ALTA celebrated the delivery of its five hundredth Pyxis, the \$6990 two-channel effects system that incorporates two 16-line window digital time base correctors.

Fairlight Instruments had new software and hardware options for its CVI Computer Video Instrument, a unique effects device designed primarily for live work. The CVI reflects Fairlight's audio experience with its 10 video slide "faders," which control the unusual live effects.

The new software package, Revision 7, adds title generation capabilities to the CVI with six character fonts, backspace and insert editing capabilities, foreign-language characters, and new character display options. Up to 100 titles may be stored.

The Return of Random Access?

Without a doubt, the hottest issue in post-production at SMPTE was the rash of videodisc-based, random-access editing systems. CMX, which very quietly showed a prototype random-access editor at NAB, invited reporters to its booth a few hours before the SMPTE floor officially opened to unveil the 6000, its new off-line disc-based editor. Paltex unveiled its new Eddi "nonlinear" editor with a little less fanfare, but just as much confidence. Even on the tape side, manufacturers such as BHP were promising virtual random access.

Ironically, neither EditDroid nor Montage, pioneers of the second wave of disc-based editing, took booths at SMPTE. Eddi and the CMX 600, with their lower prices, probably will be serious and damaging competition for both. Montage, which has been in limbo since its sale a few months back, did have demos at a hospitality suite, however. EditDroid seems to be lying low after a recent management shakeup.

It's no secret that videodiscs offer one post-production advantage tape never can: virtually instant access to any frame on the disc, with no time spent waiting for a tape transport to shuttle. But the manufacturers had few satisfactory answers for the biggest criticism of laser discs: cost.

At a panel discussion on post-production, just that question was raised by the moderator, Emory Cohen of Pacific Video. According to Cohen, disc mastering costs for a one-hour episode of a television show run \$6000. And he should know: his facility has logged extensive experience with both Montage and EditDroid.

Christin Hardman of CMX countered that the much faster editing generated by disc-based systems can result in a 30 percent labor savings over the season, although she admitted, "That's not something an editor wants to hear." Random access also allows greater creativity, which can't be quantified in dollars. Hardman

suggested, however, that a more creative production may have far greater syndication value down the road.

CMX certainly took a different tack with the 6000, which was introduced on the fifteenth anniversary of its ill-fated predecessor, the CMX 600. The 6000 has the advantage of up-to-date technology and relatively low cost—under \$50,000 for the basic system. It is fully compatible with CMX on-line systems, but shows its individuality in several ways.

Perhaps the most obvious is its dedicated keyboard, a departure from the computer-style keyboards CMX favors for its 300/3000 editing line. The streamlined keyboard of the 6000 includes an integral shuttle knob and touchpad.

Another difference is EDL disk storage. The 6000 abandons the traditional CMX eight-inch floppy in favor of a 20-megabyte internal hard disk and a 3.5-inch floppy drive for output. How will information get to the on-line system? Simple: with an optional 3.5-inch drive-on-a-card CMX is offering for its on-line editors. If the systems are close enough, they can also communicate by direct serial interface. In addition to the EDL, the system can output a film editor's cutting log.

The 6000 is a modular, turnkey system aimed, apparently, at the film community. Its straightforward approach, with time code or film edge numbers "invisible" to the editor, makes it easy to learn and use. No technical expertise is required to set it up.

The system edits audio and video in true double-system fashion; an unusual feature is that audio can be heard in still-frame mode, which sounds strange but enables more accurate cutting. An electronic "clip bin," reminiscent of Montage, displays a representative frame from each selected clip. The system is cuts-only unless the user supplies an "approved" switcher.

The configuration shown incorporated four Pioneer LaserDisc players; two for audio and two for video, for half an hour of picture



The CMX 6000 editing system showed major advancements in the post-production area.

and an hour of sound. (The largest configuration holds two hours of picture and four of sound.) The disc players that will be delivered with the system will be Pioneer LDV-6000As with 1.4- to 1.5-second access time. First deliveries are planned for next month.

In a somewhat similar vein, Paltex introduced its Eddi random-access editor, designed for off-line, real-time previewing with no visible time code. The system is also available with VHS source decks; minimum configuration is four LaserDiscs or eight VHS players. Several of its features are similar to the 600, such as Clip and Mark bins that the storage of takes, reference frames, or complete clips, each with a "named" label.

Aimed at film editors, Eddi makes full use of an internal hard disk drive to store necessary information. The system can store information on up to 150 "projects," each with as many as 4000 cuts and organized into scenes. Two logs, the master scene log (MSL) and working scene log (WSL), store a total of 500 scenes, which can be transferred and/or copied between the two logs.

Each scene, in turn, is composed of one or more clips, which are easily selected and trimmed at the keyboard. Clips that are not part of a scene are stored in the "named" bin for future recall and use. The keyboard itself is dedicated to minimize the number of keystrokes necessary. A speed

control knob is at the center of the keyboard.

EDL output, on a 5.25-inch floppy, is in Paltex or "interchange" (i.e., CMX-compatible) format. The system is designed to allow conforming on any on-line editing system.

Paltex showed a preproduction model of Eddi at SMPTE. Deliveries of the first production models will begin this month, initially to European buyers. The system costs \$32,000.

Ampex, which had demoed an engineering model of a disc-based editor at NAB, kept mum on random access at SMPTE. The post-production news at the booth included a free software upgrade for all ACE and ACE Micro users, plus an optional turbo kit for an increase in computing speed.

The turbo kit, consisting of a single, easily installed board (complete with instructions), is designed to shorten response time to operator commands and speed search within EDLs and other EDL functions. The system even boots up faster. It is compatible with 3.0 and later software.

The new software, ver. 3.1, offers several useful enhancements. For example, Learn Key Pause enables mark in and mark exit to be learned as part of a macro sequence. An advanced trigger display allows sophisticated switcher and VTR routines to be compressed into triggers for easy activation and repetition. "Pick and put" allows the editor quickly to

Broadcast Management

SMPTE

grab any number out of the EDL and bring it back up to the edit construction area for much faster manipulation.

One of the most significant advances is switcher panel memory control for Ampex AVC switchers. In essence, this feature gives the ACE access to all information in the AVC's panel memory registers, directly from the ACE control panel. It exploits the possibilities of direct serial interface to streamline complex effects building, saving generations.

Other new features of the ACE 3.1 software include switcher disable, which provides instant manual override control of designated switchers, and EDL scroll, which provides rapid random or serial access to the entire EDL via keystroke or joystick control. Also new is an interface to Graham-Patten audio switchers.

Ampex's other major post-production announcement was the debut of the Mini-Command Cen-

ter, a packaged editing system based on the previously shown Creative Command Center. The Mini is built around the ACE Micro four-VTR editor, complete with customers' choice of VTRs and an Ampex switcher. An all-Ampex Betacam system with three VCRs was shown for under \$90,000. The ACE Micro, by the way, differs from the full ACE system only in the number of VTRs it controls.

Software was also in the news at the Grass Valley Group, where a new version of Super Edit, coincidentally designated 3.1, was unveiled. The most significant changes are in the 409 and Trace programs, which now support multichannel audio in a new EDL format. An improved menu structure simplifies user interface.

Performance and time code display accuracy have been improved in jog mode. Serial control of GVG 1600/1680 switchers has also been improved, and the film mode has

been enhanced.

BHP showed many new features for its TouchVision (formerly EnVision) editing system. Up to 24 VCRs (with identical information) can now be controlled for expanded random access capabilities, allowing the user to view changes instantly. At this time, TouchVision is 3/4-inch only, although the company is working on a half-inch version. It can do on-line auto assembly or off-line work, creating a CMX-compatible floppy. According to the company, 30 to 40 percent of TouchVision users are in on-line configurations. An editing controller with three VCRs is \$66,500; A total turnkey package, including special effects capabilities, TBCs, monitors, a Grass Valley Group switcher, and six VCRs, costs approximately \$135,000.

