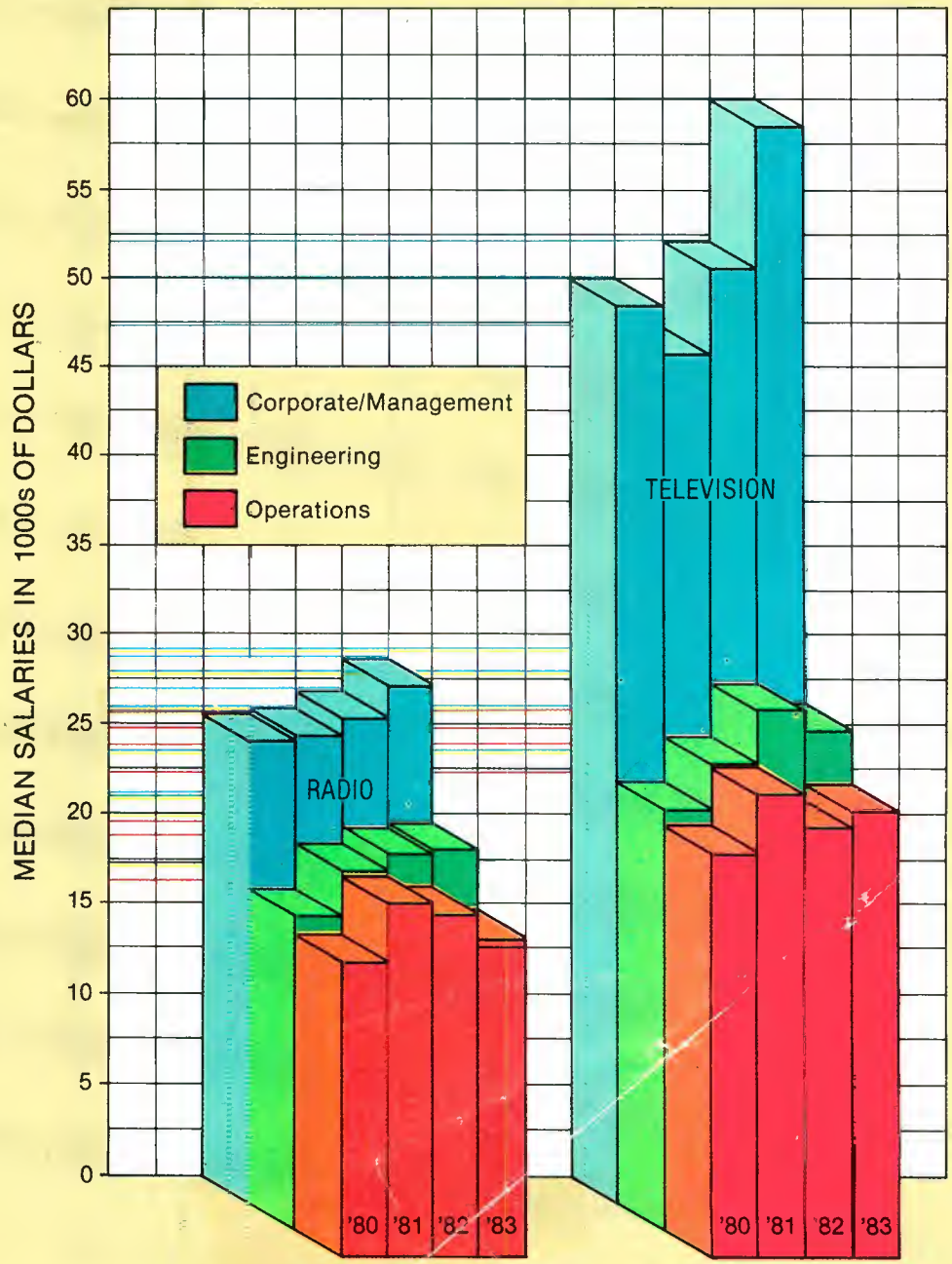
BROADCAST engineering®

October 1983/$3



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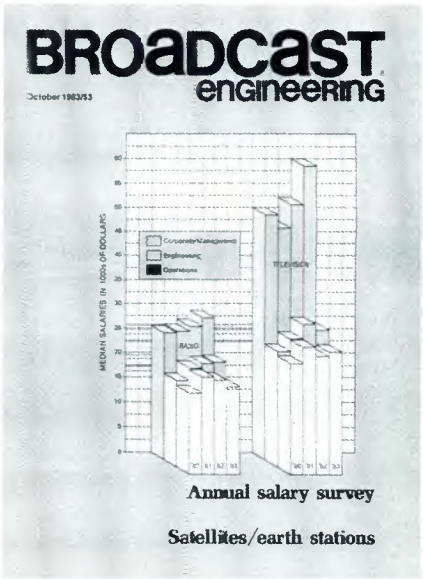
BROADCAST engineering

The journal of broadcast technology

October 1983 • Volume 25 • No. 10



THE COVER is a graphic portrayal of the results of annual salary surveys for the 1980s. Median salaries are plotted for management, engineering and operations staffs in radio and television. Bar graphs are scaled to reflect trends in median salaries in each category surveyed. An article summarizing the scope of this year's survey, analyzing the trends and including excerpted comments from respondees, begins on page 22.

Coming events

Oct. 23-26
CCBA Convention, Toronto, Canada

Oct. 29-Nov. 3
SMPTE 125th Annual Conference, LA Convention Center, Los Angeles, CA

Nov. 6-9
Scientific-Atlanta Earth Station Seminar, Atlanta, GA

November-December
Western Cable Show, Anaheim, CA

ISSN 0007-1994.

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NEXT MONTH:
- Reel-to-reel tape machine roundup
- STLs
- The propagation path
- Automation systems update

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FCC update

October 1983

Harry C. Martin, partner, Reddy, Begley & Martin, Washington, DC

Expanded use of TV aural subcarriers proposed

The commission has proposed to allow TV stations to use the TV aural baseband to provide a wide range of new broadcast and non-broadcast services. The FCC also proposes to permit TV stations to use a variety of technical systems connected with use of the aural baseband. Non-commercial and commercial stations are affected by this proposed deregulation.

The FCC proposal, if adopted, will permit new services such as multichannel TV sound—including stereophonic sound—for regular programming, data transmission, services for viewers with impaired hearing or sight, plus *storecasting* and background music. Non-broadcast uses, including paging services, electronic mail delivery, facsimile services to offices and traffic signal control, also would be permitted.

The FCC based its decision on its interest in maximizing potential uses of the TV aural baseband. It said that each of the 786 commercial and 273 non-commercial TV stations presently broadcasting could be providing subcarrier services at virtually no technical cost if its rules were liberalized.

The proposed expansion of TV services tracks with the FCC's deregulation of FM subcarrier use earlier this year, and raises similar regulatory classification issues. The commission proposes to deal with these issues in a similar manner. Generally, TV aural subcarrier services would be treated as ancillary broadcast services. However, if a broadcaster offers services on a common carrier basis, rules applicable to such services would apply.