Convergence and EECO celebrated their recent union by sharing a booth at SMPTE, under the Convergence name but EECO ownership. The recently merged companies displayed the (Convergence) 1000 and (EECO) EMME editors. The 1000, introduced at NAB '86, is a small but powerful edit controller with 1000-line EDL memory, contained in a single unit. In fact, the 1000 has almost all the features of the company's 200 series, its only limitation being the number of VTRs controlled (six).

EMME, which is available in several different versions with different operator interfaces, appeared at SMPTE with its Video Editing Workstation, a dedicated keyboard with central shuttle knob and status LEDs. The system controls up to nine devices: VTRs of any formats and multitrack ATRs, plus a production switcher. Also featured was the Econoline range to time code generators and readers, all under \$2000.

Sony showed its BVE-900 editor, introduced at NAB, in configuration with the SEG-2250 eight-input video production/post-production switcher, the MXP-29 pro audio mixer, and three recorders: a Betacam, a U-matic SP, and a BVH-2000. This capable little

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editor offers such features as control of up to four VTRs plus an effects switcher; longitudinal or vertical interval time code; two aux sources; advanced graphics display of events; and auto time tracking.

The Adams-Smith System 2600 has evolved into a full videotape editing system from its beginnings, about four years ago, as a line of time code processing modules. The line was first expanded to include A/V tape synchronization, and now can handle video transports—but always with an emphasis on high-quality audio.

The 2600AV, shown at SMPTE, is a dedicated computer control system with a computer-style keyboard. Its double-system concept allows film style editing, with the video deck and audio deck treated as a single virtual machine. It's also being sold as a very sophisticated, automated audio editing system. At this time, the system is off line and includes an eight-inch floppy drive (CMX compatible) and a 5.25-inch drive. The editing system costs \$24,000, including the computer, disk drives, monitor, and keyboard. Interfaces (A-S 2600 modules) are extra and available for 3/4-inch, one-inch, and half-inch VTRs.

Audio capability was the hallmark of Cipher Digital's new Softpac data storage system for the Softouch audio editor. The system features an external cartridge with a storage capacity of 500 soft key instructions, loops, or machine control parameters. Available as a product and an upgrade for existing systems, the Softpac is fully compatible with Cipher's Shadow synchronizers.

One of the most interesting trends of the past two or three years has been the emergence of the personal computer as a broadcast tool. This has been particularly obvious in graphics, but PCs are turning up in post-production, too. One of the most notable examples is the CED from Calaway Engineering, which adds hardware and software to turn an IBM PC/XT or Compaq Deskpro computer into a complete videotape editing system. The implications

of this technology are very interesting: rather than building a dedicated, proprietary computer at great expense, why not use inexpensive off-the-shelf hardware?

The basic CED system requires an XT or Compaq with one 5.25-inch floppy disk drive, 256K of RAM, and two free expansion slots; the CED+, which controls six machines (to the CED's four), required 512K, and three free slots. An eight-inch drive for EDL interchange with other editors is available as an option. These highly capable editors are virtually identical except for the number of VTRs controlled and expanded GPI capabilities in the CED+. Both may be configured for direct control of Sony serial machines. A four-machine CED costs \$10,500; the six-machine CED+ is \$15,500.

Another very interesting PC-based application is Comprehensive Video's Edit Lister, a software package for personal computers. The version for IBMs and compatibles costs \$900 and has a maximum EDL size of 995 events.

What makes this system so unique is that it is designed to communicate directly with off-line edit controllers, including popular models from Convergence/EECO, Paltex, and Sony, via the RS-232 port. The system, in essence, uses the computer as an outboard EDL management device with full list management and cleaning capabilities. It is an ideal opportunity for owners of basic controllers to upgrade to full list management. An upgraded software package, Version 3.0 for MS-DOS computers, was demonstrated at SMPTE.

On a larger scale than Edit Lister, but with certain similarities, is Amtel Systems' TRANSform-1 Post-Production Management System. The system is designed to give standard editing systems the "logging and film-handling functions of a Montage or EditDroid," according to a company spokesperson.

Amtel supplies both hardware and software for the system. The hardware is a proprietary micro-

computer with architecture similar to the IBM AT: an 80286 processor, 1.2-megabyte RAM, 1.2-megabyte floppy drive, and a 40- to 60-megabyte hard disk. In addition, it has an eight-inch floppy disk drive and an optional 60-megabyte tape backup system.

The most unusual feature of TRANSform-1 is its "electronic storyboard," which stores a single black-and-white reference frame for each slate. These images may be displayed on a monitor during editing, along with the corresponding notes and location for each scene.

System output may be a video EDL or a film cut list. Full list management is included, and the large storage capacity makes the system well suited to episodic productions. Beta testing is now underway and deliveries—at \$22,950 including the console and electronics—should begin next month.

One of the few really new entries at SMPTE was a company called SciTech, which introduced the Model ABREC A/B-roll, microprocessor-based editing controller. This PC-based system promises "professional-style" editing from VHS recorders by permitting genlock of these decks. According to the company, acceptable second-generation tapes with special effects is now possible.

The customer-supplied computer may be an Apple, Amiga, Atari, or IBM. The company plans to interface Beta and U-matic recorders at a later date.

Another new enhancer for VHS and 3/4-inch editing came from ESE and was called just that—The Enhancer. Designed for insertion into existing VHS and U-matic editing systems, this \$1250 device provides a black generator, automatic or manual video fade, external source editing, and stereo mixing. Up to four audio inputs and three video sources are selected by electronically latched pushbuttons and indicated by LEDs.

Other previously shown editing systems reappeared at SMPTE. Editron, the brash Australian company that recently launched

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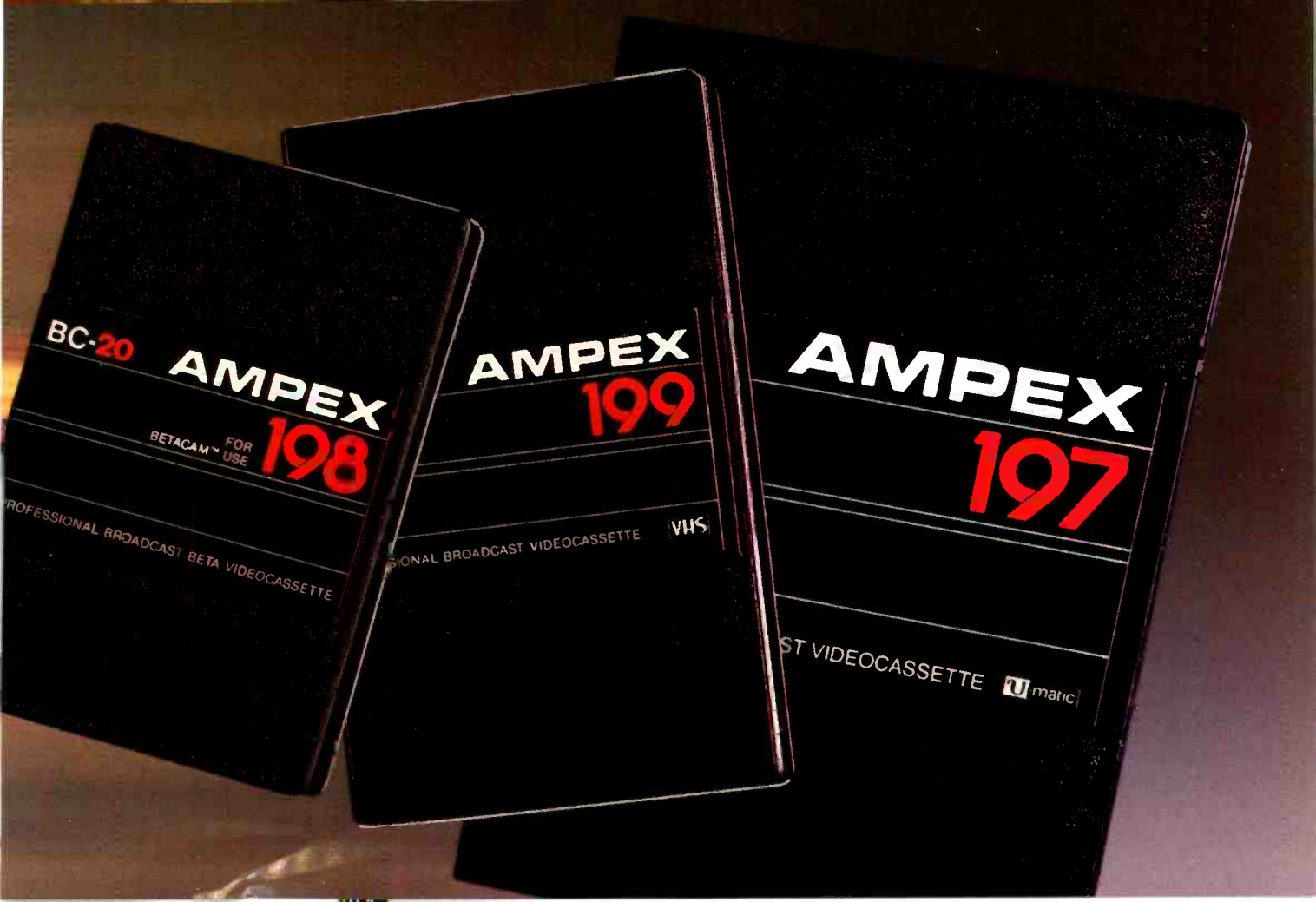
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Quantel and Sony Scale Digital Heights