The commission said that its open market approach in this area should enable TV licensees to exercise broad discretion in selecting services to offer to the public. It said that such a flexible policy would ensure the most efficient use of the spectrum.

Cable TV financial reporting eliminated

The FCC recently eliminated the annual financial reporting requirement for cable TV systems. The *Cable TV Annual Financial Report* (FCC Form 326) was abandoned at the same time.

The decision followed a year-long study of whether the cable industry and the public would best be served by retaining or eliminating a system of annual financial reporting.

In the FCC's rulemaking proceeding, all but one commenter said that the financial reporting requirement should be eliminated, because it imposed a considerable burden on cable operators and the commission. Furthermore, some respondents questioned whether the FCC possesses the authority to collect such financial information from the cable industry. It also was suggested that the FCC try to restrict state and local governments from imposing any reporting requirements beyond those necessary to accomplish legitimate rate regulation functions. (The commission decided against imposing such restrictions, however.)

In eliminating its financial reporting requirements, the FCC noted the palpable hardships imposed by the requirements on cable operators, their subscribers, the agency and the public. In weighing the costs and benefits of the current system, the commission determined that it could rely on special studies tailored to specific policy planning and analysis needs in the event financial information becomes important in fulfilling its regulatory responsibilities.

DBS orbital positions and frequency assignments adopted

On July 17 the United States signed the Final Acts of the Region II Administrative Radio Conference (RARC) for the Broadcasting Satellite Service. The main purpose of the conference was to allocate orbital positions and frequencies for direct-to-home satellite broadcasting (DBS).

The US delegation was successful in its efforts to procure eight orbital positions with 32 channels at each position. The orbital positions are located at 175° 166°, 157°, 148°, 119°, 110°, 101° and 61.5° west, and the frequencies assigned are in the 12.2-12.7GHz band.

The US delegation's bargaining for acceptance of its geographic service

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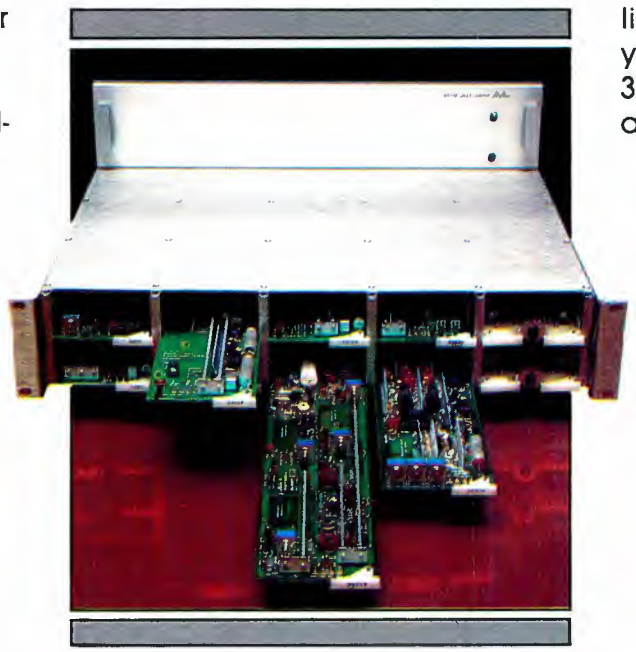

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plan achieved mixed results. Initially, it attempted to implement a plan that would furnish full service to four service areas in the continental United States (CONUS). The adopted plan instead permits the use of most assigned orbital positions to provide half-CONUS coverage. This flexibility is beneficial because technological advances will enable one satellite to serve half the United States—a far larger service area than previously contemplated by US DBS permittees. The plan also provides for service to Alaska, Hawaii, Puerto Rico and the Virgin Islands by spot beams and, therefore, allows for DBS uplinks (for special on-the-spot coverage) from anywhere in the continental United States to Alaska, Hawaii and the territories.

The RARC adopted a value of -107dB (watts per square meter) for power-flux density. This decision was disappointing for the US delegation, which argued for a value of -105dB. The delegation sought a higher power-flux density, because US DBS operators plan on using small, inexpensive receivers. However, the United States has entered a "reservation" to the RARC's power-flux density decision, which affords the United States the flexibility to use a power-flux density of up to -105dB if neighboring nations agree to such higher limits.

Program content restrictions eliminated

The commission has eliminated 10 policies regarding broadcasting program content and is seeking comments on possible elimination of three others.

Policies and rules that have been abolished concern alcoholic beverage advertising, broadcasts of astrology material, foreign language programs, harassing and threatening phone calls resulting from station broadcasts of an individual's name and telephone number, music format service company agreements with broadcasters, musical recordings and repetitious broadcasts, restrictions on presentation of off-network programs and feature films, polls and call-ins on radio and TV stations, private interest broadcasts by licensees to annoy and harass others, and sirens and similar emergency sound effects in announcements.

The commission has also proposed eliminating its policies concerning horse-racing information broadcasts, horse-racing off-track and paramutual betting advertising.

The commission said that policies and rules such as those deleted—which it referred to as regulatory underbrush—have the potential to impede competition "by stifling broadcasters' discretion in much the same manner in which small vines can choke a healthy tree."

Applicant certification of technical data proposed

The commission is seeking comments on the feasibility of relying upon an applicant's certification that technical data in its application for an FM station is correct and complies with commission rules. The objective of such self-certification would be to eliminate commission staff time now devoted to review of certain technical information.

Initially, the self-certification procedure would be restricted to FM, where distance separation is the basic method of interference avoidance and station assignment. A commission staff report on the issue concludes that it would be feasible to accept applicants' certifications in areas such as identification of mutual exclusivity, observance of protections for receiving sites, protection of AM antenna patterns and compliance with international agreements.

The commission requests comments on the anticipated risks and benefits of such a self-certification procedure, the potential for widespread interference, and the likelihood that applicants could be expected to file FM applications sufficiently accurate to avoid difficulties in these areas.

Financial interest rule repealed, syndication rule modified

In a tentative decision, the commission has eliminated the network TV financial interest rule and modified its network syndication rule.

The financial interest rule had prohibited the major networks from purchasing rights from producers to air programs over any but their own distribution systems. Repeal of the rule allows networks to obtain financial interests in syndication rights for network programs.

The syndication rule prohibited network involvement in syndication. The modification would narrow the rule's scope to prohibit only participation in domestic syndication of prime time entertainment program series.

Although modifying the syndication rule, the commission is attempting to protect independent stations from potential "warehousing" by requiring networks to transfer all rights in syndication to unaffiliated syndicators and make those programs available for syndication within six months after the end of a network run. For long-running series, the network must transfer its syndication rights after the program has been on the air for five years. Therefore, while the networks may retain passive financial interests in the programs, active syndication rights must be disposed of. In both instances, networks must notify the FCC within 30 days of the sale of the rights.

The decision contains a *sunset clause* under which all restrictions on network syndication would be removed in 1990, unless the commission makes an affirmative public interest finding that they should continue.

The commission seeks additional comments to fine tune the syndication prohibition to ensure that it provides appropriate protections without interfering unnecessarily with negotiations between networks and producers.

Congress is considering delaying the FCC action on the financial interest and syndication rules.

feedback

FCC update

*An error was made in FCC Update (**BE** August 1983) in the headings prepared for Table I. The fourth column heading should read "Second and Third Adjacent Channels." The fifth column heading should read "10.6/10.8MHz."*

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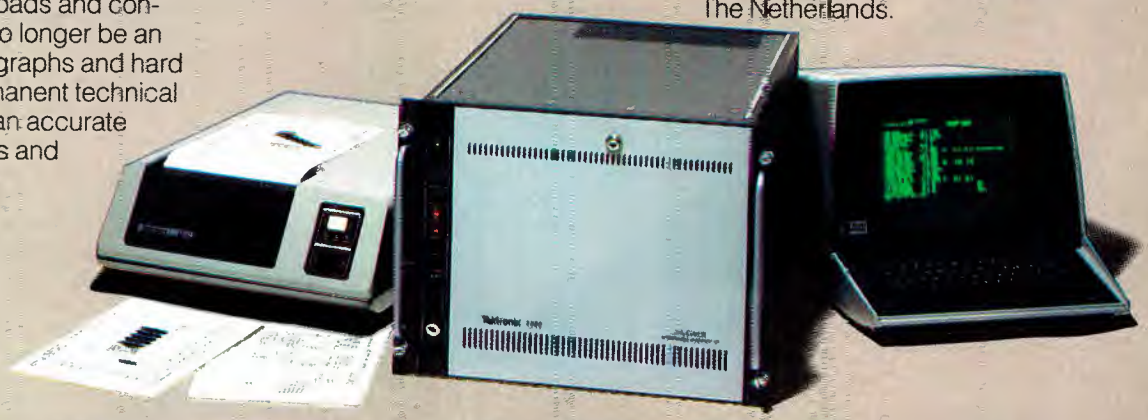

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Deregulation demands new leadership

Our forefathers encountered the hardships of clearing the underbrush in the building of a country. Now, in a similar undertaking, the FCC has begun a program of deregulation to clear the entanglement of government from broadcasting. Although the pathways are far from clear, it is time for broadcasters to heed the signs that herald a new era for the industry.

FCC chairman Fowler, having been closely associated with the broadcast industry, is in a position to understand broadcasters' needs. But we think his commission perhaps has used too drastic a method to clear away the regulatory underbrush of Volume III, Part 73, et al. We are joined by many of our readers who concur that too much regulatory relief, offered too quickly, may create serious headaches for the commission and broadcasters.

Let's review some recent trends and potential problem areas:

- **First Class License.** We agree with the FCC that passing a written exam for the First Class Radio Telephone License was an inadequate measure of an engineer's qualification for broadcasting. We also follow the logic that, by allowing personnel with lower-grade licenses to operate a transmitting facility, a certain amount of salary relief would be provided to beleaguered broadcasters. Our concern is that the economic relief might trigger a trend toward reduced quality in signal delivery that will hurt the industry. We urge management as well as engineers to consider their alternatives carefully so that the status of broadcasting does not suffer.
- **Type acceptance.** The process of getting new equipment type accepted/approved is costly to manufacturers. But this expense has been justified by broadcasters to attain high quality and performance. Now, with reduced requirements for acceptance/approval, the door is opened for enterpreneurs to enter the market with lower-priced, less-qualified equipment. No one objects to saving money, but if a signal is degraded or reliability is reduced, broadcasting suffers. We urge broadcasters to proceed cautiously in adopting new, untried systems to avoid jeopardizing signal quality.
- **Station logs.** Long considered a nuisance, stations' logs for programs, engineering operations, and maintenance still serve vital functions. Now, with deregulation largely dispensing with the need for logs, stations are freed to maintain records that better serve their requirements.

The commission still expects stations to be operated in accordance with technical standards listed in Part 73, just as tower lighting requirements in Part 17 must be met.

Although logs of your technical operations and maintenance are no longer required, they can be your strongest ally when the FCC inspector pays you a visit. If a problem is uncovered during inspection, the logs will document whether engineering recognized the situation and took corrective measures. That may be all that is needed to avoid serious confrontation with the FCC. On the other hand, a sloppy operation, with no log support, is likely to have immediate difficulties.

Continued on page 14

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Satellite update

By John Kinik, satellite correspondent

Antennas for 2° spacing

The FCC released the final Report and Order on satellite orbital spacing on Aug. 16, confirming an immediate implementation of 2° spacing for Ku-Band (12GHz/14GHz) satellites and a time-phased implementation of 2° spacing for C-Band (4GHz/6GHz) satellites. This decision has caused a scramble in the industry as antenna manufacturers strive to determine technical solutions for the tighter specifications imposed on antenna pattern performance and system operators worry about the higher levels of interference that are sure to result.

The concern is real and immediate, because the new standards apply to new antennas on July 1, 1984, and to existing antennas on Jan. 1, 1987. Thus, all antennas purchased from now on are subject to the new specifications, which are mandatory for transmit antennas but are only suggested for receive antennas. The industry problem is significant at C-Band because of the large number of Cassegrain antennas and small diameter antennas now in service, and because the Cassegrain configuration predominates for transmit antennas. Also, dual-beam and multibeam antennas, attractive with the current 4° spacing, may not be reception solutions to expanded satellite communications problems.

The new sidelobe pattern performance requirements for the transmit function are defined by an isotropic gain envelope as follows[1]:

$$G(\Theta) = \begin{cases} 29 - 25 \log \Theta \text{ dBi}, & 1^\circ \leq \Lambda \leq 7^\circ \\ 8 \text{ dBi}, & 7^\circ \leq \Lambda \leq 9.2^\circ \\ 32 - 25 \log \Theta \text{ dBi}, & 9.2^\circ \leq \Lambda \leq 48^\circ \\ -10 \text{ dBi}, & 48^\circ \leq \Lambda \leq 180^\circ \end{cases}$$

[1]For more details, see "Reducing Satellite Spacing to Meet Demands" on page 62.

For cross-polarized patterns, the envelope must be 10dB below the previously mentioned envelope for off-axis angles from 1° to 10°.

Also, no sidelobe peaks are allowed above these envelopes for angles from 1° to 7°. For angles greater than 7°, only 10% of the sidelobe peaks may exceed the envelope by a maximum of 3dB.

For the receive function, the requirements serve as a guideline to determine expected interference levels. A realistic interpretation of the new requirements for transmitting antennas places a burden on receiving antenna operators. They must ensure the best possible sidelobe performance for their systems, because the interference levels actually may turn out to be higher. Antenna manufacturers will have difficulty meeting the C-Band transmit requirements and, in the new deregulated environment, the receive system should be protected with the best antenna performance available within reasonable cost limits.