Even though digital video has played an important role in television and video production for several years, it is only now that it is finally coming into its own as a video format. Agreement at the national and international level—first on the CCIR Recommendation 601 that defined 4:2:2 component digital and most recently on the SMPTE D-1 standard digital television tape recorder—has moved digital video beyond the realm of processing and placed it squarely in the sphere of production.

A striking demonstration of digital's new-found power took place off the floor at last fall's SMPTE convention. A short walk away, at the West Side studios of VCA/Teletronics, two of the biggest names in digital video, in collaboration with the creative and teleproduction communities, joined forces to show the scope of digital graphics production.

The All-Digital Production Suite brought together the Harry, Encore, and Paintbox, all from Quantel, interfaced with Sony's DVR-1000 digital videotape recorder. Several of these systems, sans Sony, have been installed around the country; Sony machines will follow at almost all sites early this year when deliver-

ies begin. No one who's seen this system in action can doubt that it's hot stuff. Images are created in digital, manipulated in digital, stored and edited in digital. Analog never rears its imperfect head until final output, and then only because there's still no way to avoid NTSC for distribution.

Harry, the hard-to-classify computer that Quantel launched less than a year ago, is earning a reputation as a flexible and easy to learn production tool that takes over many of the functions associated with edit controllers. Its only apparent limitation is its under-90-second record time. Direct interface with the DVR-1000 eliminates that complaint entirely, allowing all-digital production and post-production even of long-form material.

The actual demonstration illustrated the ease and flexibility of the system. Creative director Maureen Nappi began with a storyboard created on the Paintbox and combined chromakey footage of a dancer (recorded directly to the DVR-1000) and remote footage (shot with a Sony Betacam and transferred to the DVR-1000). The final piece was put together in minutes using the compositing and matting capabilities of the Harry along with Encore effects and Paintbox modification of frames.

company that recently launched its Model 500A audio editor in this country, showed also the Model 500V video editing system. With many operational similarities to the popular CMX 340X, the 500V is an elegant, full-featured system with excellent audio capabilities. It can control up to 15 video and/or audio recorders at one time. In fact, the 500A and 500V are almost identical in configuration with the exception of the keyboard; the 500A replaces the 500V's color-coded, computer-style keyboard with a smaller dedicated keyboard. PAL and NTSC configurations are standard, and the systems offer full, CMX-compatible list management.

Evertz Microsystems, famous for its A/V synchronizers, featured the Emulator, an audio transport interface for videotape editors. This device, which Evertz claims will work with all major video editors, allows full integration of audio into edit suites. The Emulator has new software that allows it to hook directly into a CMX editor without an I2. It costs \$3950, including a cable for the customer's choice of audio transport.

United Media, whose Commander line of editors is well-

known in the industry, featured its latest model, the Comm-Ette. This petite A/B-roll editor should not be underestimated, especially since it is upgradeable to a Mini-Comm or eight-VTR Commander II. It offers 250-event EDL storage, list management, integral SMPTE time code reader, split audio/video edits, automatic match frame dissolve computation, an animation editing mode, and a user-programmable smart key.

Videomedia featured its low-cost, mouse-controlled Mickey editor in two configurations: cuts-only and A/B roll. This basic, entry-level editor offers frame-accurate cuts with SMPTE time code, auto-match, jog functions, programmable preroll and post-roll, and several editing modes. The Mickey 1 is under \$4000 and is upgradeable to the A/B-roll Mickey 2, which sells for less than \$5000.

Also featured at the Videomedia booth was the Magnum six-machine controller, a microprocessor-based system with 250-event EDL, slow-motion control, list management, and auto edit.

Vid Video showed several upgrades for Sony VCRs. The most recent gives time code read/write capabilities on the address track

of VO-6800s. A new item, the Shuttle 1B remote controller, gives Sony Type 5 machines A/B-roll capabilities with the RM-440 editing system.

The featured item was the Shuttle 2B, which gives joystick shuttle capability for the Sony 5000 or 5600. Vid Video also demoed the Translator, which allows the RM-440 to talk to and control the Panasonic NV-8500 pro VHS recorder and the JVC 8600 VHS player.

Datum, which brought its full line of time code products, introduced a pair of SID products at SMPTE, the 5310 encoder and 5320 reader. Both are designed for use with standard composite NTSC signals. The 5310 sells for \$7550; its companion reader is \$8550. Datum also showed its 5300 Series Intelligent Time Processor product, a full-featured SMPTE/EBU reader/generator for both longitudinal and VITC codes.

Cameras Focus on Versatility

New technologies and corporate changes made for heightened interest in the video camera category at this year's SMPTE. Panasonic Broadcast System's M-II format (as it affected camera/recorders) was

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one of those technologies. While the conferences and exhibits were progressing at the Javits Center, across town NBC announced that M-II had "met or exceeded" the network's specifications for all of its videotape operations. At the show, Panasonic's display featured the AU-400 recorder mounted on the new AK-400 three-chip CCD broadcast video color camera. This configuration uses the small, pocket-sized, M-II cassette and weighs all of seven pounds.

CCD cameras were the focus of attention at other booths as well. NEC showed its SP-3A configured for Beta and M-II. The SP-3AES (electronic shutter) model was also on hand, freezing action at speeds of from 1/60 to 1/1500 of a second. The SP-3A was being used across town at the World Series while the exhibit at the Javits Center was taking place.

Reinforcing the commonly heard statement that "CCDs are the way of the future," Sony had a special display at its booth showing the BVW-505 Betacam SP CCD camera/recorder, which, most obviously, will compete in the market against Panasonic's M-II camera/recorder configuration and against another Beta SP product, the Ampex CVR 505 camcorder. The reentry of Ampex into the camera business is significant and is currently reflected in ENG models such as the three-chip CCD CVC-5 105 camera. Soon, product will be shipping out of the Ampex plant in Colorado.