Antenna types

Existing Cassegrain antennas, which employ a dual reflector configuration, do not have the sidelobe performance characteristics necessary to meet the new requirements at C-Band, because the signal wavelength is large enough that significant scattering of RF energy is caused by the subreflector and its support members. At Ku-Band, the problem is decreased for antennas of comparable diameter because the wavelength-to-diameter ratio is much lower; thus, the RF energy, acting more like particle energy than wave energy, is scattered less.

Another type of dual-reflector antenna is the Gregorian configuration, which typically provides better sidelobe performance than the Cassegrain type. The Gregorian system employs a concave subreflector positioned close to the feed-horn aperture, whereas the Cassegrain system employs a convex subreflector that is more distant from the feed.

Most antennas available in the 4.5-10m size range are the Cassegrain type, with only one major manufacturer of antennas offering the Gregorian configuration. Cassegrain antenna manufacturers must improve their C-Band performance by optimizing a number of parameters, including main reflector surface accuracy, subreflector size, subreflector support member design and feed illumination. Because these parameters are interactive, performance improvement can only be achieved by a lengthy and costly trial-and-error process. Theoretical calculations must be verified by measurement on a test range, with a large number of test runs necessary to confirm performance at frequencies across the transmit and receive bands, and at several polarizations.

Receive-only antennas in the smaller size range (3-4m) are predominantly prime-focus configuration types, which are not subject to the same sidelobe level problems that occur with Cassegrains, but have wider main beams. Dual-beam (and triple-beam) antennas use the prime focus configuration, but they may experience beam-to-beam interference problems at the closer satellite spacing. Manufacturers of these antennas are reassessing their designs, because considerable reluctance can be expected on the part of buyers to commit to antenna designs that might not meet performance requirements at satellite spacings of 3° or less.

Antenna buyers will have to exercise caution in this new market environment where antenna performance claims made by manufacturers can no longer be accepted as easily as in the past. Manufacturers will have a natural tendency to defend their product design and may also present performance data that might not be backed up by the thorough testing necessary.

The antenna industry has been a competitive but relatively stable industry over the past 10 years in terms of RF design and performance. With

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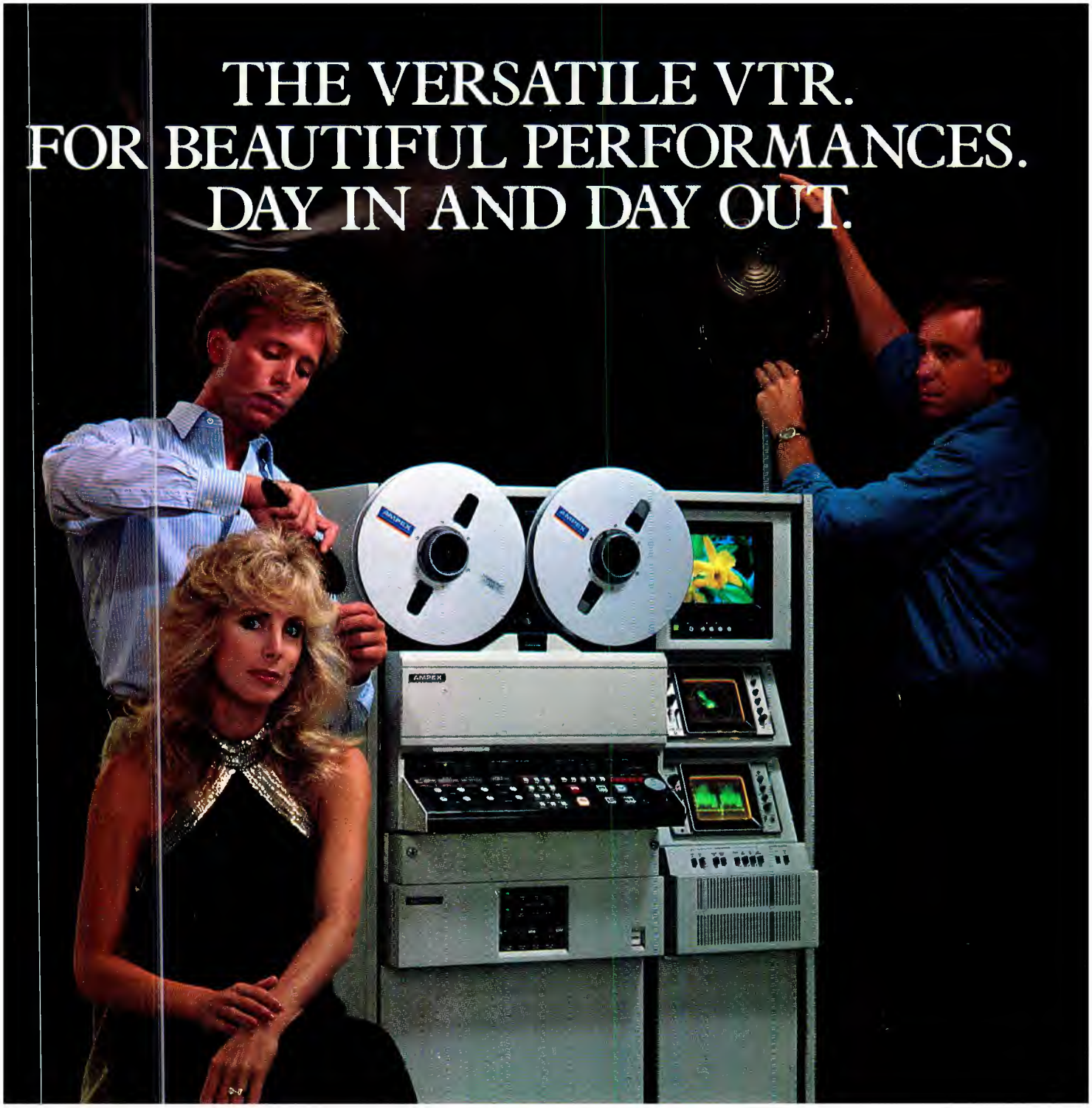

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the new specifications, the burden is placed on manufacturers to be as innovative and competitive in RF design as they have been in the past with mechanical designs. New antenna designs may emerge with much lower sidelobe levels, such as offset configurations where the reflector is designed to reflect RF energy to or from a feed located at the lower edge of the reflector on an extended arm. This type of configuration eliminates the primary energy scattering mechanism by taking the feed and its support arm out of the reflector's aperture area.

Editorial

Continued from page 10

Our recommendation to broadcasters is to maintain all records and logs as usual, with increased attention to details that will maintain the airing of quality signals. Chief engineers should thoroughly study FCC rules and standards and supervise the documentation of their stations' logs. Where needed, operators should be indoctrinated in the maintenance of accurate operations logs.