At the end of the convention,

Sony hosted a reception at a downtown club to give a vivid demonstration, featuring both the broadcast and industrial versions, of the CCD's capabilities in low-light situations and ability to shun comet-tailing effects.

When discussing portable and ENG cameras, Ikegami is clearly a major force in the camera business. Continuing in the CCD vein, the MKC 100 introduced at the NAB was on hand with the battery backpack supplied. The HL 79 is almost the standard of the industry for ENG departments and was, of course, on display. Further, the HL 95 camera, which is adaptable for mounting to either the Beta or M-II format recorders, was displayed, demonstrating its great versatility. There were, in the past, certain differences between the two configurations requiring modification to the wiring of the camera head, but the current version of the 95 has been designed so that only a different mount is required when changing between recorder formats.

Also a trendsetter in the studio and larger EFP camera markets, Ikegami brought a full showing of its entire spectrum of camera possibilities. Reflecting renewed interest in the $\frac{2}{3}$ -inch area, the HK 323 was demonstrated along with its portable relative, the 323P. They both offer an integral microprocessor arrangement with control panel for auto setup. The economy-class studio and field unit, the SC 500P, was exhibited as was the ITC 730 A. Ikegami's one-inch representative was the HK 322. Its high-

definition camera and projection systems were also to be seen.

One of the most significant developments of 1986 came with the announcement that Bosch and Philips were forming a joint company, Broadcast Television Systems (BTS). SMPTE was the first major U.S. convention at which the combined product lines were demonstrated. The Philips contribution comes most importantly to the camera lines, especially in recognition of their advancements in computer control of camera functions. A force to be reckoned with in the studio side is, of course, the LDK-6 line of cameras and the LDK-26. On the portable line, the LDK-54A carried the standard at SMPTE, and, as with the studio units, it offers total computer control.

Also a forerunner in the computerization of cameras, Hitachi showed the Computacam series, including ENG models like the SK-97D with $\frac{2}{3}$ -inch tubes that can also serve as the camera half of a camera/recorder combination. The Computacam series of cameras all contains EPROMs, which Hitachi burns in at the factory. All this allows the company to offer factory performance evaluation via modem. In the studio market the SK-970 and 970D, both full auto-setup cameras, are $\frac{2}{3}$ -inch tube cameras that can operate with the SK-120, one-inch, or the SK-110D, 1.25-inch, cameras.

Also involved in automatic studio cameras is Thomson-CSF, which displayed its TTV 1525C one-inch camera. Just introduced with automatic setup using integral microprocessors and a central engineering control panel was the TTV 1530, a $\frac{2}{3}$ -inch camera offering both multicore and triax operation and complete compatibility with the 1600 line of Thomson cameras. In the category of ENG, Thomson offers the 1623, which can be configured as a camera/recorder if desired using the Beta format. Of note in the Thomson demonstration was the remote control panel PT 1530, which gives access to automatic setup functions and monitoring signals as well as operational controls.

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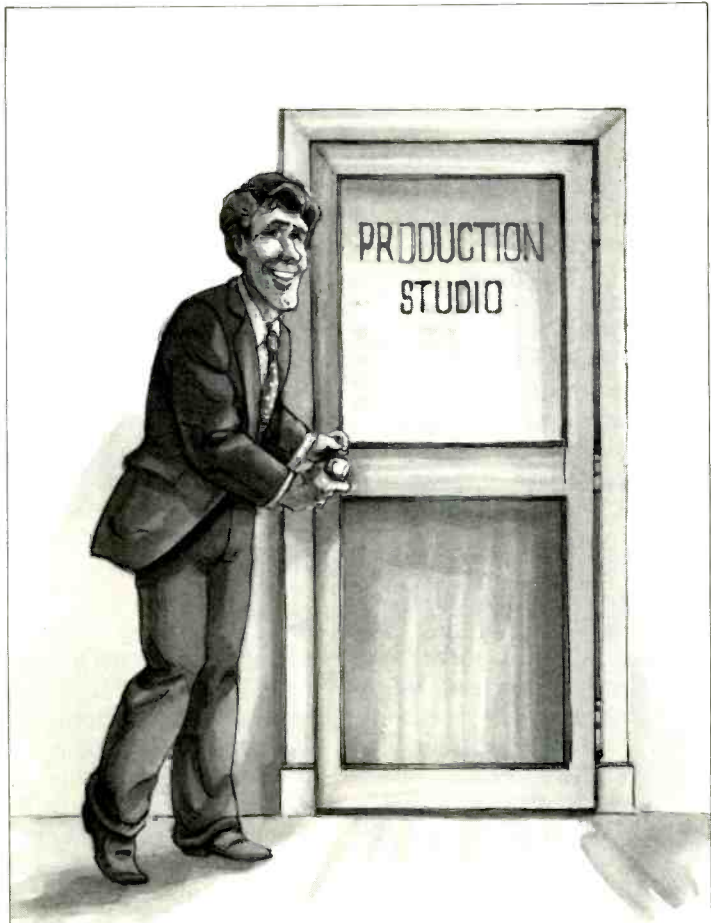
Camera Control Pans Competition

Remote pan/tilt heads for video cameras have progressed so much in recent years that *automated camera control* more aptly describes what the best of these systems can do. The 128th SMPTE show in New York proved to be a good forum for exhibiting the advanced capabilities of these software-driven control mechanisms. Applications for automated systems go beyond sports and remote usage to include studio news and production functions as well.

For studio applications, TSM has introduced the HS-110P camera automation system. It is a high-speed device with programmable pan/tilt head capable of supporting a large studio camera with a 44X zoom lens and a teleprompter (a total of up to 250 pounds). The system uses TSM's Multicontroller, which has been around for a couple of years, and operates off of new software. Of utmost concern with remote systems is that they operate at least as well as a human operator would. The HS-110P, with precision motion control of 18 arc/second repeatability, 180 degree per second velocity, and 90 degree per second acceleration, fits the bill. This is accomplished by using digital/analog servos with RS-422 control, and the unit may be pedestal or ceiling mounted.

The second half of the equation, the Multicontroller, through its software, provides learn and recall modes with full control of all pan, tilt, zoom, and focus operations. It uses a live joystick and has three operating modes: solo for a single operator, program/preview for news automation, and master/remote for productions requiring camera control from either of two directions.

TSM also introduced the Sportsfocuser, an auto-focusing system offering quick setups, holding of focus while live, and the ability to stay with motion tracking precisely to within one foot in 100 yards and within one-tenth of a second. The device mounts easily to a standard camera remote handle.



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Evershed Power-Optics (EPO), a U.K. company that recently signed with A.F. Associates to serve as the exclusive U.S. distributor for its remote camera control systems, has entered the American market with something of a bang. Having installed its remote camera control systems in both the Senate and House of Representatives, EPO proceeded to draw fire from others in the industry, since it was felt that there was not an open bid and test procedure conducted by the U.S. government before it decided on a foreign company as a supplier. How that controversy gets worked out is now up to the lawyers, while EPO, nevertheless, has certainly complete, working systems installed in Washington.

The systems offer two basic types of heads—the servo type 424 and the 425—the latter being the larger unit for the heavy payloads (approximately 200 pounds) required of studio cameras with big lenses and teleprompters. Both of the units can be controlled either by the System TS or the System 90. The TS version is the economy range of equipment offering 99 preset camera positions. The high-end System 90 uses Intel 8088 microprocessor circuits in conjunction with software modules, all operated by a control panel. Inputs on the panel include encoder update, pot positions, key switch, push button, and other input data. The processor sends information via a serial data link to the camera control. Memory includes up to 500 preset positions controlling five analog functions. The core of this system is expandable with different combinations of control panel elements.

Naturally, with all these systems, there is a great variety in capabilities depending on what the customer specifies, and prices vary accordingly. Yet another good-quality programmable remote control with different options comes from Vinten. Long known for its support equipment, Vinten enters this particular market with its Microswift 200. A digital system offering many configurations, the Microswift provides



TSM automated camera control systems were demonstrated showing new software and other innovations.

the Mark 3 for ENG camera without prompter with a capacity of up to 77 pounds. For larger camera/lens/prompter units, the Mark 2 can handle up to 240 pounds with single- or double-channel systems available. The pan and tilt functions can operate at 60 degrees per second with a range of up to 178 degrees.

Lenses View Market Favorably

Just as the VTR market drives the switcher market, so does the camera market influence development in the lens category. Reflecting this, the major lens manufacturers concentrated their showings at this year's SMPTE in ENG, $\frac{2}{3}$ -inch, and wide-angle type lenses. Another significant evolution in cameras this year was the CCD, which also has impact on lens design.



Canon's display included its PV18 X11B lens with camera mounted atop its pedestal.

Due to the emerging importance of CCD cameras, the most important consideration for the lens manufacturers is that, with the CCD chips glued to the prism in the camera, there is no real back focus. In tube cameras, the adjustment is made with the tubes, but, that not being the case with CCDs, a new type lens has to be designed so that the image falls at the same focal length on the prism.

Other developments that may be seen in the near future include the incorporation of microprocessors into the lens itself so that when the lens is attached it will download information into the camera head so there is minimal calibration involved. Schneider now markets this product, which also has no mechanical cam, overseas and expressed at the show the intention of introducing it to the U.S. market.

In other developments, ENG was emphasized at the convention, with both Canon and Fujinon addressing the same issue. Canon showed developments in its J18X, J13X, and J8X lenses. Along with this, there were innovations in the electronic portion of the lens package, including a reduced number of circuit boards, necessitating changes in the servo housing. An obvious beneficial side effect is a reduction in weight.

Specifically in the J18X, the wide-angle capability was increased along with the weight reductions to achieve a 55-degree horizontal 8.5 mm-wider angle capacity. In addition, the J8X6 super-wide showed a new built-in 2X extender.

Always reacting swiftly to market demands, Fujinon introduced a new, wider angle ENG-style lens, the 18 x 18.5 model. Other market changes are occurring in the $\frac{2}{3}$ -inch area, and the company is ready here with the 15 x 8, especially suited for the Sony BVP 360, Philips LDK 26, and the Hitachi SK 970. Fujinon also showed a range of other lens products and viewing changes to come in the electronics for lenses.

Schneider centered its dem-

onstrations around the ENG/EFP product area, offering the 14 x 9 mm for the 3/8-inch cameras, labeled TV-56. The 17X lenses with 2X flip-in range extender and diascope were also on hand for studio/EFP applications, type TV-80. The TV-56 is a true apochromatic design particularly appropriate for CCD cameras.

Also with impact in the industry, Angenieux concentrated in field units with 14 x 7, f1.6 extreme-wide horizontal field lenses for 3/8-inch cameras. Offering 64 degrees horizontally, the unit has macro capability and a built-in 2X range extender.

VTRs Assemble Forces for Format Wars

The future of videotape recording (digital) was notably absent from this year's SMPTE show. Instead, the VTR/VCR picture was colored by the past with the 30th anniversary of the Ampex videotape recorder. A session of personal reminiscences about the developments of the first Ampex VTR was delivered by Ray Dolby, and one of the early machines, with its racks of tubes, was on display at the Merlin Engineering booth. The present state of the market was no less in evidence, as the format battle begun with so much fanfare at the NAB continued at SMPTE, with the M-II and Betacam lines being squarely drawn.

In fact, NBC held a press demonstration concurrent with the SMPTE show to demonstrate that delivery of the M-II equipment had been made and that the units were in fine working order. Also in fine working order is the now fully organized new company, Panasonic Broadcast Systems, ready to develop as it charts out its new course. It will do so with analog component products such as the AU-400 camera-mounting recorder. The AU-400 has Dolby C NR and hooks to NEC's SP 3A CCD camera, Ikegami's HL 95, and of course Panasonic's own units. The AU-500 is also a field recorder, though not a camera/recorder device, and provides color playback through a monitor as well as offer-

ing two FM audio tracks in addition to two audio signals on the longitudinal tracks.

Designed in a rack-mounted configuration, the AU-650 recorder is a studio machine that permits up to 95 minutes of programming using half-inch metal tape in a normal-size cassette, or 23 minutes in a pocket-size cassette. The 650 is reportedly available now and is billed as a recorder/editor/player. In association with Panasonic in providing the M-II format machines will be, at least for now, JVC.

The Beta camp, headed of course by Sony, now includes Ampex, which will soon be building in the U.S., Bosch (or BTS), and Thomson-CSF. What becomes most obvious in this review is that compatibility and standards adherence, at least in recorders, is nowhere in site despite honorable efforts by SMPTE, the exception for now being the D-1.

The skirmish extends beyond the portable market. The production and playback arena received stimulation from the format conflict as well. Positioning themselves as the most effective solution to the multiformat question, Panasonic goes on to suggest that M-II can replace Type C. This remains to be seen. And, according to a paper delivered by 3M's Robert Herman, it will take even longer for digital, or any other format, to supplant Type C than it took Type C to replace quad (that was a four-year fight).

Some other exhibitor's seemed also to be convinced that one-inch

Type C is still alive and well as witnessed by the attendees at various demonstrations going on. Prominent among these displays was the incorporation of the Ampex VPR 6s and VPR 3s (in conjunction with the Zeus TBC—an Emmy-winning combination) into what it termed a Command Center. The high-quality products of Ampex are, by now, well known to almost all attendees and readers, but the marketing approach may be less clear. At least until now. Incorporating its product lines into the centralizing command stations, Ampex emphasized at the convention the growing trend in broadcasting towards systems installations making for more economical use of equipment, ensuring compatibility, and allowing for fast, reliable operation as well as plenty of aftermarket support by the one, known source.

Another rather large company that has invested time and money both into Type C products and into system configuration is Sony. The demonstration of the system concept was also the lone place for the D-1 appearance. It was not on the SMPTE exhibit floor, but in a separate press conference held in conjunction with Quantel announcing the "All-Digital Production Center" that included the Paint Box and other graphics gear. As far as the product most affecting today's broadcast industry, one-inch Type C was certainly present in its many models. The BVH-2000 series occupied a large section of the VTR display, including the 2800, Sony's PCM sound VTR with five channels of audio: two PCM and three longitudinal analog channels. Of course, there were other 2000s there as well, offering the various control panel types, providing variations on the full-edit facility, dynamic tracking with a range of speeds, and an integral time base corrector.

In addition to formats and features, of concern in the VTR market are the current problems developing with serial interface.

Production Switchers Advance Interfaces

It has been said that VTR technology drives the switcher business.



The Ampex VPR-3 and Zeus time base corrector drew attention from attendees.

Since the switcher is where everything comes together, especially the VTR and editing connections, it's old news that manufacturers are faced with the challenge of making their production switchers interfaceable with an increasing amount of technology made for such things as digital video effects and computer graphics. Fortunately for the industry, this challenge is being met, with effects built-in in many models. Serial inputs for interfacing with editing systems are also common. Such features were typical of many of the switchers displayed at SMPTE. The show saw the North American premier of Central Dynamics' Strata 7 production switcher, which—as the name implies—can overlay up to seven layers of images. The full range of CDL gear was on hand, exemplifying their commitment to the U.S. market. Further, the trend toward incorporating digital effects was typified by Grass Valley's showing of its versatile Kaleidoscope DPM-1 digital effects system, which can integrate handily into their model 300 switcher. The ability to operate with any editing system is one of the many attributes of Ampex's popular AVC Century series, shown at the company's booth as part of its Command Center. The Command Center reinforced the systems-integration approach spurred on by changing market conditions that seem so prevalent these days.