• **Use of less-qualified technical operators.** Special instructional programs are needed to help new recruits into the business, but the level of training needed depends on the staff. For some, this means training on the general functions of all equipment in the station, with special attention to indicators that pinpoint equipment that is not operating correctly. In any event, the station is responsible for seeing that its staff is adequately trained – a situation that must be faced squarely by each station.

• **Marketplace decisions.** From the beginning, we objected to the pitfalls of marketplace decisions as a *general approach* to solving broadcast problems. But the FCC has begun a headlong program to deregulate and to let the marketplace decide its fate. Because this is a fact of life, broadcasters must face it. It is time now for the industry to develop new techniques to implement marketplace decisions so that all phases of broadcasting can progress on an even keel.

We stand on the threshold of a new era in broadcasting. Never before has the industry itself been so much in charge of its own destiny. But, to thrive and advance in this dawning period of deregulation, we must take the initiative to guide our future. We must demonstrate the leadership required to provide the services, standards, programs and techniques for survival in an unregulated environment.

This is not a time to dawdle. We must take this leadership now and develop the momentum necessary to weather the storm of change. If we don't, other delivery sources stand ready to replace traditional broadcast service.

This is pioneering work, and there is still a long way to go. We must clear the underbrush and deadwood and nurture a new forest. With the right leadership it will be our forest, and it will be *user-friendly*.

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Circle (13) for information
Circle (14) for demonstration

news

World's first digital TV to be shown by ITT

The world's first production color TV sets using digital signal processing techniques, developed by ITT, were shown at the International Radio & Television Show in September in West Berlin.

In the new sets, seven Very Large Scale Integrated (VLSI) circuits designed and patented by ITT Semiconductors Worldwide, located at Freiburg in the Federal Republic of Germany, replace 300 conventional components.

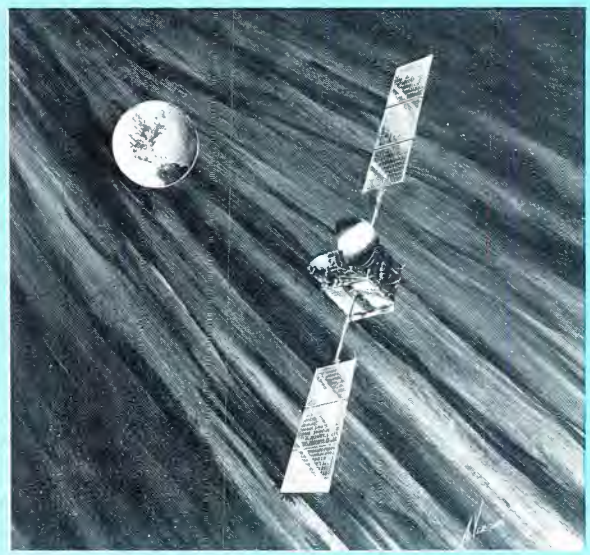
Picture and sound signals are processed in digital form in these TV sets, with immediate advantages in terms of long-term stability of picture quality; true hi-fi stereo sound; simplified inclusion of videotex; more accurate and easier service adjustments; and increased reliability.

The TV sets will be sold under the brand names of ITT and Graetz. They will be widely available through the company's national sales network this month, and will also be marketed from the outset in Austria, Switzerland and other European countries.

Last year, SEL produced 1.2 million color TV units, with stereo TV sets accounting for more than one-third of this output. The digital chassis will be installed first in the company's stereo models, and the company expects that within two years all of its stereo TV production will be the new type.

The space made available by the reduction in the component count has been used to incorporate an enhanced audio section, with improved sound reproduction from a new base-response system.

The patented VLSI circuits developed by ITT Semiconductors Worldwide will also be supplied to other TV manufacturers.



An artist's concept shows how an American Satellite Company (ASC) communications satellite will look in orbit over the equator. RCA Astro-Electronics is building the 3-satellite system under a contract of more than $100 million. The contract includes three dual-band (C-Band and Ku-Band) communications satellites, launch support and training of ASC personnel. Options for additional spacecraft also are included. The satellites are being designed for 10-year orbital life, with the first launch scheduled for September 1985.

Continued on page 20

World's most accommodating camera.

You'd expect the Ikegami HK-322 to make beautiful, crisp, color-true pictures. It does. You'd also expect it to offer the latest in computer set-up convenience with its third generation microprocessor control plus comprehensive operational automatics and 8 scene files and 8 lens files. It does that too. But what you might not expect, is just how incredibly flexible the HK-322 is.

Consider that you can specify 30mm or 25mm Plumbicons,* and for each size select standard, Anti Comet Tail or diode gun operation. The same holds true for cabling. You choose from triax, multicore or, if you'd like, specify an HK-322 version that's compatible with your existing TV 81 cable. You also have a choice of optional camera control configurations.

There are also some unique features such as trim files that compensate for differences between the internal pattern projector and the external scene caused by chromatic aberrations in the lens.

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Harris Studio Division.

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HARRIS

Continued from page 16

Satellite complex operating in Nigeria

A $20-million earth station and satellite communications center, located near Kaduna, Nigeria, is now in full operation. Briel Rhame Poynter & Houser (BRPH), Architects—Engineers, Melbourne, FL, under a subcontract from the Harris Corporation, designed the civil works for the communications complex.

The communications center, one of the world's most sophisticated, and Nigeria's second, consists of four buildings. The operations building contains all-electronic equipment; a power plant generates power for the entire project. The administration building houses managerial and engineering offices. A visitor's center contains models and displays to demonstrate satellite communications operations. The complex handles telex, telephone, TV and all other international communications. The earth station is one of Nigeria's primary links to the outside world.

The center is totally self-sufficient. In addition to the buildings, BRPH's design includes wells for the water supply, a waste treatment system and other facilities to make the system self-supporting.

A major problem in designing the complex was shielding sensitive electronics equipment from dust storms common to the area. The storms, originating as sandstorms in the Sahara desert, some 1000 miles away, carry wind-dust as fine as face powder. If not blocked from delicate equipment, the air-conditioning system and compressors, it can cause serious equipment malfunctions. The BRPH design sealed the buildings to keep dust out and provided filtered air, with additional means to seal all the equipment.

Benji breaks new ground

Benji, on CBS Saturday morning television, is breaking new ground in many areas. Joe Camp, Benji's creator and director, thinks that the show is making significant strides toward improving the quality of children's TV.

"The shows are full of old-fashioned emotions and old-fashioned values. Shows that will make us laugh and cry and come out feeling good," Camp said.

In other precedents, *Benji* is the first network dramatic show shot on location entirely on videotape. It is the first network TV show produced on the new Panasonic M Format ½-inch RECAM video system. It will be the only non-animated, live-action show on Saturday morning. The children's show is the first network TV series conceived and produced outside of Hollywood and New York. The show was conceived by Dallas' Mulberry Square Productions and is being produced in Dallas with a Dallas production crew and Dallas actors.

Bonneville networks first educational videoconference between US and USSR

In July, Bonneville Satellite Corporation networked the first direct 2-way interactive educational videoconference between the United States and the Soviet Union.

The 1-hour program, which used five separate domestic and international satellites to complete the 2-way interconnect, originated from the production studios of Gostel Radio in Moscow and the campus of the University of California at San Diego.

The program was educational, with films for children being its focus. Among the Americans participating in the discussion with the Soviets were actress Shelley Duvall and producer-director Robert Radnitz (*Sounder*). The Soviet group moderator was journalist Vladimir Pozner.

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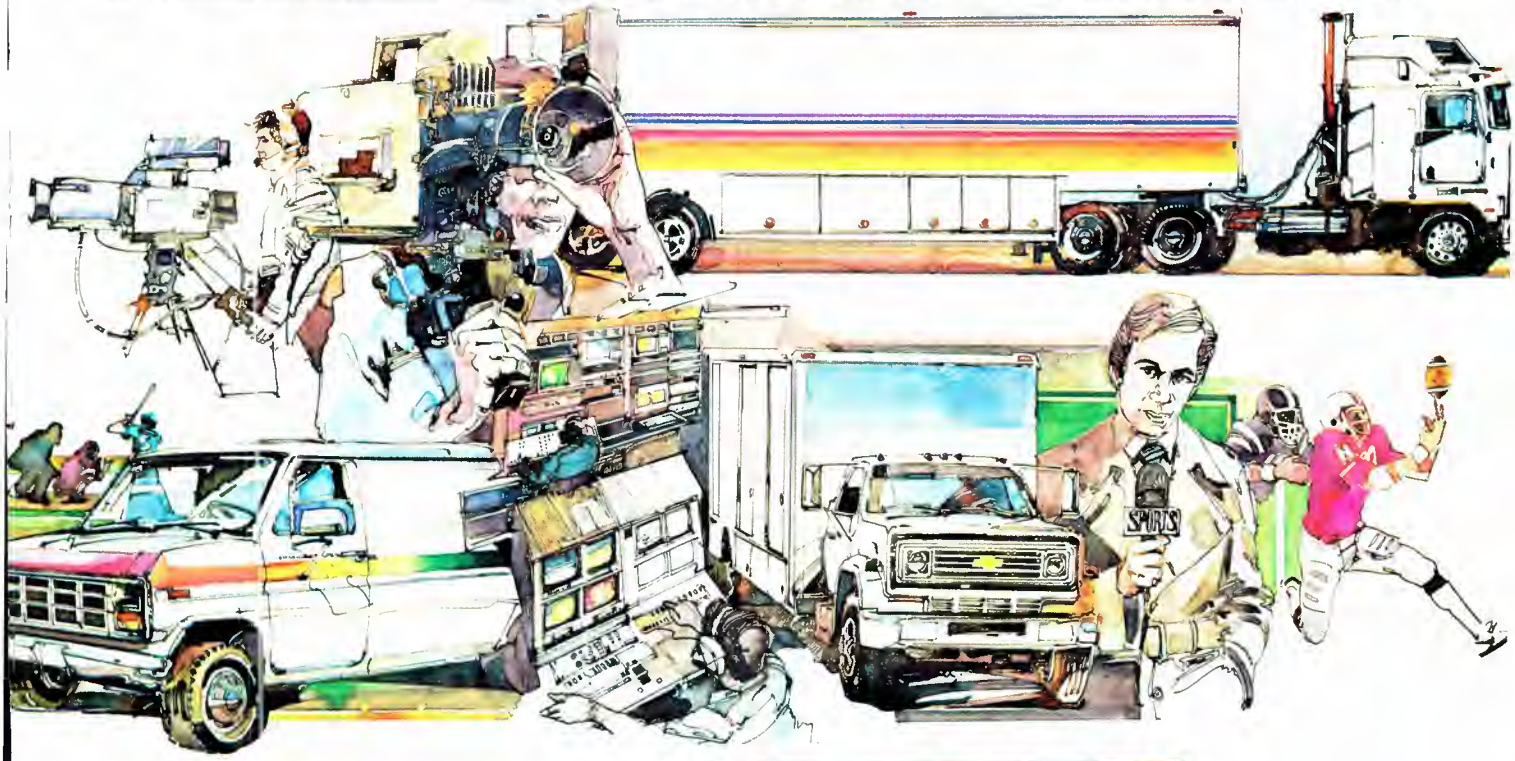

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Broadcasters' salaries:

A national survey

By Bill Rhodes, editorial director, and Carl Bentz, technical editor

Our fourth annual salary survey spotlights industry-wide salary levels, rates of salary increases and trends in fringe benefit packages. Because FCC deregulation has affected station technical requirements, we have continued to request data on the number of years spent in the present job, licenses held, part-time or freelance work undertaken, respondent's age and educational background. All data were requested separately for the radio and TV segments of broadcasting so that in each branch of broadcasting, trends could be pinpointed.

Our survey was again conducted scientifically under the direction of Kate Smith, market researcher, Intertec Publishing Corporation. In an accompanying sidebar, she explains the methodology followed and the statistical basis of this survey.

Tabular results

Complete details of this year's survey are compiled in three tables. Table I covers the management corporate staff; Table II, the engineering and technical staffs; and Table III, the operations staff.

Because this year's survey follows the same format as was used last year, the data for each year can be directly compared. You have to pull last year's report to do a comprehensive comparison, but Tables IV and V present tabular summaries of the salary data for 1982 and 1983, with radio and TV data compiled separately.

Note that the data report *median* salaries, values that may differ considerably from *average* salaries. The median salary is the midpoint for the group reported, with half the group above and half below that point. Thus, median values provide a better statistical representation of the overall data than would average values.

Salary levels

The salaries received for services rendered have remained the survey's key question. The level of direct compensation for each market can be seen by scanning the top rows of Tables I, II and III. The median salaries for the industry (radio and television combined) are as follows: management, $37,550 (up 10.7% over 1982); engineering and technical, $24,600 (down 2.7% over 1982); and operations, $21,300 (up 0.2% over 1982).

Several trends are evident across the industry, as may be seen by comparing the data in Tables I, II and III and by looking at our issue cover, where data for corporate management and engineering and technical management are plotted.