Ross Video introduced its new 216A, a full-featured compact switcher that improves on the 216, offering encoded chroma keying, regenerator with genlock, and pattern limits. Crosspoint Latch showed its compact post-production switcher, the 8200A Excalibur, which has two built-in time base correctors and a host of other features that offer what used to be only high-ticket capabilities.

Video Processing Expands Domain

Semiconductor technology has lowered the cost and widened the market for timebase correctors in

recent years. Vendors continue to trim prices to attract an ever-wider market of video users. At SMPTE, Fortel introduced its DHP 525 TBC, a solid, economical unit priced for those who don't need the extras. The Alta Group displayed its Pyxis digital video production system, a two-channel TBC with built-in digital effects, and its Cygnus, a single-channel, infinite-window device with built-in production effects. Hotronic Showed the AE61 and 61B units with constant H phase for matched frame edit. Nova Systems' emphasis was on its model 620, providing full frame of video storage.

Though Microtime's centerpiece for its display was the RP-1 3D digital effects system, let it not be misconstrued that Microtime isn't still a major force in time base correctors. Also on display at the booth were the T-220 format-interchange TBC, the T-320D TBC, and the S-230 frame synchronizer. Further developments in frame synchronizers were evident at the For-A booth with its FA-800 Autocor unit, now with enhanced TBC capability for correcting Type C VTRs. In addition, Scientific-Atlanta's Digital Video Systems Division added a comb filter to its DPS-175A TBC/framestore and its DPS-165A frame synchronizer, which also now incorporates a single-wire remote control.

Other processing developments occurred, appropriately enough, in the realm of SMPTE time code equipment. RTI, Research Technology, International, combined a time code generator and videotape analyzer in its unique DV-5 unit. Amherst Electronic Instrument's Amicon intelligent controller combines a TBC, SMPTE/EBU time code and control track reader, and machine control functions. Evertz, a company known for its time code products, showed its Chaser, a time code based chase synchronizer, and Emulator, an audio transport interface that integrates audio into the video edit suite without the need for extra VTRs and external tape synchronizers.

In related hardware, Leitch emphasized its CSD-5300N master clock system driver. Datum, a maker of timing products, introduced its 5130 SID encoder and 5320 SID reader for the relay of source identification data.

Test & Measurement Computes Market Change

As the markets of other video gear shifts, so too must the test and measurement manufacturers. Essential to the implementation of broadcasting's increasing number of new technologies and video formats is the end user's ability to effectively test and measure them. This firmly in mind, manufacturers of test gear are introducing a variety of new equipment, some of which was seen for the first time at the 128th SMPTE.

Magni Systems, Inc, unveiled its model 1515 component analog test signal generator, the first instrument, according to its makers, to generate both component analog video (CAV) and NTSC composite signals. The 1515 is available in three different configurations, including systems for the M-II and Betacam formats. Connected to a waveform monitor, it can be used to check CAV in a manner similar to that used for NTSC.

Magni also announced Option DV-422, software for its 2015 television signal synthesizer, which uses an IBM PC to create optimum signals for testing a wide range of television systems. DV-422 is part of Magni's plan to issue disk-based software to users of the 2015 as new standards become defined for CAV, HDTV, and others that may come along.

Tektronix's response to the CAV trend includes their TSG-300 test signal generator, WFM-300 waveform monitor, and 650HR-C component/composite picture monitor, all of which were shown at the company's expansive booth. Addressing the mobile satellite uplinking trend, Tektronix premiered its 1705 spectrum monitor at SMPTE. The unit is portable and costs less than a full-

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fledged spectrum analyzer, but the system still enables an uplinker in the field to identify satellite carriers and accurately peak his dish.

Having grown at a very rapid pace and making its niche in the reasonably priced, quality product area, Videotek featured its new TSM-60 waveform monitor, available in NTSC, PAL, and PAL-M standards. Another Videotek introduction at SMPTE for another of today's hot areas—stereo—was the APM-2RS audio program monitor. It indicates phase on a 10-segment bar graph VU and takes up only 3.5 inches of vertical rack space.

As television stations continue to convert to BTSC stereo, vendors continue to introduce increasingly precise gear for checking it. Present at SMPTE were Sound Technology's 1530A BTSC analyzer monitor and 3100A programmable audio generator. The two perform computerized, com-

prehensive, rapid tests of a BTSC system, with a CRT on the 1530A for display of results.

TFT has certainly carved out a major corner of the stereo measuring market due in no small part to the model 850 aural modulation monitor. It includes a wideband demodulator so that complete aural proof-of-performance measurements can be made on a broadcast BTSC stereo composite signal. Belar's display included its TVM-210 and 220 TV stereo modulation systems and, like TFT, also showed several other products, including modulation monitors for FM stereo and for AM.

Other major manufacturers of test equipment at SMPTE included Rohde & Schwarz, showing their new UPA, a complete audio analysis system, and their video analyzer UVF and signal generator SMG; Philips, introducing the U.S. to their low-cost PM 5646 TV test signal generator; and Asaca

displayed several items from the full line of Shibasoku measuring instruments, although Asaca's major emphasis was on their ACL-6000C automatic random access cart system.

In what may presage greater attention to the broadcast market in the future, Hewlett-Packard demonstrated their HP 51810S video measurement system. It will measure over 60 NTSC baseband video parameters automatically, and incorporates an HP 300 series computer that can perform other functions besides measuring video product quality.

Audio Speaks Softly

Audio tends to take a back seat at the SMPTE conference, but not to the extent it used to. This year, an emphasis on post-production, updated production tools, and the continued focus on digital trends gave audio engineers something

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to see at a show where video effects and frame synchronizers abound.

There were even several new product introductions; some of them major additions to the field, others mere useful items of the bread-and-butter variety. Some of the more exciting developments have taken place in the infant category of computerized audio editors.

New audio editors

Audio editing incorporating some form of computerization is a category that sees increasing entries at each NAB show. Now, there is a new focus on editors specifically for audio for video post, and the newest ones feature digital storage.

Last year, along these lines, Lexicon showed a project in its early stages in a private suite. At the time, it was called RDI, for random-access disk-based processing, and could perform six channels worth of audio mixing and editing functions digitally. Now the project is about to become an actual product, emerging in prototype form as Opus at the SMPTE show.

The concept has turned into a full-fledged 12-channel mixing-editing console in actual console form, faders and all. Lexicon has done everything possible to give audio engineers a product that feels familiar. One feature that survived intact from the R&D phase of last year is the cue wheel, which gives the feel and sound of cueing tape—only without the tape.

Opus can record or play back up to eight events simultaneously from digital or analog sources; therefore, eight-track production is possible. Each hard disk stores 120 minutes of full bandwidth, mono audio, and a system can have up to four hard disks. Lexicon is planning product availability in the spring and says a half-dozen systems have already been spoken for. Fully configured, Opus will cost around \$200,000. The development of this product has taken an interesting turn in an effort to appeal to audio record-

ing veterans. It almost looks as if Lexicon has gone into the console business to gain industry acceptance.

Another digital audio editing system that debuted at the NAB show was Advanced Music System's Audiofile. It also accepts multiple channels of audio and stores it digitally, and it can edit or playback. There is similar cueing capability, but there are some differences in features.

Audiofile is in the product stage now and is designed to be used with a studio's existing console. However, AMS recently purchased Calrec Audio, a console manufacturer, so it seems likely that the company will soon have a console dedicated to working with the Audiofile. The system can also store up to two hours of mono audio, and the cost of a system is about \$70,000. AMS will also be offering upgrades to the system on floppy disk at no extra charge.

Noticeably absent at the show were the digital store-and-playback systems that are trying to find a market in radio stations. They would seem to have a logical home in the storing of sound effects for video post, but their costs might be prohibitive while cart machines, and now CDs, are still in use.