First, salaries for workers in television are significantly higher than for those in radio. Second, top corporate management staff salaries remain considerably higher than those for engineering and technical staffs and operations staffs. Third, there is a considerable range of salaries across both radio and TV broadcasting, when you look at the market served, with the larger markets paying higher salaries (with one exception). In Table I, note the management row for radio in the

TABLE I.—MANAGEMENT STAFF PROFILE*

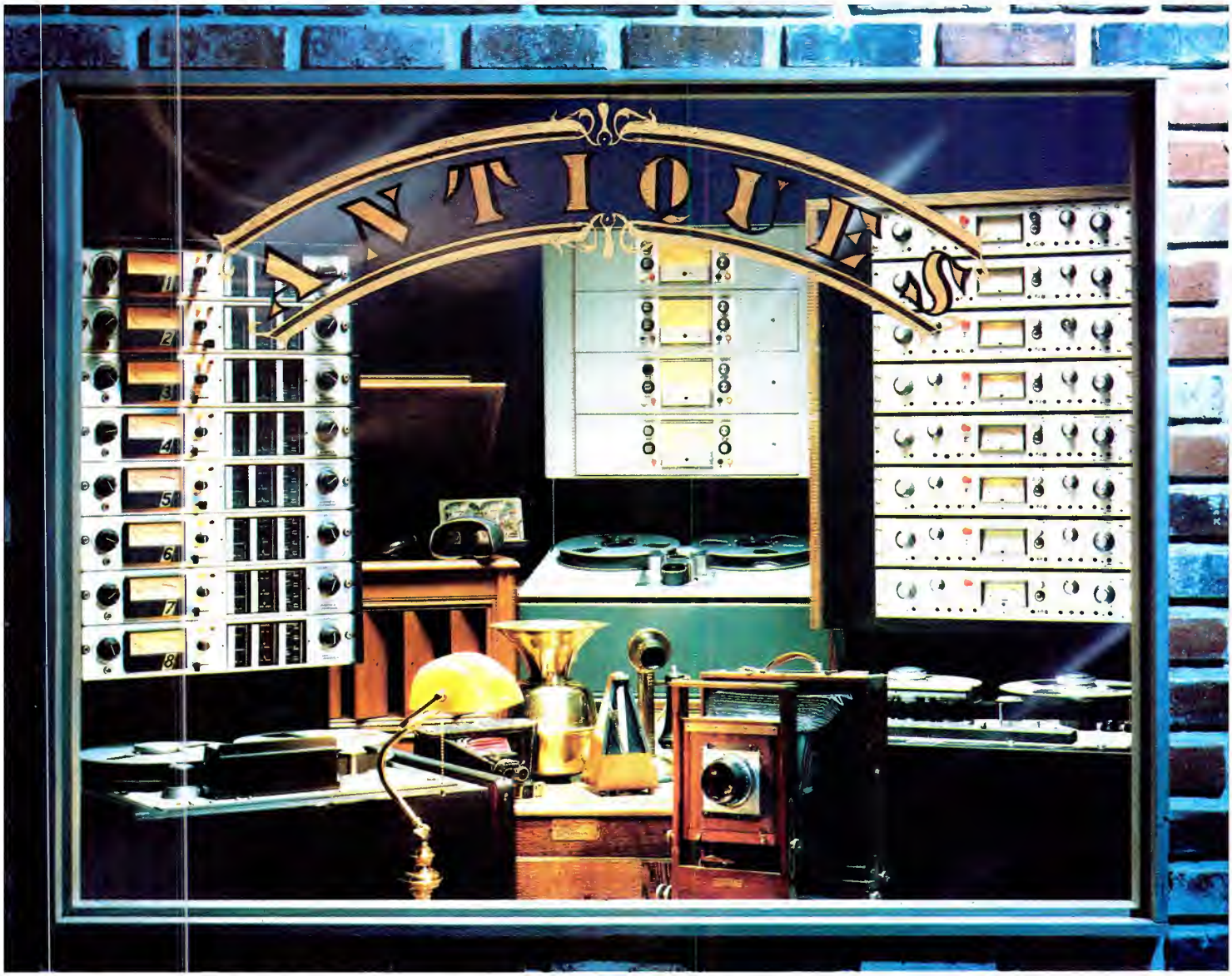
	TV + RADIO	TELEVISION				RADIO			
	Total %	All Markets %	Top 50 %	Top 100 %	Below Top 100 %	All Markets %	Top 50 %	Top 100 %	Below Top 100 %
Salary Level									
Less than $15,000	8.4	4.5	.....	7.1	6.8	11.1	16.7	5.3	10.9
$15,000 to $24,999	19.3	4.5	7.7	3.6	2.3	29.6	16.7	.....	37.1
$25,000 to $34,999	18.7	11.7	12.8	7.1	13.6	23.5	12.5	26.3	25.2
$35,000 to $49,999	16.5	18.0	10.3	17.9	25.0	15.4	20.7	26.3	12.6
$50,000 to $74,999	17.6	27.0	25.6	28.6	27.3	11.1	16.7	31.6	6.7
$75,000 or more	18.0	33.4	43.6	35.7	22.7	7.4	16.7	10.5	5.0
Not given	1.5	0.9	.....	.....	2.3	1.9	.....	.....	2.5
Median =	$37,550	$60,000	$68,750	$62,500	$51,000	$28,600	$38,000	$45,500	$25,300
Received Salary Increase During Past Year									
Percentage of increase	57.5	71.1	71.8	71.6	70.6	48.2	62.5	68.5	42.0
Less than 5%	3.3	3.6	5.1	3.6	2.3	3.1	.....	5.3	3.4
5% to 9%	21.6	27.0	15.4	42.9	27.3	17.9	25.0	31.6	14.3
10% to 14%	16.1	20.7	23.1	3.6	29.6	13.0	12.5	5.3	14.3
15% or more	10.6	16.2	23.1	17.9	9.1	6.8	12.5	10.5	5.0
Not given	5.9	3.6	5.1	3.6	2.3	7.4	12.5	15.8	5.0
Median =	10.3	10.8	12.8	8.6	10.8	9.9	10.0	8.4	10.3
Fringe Benefits									
Medical insurance (paid)	82.1	86.5	89.7	85.7	84.1	79.0	87.5	94.7	74.8
Dental insurance (paid)	24.5	31.5	51.3	21.4	20.5	19.8	45.8	31.6	12.6
Life insurance (paid)	71.4	78.4	76.9	82.1	77.3	66.7	79.2	79.0	62.2
Sick leave	70.7	84.7	82.1	82.1	88.6	61.1	79.2	68.4	56.3
Vacation	87.6	95.5	94.9	96.4	95.5	82.1	87.5	84.2	80.7
Stock purchase plan	15.4	24.3	35.9	14.3	20.5	9.3	16.7	21.1	5.9
Profit sharing plan	19.8	26.1	25.6	14.3	34.1	15.4	20.8	10.5	15.1
Savings plan	7.0	11.7	20.5	10.7	4.6	3.7	8.3	5.3	2.5
Pension plan	30.8	51.4	53.9	64.3	40.9	16.7	33.3	31.6	10.9
Bonus	45.4	55.9	53.9	46.4	63.6	38.3	45.8	42.1	36.1
Tuition refund plan	15.8	18.9	30.8	10.7	13.6	13.6	25.0	26.3	9.2
Automobile furnished	52.4	63.1	59.0	50.0	75.0	45.1	54.2	52.6	42.0
Years in Present Job									
1 or 2	23.1	27.1	30.7	28.5	22.7	20.4	12.5	26.3	21.0
3 or 4	17.6	14.4	15.4	17.9	11.4	19.8	25.0	26.3	17.7
5 to 9	21.5	20.7	23.1	7.1	27.2	22.3	16.7	31.6	21.8
10 to 14	13.6	14.4	10.3	25.0	11.4	13.0	16.7	.....	14.3
15 to 24	16.5	15.3	12.8	17.9	15.9	17.3	20.8	10.5	16.8
25 or more	7.3	8.1	7.7	3.6	11.4	6.8	8.3	5.3	7.6
Not given	0.4	.....	.....	.....	.....	0.6	.....	.....	0.8
Median =	7.1	7.1	5.9	7.5	7.9	7.2	8.8	4.8	7.5
Years in Broadcast Industry									
Less than 5	4.4	0.9	.....	.....	2.3	6.8	12.5	.....	6.7
5 to 9	11.7	10.8	18.0	10.7	4.6	12.4	.....	36.9	10.9
10 to 14	12.5	9.9	12.8	10.7	6.8	14.2	16.7	10.5	14.3
15 to 24	31.5	27.9	33.3	25.0	25.0	34.0	25.0	26.3	37.0
25 or more	39.5	50.5	35.9	53.6	61.3	32.0	45.8	26.3	30.3
Not given	0.4	.....	.....	.....	.....	0.6	.....	.....	0.8
Median =	21.2	25.2	19.7	25.9	28.6	19.3	20.0	15.5	20.0
Do Part-Time or Free-Lance Work	23.4	18.0	20.5	21.4	13.6	27.2	29.2	26.3	26.9
Licenses Held									
First Phone	31.5	22.5	28.2	17.9	20.5	37.7	45.8	21.1	38.7
SBE Certificate	8.4	4.5	2.6	7.1	4.6	11.1	12.5	10.5	10.9
Education									
High school	18.0	13.5	7.7	14.3	15.9	21.0	4.2	26.3	23.5
Two years of college	21.6	21.6	20.5	17.9	25.0	21.6	20.8	5.3	24.4
Four years of college	31.1	30.7	33.3	28.6	29.6	31.5	20.8	31.6	33.6
Post-graduate college	27.8	34.2	38.5	39.2	27.3	23.5	54.2	36.8	15.1
Voc/tech school	13.6	11.7	10.3	17.9	9.1	14.8	8.3	10.5	16.8
Not given	0.7	.....	.....	.....	.....	1.2	.....	.....	0.8
Age, Years									
Under 25	1.5	0.9	.....	.....	2.3	1.9	4.2	.....	1.7
25 to 34	18.3	11.7	23.1	7.1	4.6	22.8	16.7	36.8	21.9
35 to 44	30.4	26.1	25.6	25.0	27.3	33.3	41.6	31.6	31.8
45 to 54	19.4	24.3	20.5	28.6	25.0	16.1	4.2	15.8	18.5
55 or over	30.4	37.0	30.8	39.3	40.8	25.9	33.3	15.8	26.1
Not given	.....	.....	.....	.....	.....	.....	.....	.....	.....
Median =	44.9	49.6	45.6	51.3	51.4	42.6	42.0	39.2	43.3
Base =	273	111	39	28	44	162	24	19	119