The word is wireless

The use of wireless mics and systems for production has been steadily rising over the past few years. There are more players than ever in the field now, and there were several new product introductions at the show.

Shure Brothers unveiled two wireless mic systems, the W1020 nondiversity and the W1025 diversity. Each includes a body-pack transmitter, receiver, and lavalier mic, and Shure is aiming for the same quality response from its wireless systems as from its other microphones.

Telex introduced a number of new wireless products, including a new wireless IFB (interrupt feedback). IFBs are becoming a crucial production and ENG tool, and Telex's wireless system can cue talent from up to 300 feet



A surprise introduction was an audio editor, The Boss, from Alpha Audio.

away. One major advantage over wired systems is the elimination of the wire, which usually runs from the intercom system to the talent. The wireless IFB is made to work with any multichannel intercom master station such as Telex's own IC-2MA or IC-4M.

Telex also has a new ENG wireless mic system called the ENG-4. It features a four-channel receiver spreadout over two adjacent TV channel frequencies between channels 7 and 13, a switchable compander, and adjustable mic or line level.

Micron also showed new wireless products in the 500 series, with CNS, a noise suppression feature. The CNS TX503 hand-held mic is an update of the TX203, and the CNS TX501 and TX 502 are updates of the TX 101 and TX 102.

Cetec Vega also introduced several wireless products. Two new mic systems, the Traveler 1 and Reporter 1 are for ENG and EFP use and operate on VHF frequencies. Also new is the Model 66B professional portable wireless mic receiver. It features a GaAsFET (gallium-arsenide field-effect transistor) front-end and its range extends to up to 1200 feet.

And as evidence of the growing popularity of wireless systems for ENG and production, two companies that make wireless products introduced special compact carrying cases. The Sennheiser Model RS-2012 is a "six-pack," housing up to six VHF transmitters and six receivers. Power voltage and RF for the six come from a com-

mon supply, and each of the six can be monitored separately or together.

HM Electronics' Field Pac receiver case houses up to four of the company's receivers and contains the electronics of an antenna diversity system for full diversity reception.

Enhancing the sound

At just about every industry show lately, any talk of audio sooner or later lands on the subject of Dolby SR—the new spectral recording process, which production engineers are saying equals or surpasses the performance of digital recording. The signal processing provides noise reduction but also increases the dynamic range and extends the headroom. Dolby reports that SR cards are in demand, especially in film production.

Industry insiders are also reporting that many production houses are switching to Dolby SR and delaying the conversion to digital recording. The next step is that ATR manufacturers are interested in incorporating the SR process into their machines. That development showed up about two weeks after the SMPTE show at the AES.

MIDI control is a necessity the video production industry has had to address recently. Eventide introduced it as a feature to the SP2016. And it's also a feature of a new digital reverb and effects unit from AKG. The microphone company bought Ursa Major last year and formed a digital products division as a result. The ADR-68K has a two-in/four-out design and features a range of reverb and digital effects.

One digital audio product drawing a great deal of interest at the SMPTE show was New England Digital's Synclavier digital music system. It was unveiled at last year's NAB show, and later appeared at the AES show.

Digital multitrack

With developments such as Dolby SR making an impact in the industry, there's some question as to the future of digital



Solid State Logic's SL 4000 finds many applications in the audio sweetening being done in television today.

ATRs and multitrack recorders. Aside from overall questions about digital, there is still a difference over formats. Sony remains the flag holder for the DASH format and is the only company to date with a DASH recorder. Mitsubishi and Otari both have PD (ProDigital) machines on the market, with AEG expected to come out with a product this year.

But while some highly competitive production houses feel the need to convert to digital to gain an "edge," it seems clear that the move toward digital has been slowed somewhat by Dolby, and it might be a while for the forces of digital to gather any momentum in the video post-production part of the industry. The one area where digital recording does seem to be gaining acceptance is in the music recording industry, where the rise in popularity of compact discs is causing a demand for a digital process from start to finish.

At the SMPTE show, Mitsubishi introduced the X-400, a 16-track digital recorder in the PD format. The 16-track configuration was designed specifically with the video post-production market in mind.

MTS hits a plateau

While just one year ago MTS was the hot topic at the SMPTE show, this year it took more of a back seat to other developments. For one thing, conversions by TV stations to stereo sound have slowed somewhat and, instead of soaring upward, are now growing

at a steadier, if more leisurely, pace. There has been an increased emphasis on test equipment and production tools for stereo, and audio engineers in TV and video production have spent the time re-learning, or at least rethinking the way they have done things in the past.

But stereo sound is still in demand, and post-production houses have been gearing up with overall improvements to audio booths. Important additions are new consoles designed to handle stereo with ease; synthesizers, for old video and film without stereo sound; and such essentials as phase meters, to ensure mono compatibility. Kintek, which already has a stereo simulator on the market, introduced a phase meter, the KT-932. It features an LED bar graph with discrete readings in one-degree increments to 30 degrees, and six-degree increments to 180 degrees.

Consoles and integration

Nowhere is the marriage of audio to video more apparent than in the console sector of the industry. Large, automated, digital consoles seem tailor-made to handle the increased striving for quality audio in video production. This is especially evident in TV, on the network level, where, for example, stereo-minded NBC has purchased many consoles from Solid State Logic to accommodate the new sound.

SSL and Quantel, primarily a video company, recently merged, and there are indications that

other such moves may not be far behind.

Neve, which also manufactures digital audio consoles with video production in mind, was bought last year by the large Austrian company Siemens. That diverse corporation has voiced an interest in making inroads into the video switcher market in the U.S. and has also said it would like to merge with a well-established video company reminiscent of the SSL-Quantel joining. The feeling seems to be that in the U.S., the video post-production market is growing and perhaps healthy enough to support marketing from overseas.

One console maker trying to go it alone also aims its products at the post-production industry. Harrison showed its Series X virtual, fully automated console. It was an updated version of the one shown last year.

Batteries Power Ahead

All the R&D in the world can go into a new ENG camera, light, or portable VCR, but their performance still hinges on dependable battery power. Battery manufacturers at the SMPTE show were clearly keeping a close watch on developments in camera/recorder design and are planning their product lines accordingly. New to the show was Perrott's MP309s, a 2.75 pound silver zinc clip-on developed specifically for Betacam and M-II camera/recorders. It is worth noting that CCD cameras require less power than traditional tube cameras do, so they can use smaller batteries. "On board" models outnumbered battery belts at the show.

Emerging from the plethora of nicad, lead acid, and silver zinc batteries shown was the obvious fact that ENG/EFP applications predominate. Among the exceptions were G+M Power Products' introduction of its giant superblock dual 12 V 10 AH battery pack, which is designed for use with Panavision and Moviemotion picture cameras.

Longevity is, of course, a key feature sought by users. Mini-

mization of battery downtime is another, and there was a variety of chargers on hand for this purpose. Alexander showed its micro-processor-controlled charger, which prevents overcharging. Anton/Bauer exhibited a full display of chargers for every conceivable use with a variety of features. Cine 60, Frezzi, and Perrott, of course in the forefront of fast chargers and trickle-charge devices, drew considerable attention there as did Pro, G+M, PAG, and Paco.

Accessories for on-board batteries included Anton/Bauer's DataTrap, which sandwiches between their Snap-On bracket and battery to measure and display power consumption. Another was Frezzi's new Power-Ups-Interface, and uninterruptable power supply that allows you to keep on shooting without stopping to change batteries.

PAG America showed their Paglock battery connector sys-

tem, which it is promoting as the solution to the need for a single, standard battery connector for on-boards. For a one-time fee, PAG says it will license the design in perpetuity to all camera and battery manufacturers. Time will tell if this one-hand, top-locking interface replaces all others, including the popular Anton/Bauer Snap-Ons.

Microwave Shrinks with Possibilities

It's not only the wavelength that's small when it comes to broadcast microwave technology today, the equipment itself is shrinking. Trends in microwave cited by manufacturers at SMPTE included portability to get in and out of news situations quickly and even to get live shots never before possible (from a galloping race horse, for instance). Smaller, lighter high-performance transmitters, and mobile and ultra-mo-

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bile systems, were much in evidence. One bit of a shift in the marketing spectrum of these products came in the sale of M/A-COM's sale of its ENG line of microwave gear to Microwave Radio, both of which shared a booth at the show.

Nurad featured portable units at its extensive demonstration. Nurad, long known for its adaptability to the requirements of ENG, showed helicopter units as well as various design configurations for different situations.

Ikegami, though famous for its ENG cameras, is very big in ENG microwave gear too and may consider making an even stronger push in the U.S. with this equipment. Harris, of course, is always to be reckoned with in this area, and its display at the convention showed its versatile approach to this department. RF Technology also had a complete display of portable and standard microwave gear.

Automation/Master Control Change Route

If control and automation of your plant operations—TV, post-production or cable—is your major concern, the 128th SMPTE Conference exhibit area was the place to be. Not every manufacturer that went to NAB Dallas elected to show at SMPTE, but four of those who did made significant new product announcements: Merlin, Lake, Alamar, and AF Associates. And a fifth, BTS (Bosch/Philips), showing a prototype next-generation routing switcher in a private hotel suite, said, "Wait 'til next NAB."

Building from its machine control technology found in Q-Driver, Merlin showed some remarkable software to integrate Sony's Betacart MERP into a total system environment. Alamar, also working out of a machine control context, showed new cart automation software. Lake, on the other hand, incorporating its cart automation expertise, unveiled some new software packages designed to move it further into the field of

not only on-air broadcasting and cable, but post-production operations as well. AF Associates, which at NAB showed its Pegasus system as an off-line compiler, changed the software and came up with an on line machine control system.

Utah Scientific, which created a stir at NAB with its Dynabus data network, which is much faster than the ESBUS protocol (which emerged at the last NAB as the standard), continued to make that point on the floor and at one technical session. Exhibited were SMC-1 serial machine controllers bus tap-offs.

There was less news at other exhibits. Grass Valley showed its integrated automated systems capability with the focal point being the master control switcher. All of the hardware was familiar—the Horizon family of routing switchers and the M-200 master control switcher. Central Dynamics showed a similar capability built around the SDS-2 Signal Distribution System. Intergroup reinforced its showing from the NAB. The same was true for Dynair, which last April showed its ESBUS compatible Series 1 machine controllers and its Advanced Technology Distribution and Switching systems that feature 120 MHz bandwidth.

Dynair did have a new dramatic display showing superior transient response. Di-tech, which unveiled a new high-density routing switcher at NAB caught the attention of SMPTE visitors by virtue of its eye-stopping physical dimensions, but, if that were not enough, its associated color CRT system controller with extremely easy-to-read displays was certainly captivating.

Image Video Limited made some news in the routing switcher field by adding to its high-density line an RGB (Y) model, the 9400. Hedco had a new BPE 301 1x8 switcher that was portable and battery operated. Videomedia discussed its distributed intelligence Q-Start II approach (shown at NAB) and did have one new piece of equipment, the VMC-3000 Traffic Controller. While Bosch

didn't say exactly what its new automated machine controlled distribution and master control switcher would do, it described it as a state-of-the-art approach to provide a "better on-air look." The system will use the H-P 9000 Series 300 computer, which uses the UNIX operating system and a 68020 CPU.

In the area of VCR robotized players Sony, Odetics, and Asaca were present with pretty much the same displays as at NAB, except that Odetics was demonstrating primarily control of Betacarts. The system is now being delivered, said Odetics, with four stations already having installations. Asaca, which still handles the most number of cassettes (600) stressed the ability to handle both Betacam and M-II.

Software control, which has been the watch word of Lake Systems, took on new meaning at SMPTE as the company announced three new proprietary software packages. Using the trade names of Broadcastops, Productionops, and Multiops, each program is designed to meet the special needs of different industry sectors. For broadcasters, interfaces and software allow simultaneous two-channel operations (on-air and off-line compiling). Spots and program segments can be stored singly or in timecode-identified slots (cassettes, reels, or disks). Up to 75 A/V sources can be addressed. An execution log can be downloaded from a traffic computer. For network switching centers or cable operators, Multiops is similar except that it can be configured to operate up to ten independently scheduled channels simultaneously.

The Productionops program gives Lake an entry into post-production houses. Already installed by NFL Films, the program saves a great deal of painstaking labor. Dubbing, assembling, and conforming operations are performed automatically. Lake reports interfaces are being developed to integrate Sony D-1 DVTRs and the new small VTR formats (Betacart and M-II) into systems that pro-

duce both time-coded air-ready cassettes and Type C and quad spot reels. Lake adds that in addition to saving labor, more utilization of machine time is possible. Midnight "automation shifts" can be scheduled.

All of the new Lake programs load into the company's 68000 microcomputer shown at last year's NAB. Interfaces with machines use ESBUS protocol. Earlier La-Kart commercial insertion system customers can upgrade to the latest configuration for as little as \$14,000. Under development are additional software modules to interface with various computers.

Clever software along with barcode usage was the approach taken by Merlin to help Sony Betacart MERPs users integrate automated spot playing equipment into a broadcaster's whole system. After hearing how Betacart users have independently managed to integrate the spot players with the overall plant operation, Merlin set out to develop a "standardized" approach building on its intelligent machine control Q-Driver system. Betacart can be connected directly into the ME-448 automation control system and, at the same time, interface through an RS422 bus and unit controllers to other machines—electronic still stores, telecines, VTRs etc.

Then, using a PC-compatible computer and software, Merlin came up with a management system for Betacarts that identifies and controls all carts in the plant.

Through the use of barcodes, Merlin interfaces with traffic, downloading the playlist and interrogating the data base to assure that all carts are accounted for and all barcode IDs matched. Called the Barkeeper, the system also monitors the log, the playlist, and the cassette locations to prevent missing or duplicated (or misidentified) IDs from coming up. In a sense, Merlin can do some of the things expected of a library management system that Sony talked about at NAB Dallas as "future systems."

This same computer system becomes a subsystem of the Q-

Driver to integrate play functions beyond the parameters of the Betacart. Through the Q-Driver's friendly track-ball, the operator can control the system without going to a keyboard. During SMPTE demos, actual Betacart control panels were simulated on the computer CRT.

New software was the basis of AF Associates' Pegasus Automation 5150 system. The hardware is the same as offered in its off-line compilation system (Pegasus 5100), but changing instructions, Pegasus can operate machines on line.

Alamar showed two new products at SMPTE. Its new Auto-Cart automated program controller, replacing the Ala-Cart model, offers greater capability at only a slightly higher price—\$7995 compared to \$6995. Auto-Cart will control up to 32 VTRs and also sequence other units such as telecines, character generators and switchers. Software permits

commercial insertion, cart machine substitution, delayed programming, and timed remote control. Program cueing includes confirmation of content. Alamar also introduced a computerized (IBM XT/AT or compatible) library system that catalogs all film and videotape programming. Information blocks include type, length, description, and comment. Program entries can have run-sheet data included. Program segments can appear on many separate reel entries.

The excitement in sync equipment was generated by Grass Valley with a new series 9500 designed to "bridge the gap between price and performance." New technology such as the SPG gate array designed by GVG made all this possible (one 44-pin IC has 2100 logic gates equivalent to 121 standard 14-inch ICs). A source synchronizing generator sells for \$1800, a reference sync for \$2900, and a master reference for \$3500.

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