*Management staff: president, owner, partner, vice president, general manager.

TABLE II. – ENGINEERING AND TECHNICAL STAFF PROFILE*

	TV + RADIO	TELEVISION				RADIO			
	Total %	All Markets %	Top 50 %	Top 100 %	Below Top 100 %	All Markets %	Top 50 %	Top 100 %	Below Top 100 %
Salary Level									
Less than $15,000	12.7	3.9	3.0	7.1	3.7	24.3	10.8	27.3	34.7
$15,000 to $24,999	38.3	37.5	26.1	52.4	53.7	39.8	23.1	45.5	52.0
$25,000 to $34,999	26.6	30.4	29.8	31.0	31.5	21.4	29.2	24.2	13.3
$35,000 to $49,999	17.4	20.9	28.4	9.5	11.1	12.7	33.8	.....	.....
$50,000 to $74,999	3.7	5.6	9.7	.....	.....	1.2	3.1	.....	.....
$75,000 or more	.3	.4	.8	.....	.....	.....	.....	.....	.....
Not given	1.0	1.3	2.2	.....	.....	.6	.....	3.0	.....
Median =	$24,600	$27,600	$31,600	$23,550	$23,000	$20,850	$30,500	$19,400	$17,500
Received Salary Increase During Past Year									
Percentage of Increase	73.0	78.4	83.7	66.6	74.2	65.9	86.2	57.6	52.0
Less than 5%	6.7	10.0	9.0	11.9	11.1	2.3	.....	3.0	4.0
5% to 9%	43.2	45.7	53.0	35.7	35.2	38.2	55.4	30.3	30.7
10% to 14%	10.7	10.9	10.5	9.5	13.0	12.1	9.2	18.2	8.0
15% or more	6.7	4.4	5.2	.....	5.6	9.8	15.4	.....	9.3
Not given	5.7	7.4	6.0	9.5	9.3	3.5	6.2	6.1	.....
Median =	8.1	7.8	7.8	7.4	8.1	8.8	9.5	8.8	8.6
Fringe Benefits									
Medical insurance (paid)	80.4	87.0	91.8	69.1	88.9	71.7	83.1	69.7	62.7
Dental insurance (paid)	35.7	41.7	50.8	26.2	31.5	27.8	43.1	18.2	18.7
Life insurance (paid)	59.1	64.8	70.9	42.9	66.7	51.5	67.7	51.5	37.3
Sick leave	79.4	92.6	93.3	88.1	94.4	61.9	81.5	54.6	48.0
Vacation	91.8	97.4	97.8	97.6	96.3	84.4	89.2	93.9	76.0
Stock purchase plan	19.6	24.8	36.6	14.3	3.7	12.7	26.2	9.1	2.7
Profit sharing plan	15.4	15.7	20.9	7.1	9.3	15.0	13.9	24.2	12.0
Savings plan	20.6	26.5	38.8	7.1	11.1	12.7	26.2	6.1	4.0
Pension plan	48.6	62.2	71.6	50.0	48.2	30.6	49.2	27.3	16.0
Bonus	14.6	13.5	13.4	16.7	11.1	16.2	18.5	18.2	13.3
Tuition refund plan	29.3	39.1	47.0	19.1	35.2	16.2	30.8	9.1	6.7
Automobile furnished	15.9	12.2	9.0	9.5	22.2	20.8	23.1	21.2	18.7
Years in Present Job									
1 or 2	25.3	25.3	23.1	26.2	29.6	25.3	27.8	27.3	22.7
3 or 4	18.6	20.0	20.9	14.3	22.2	16.8	15.4	27.3	13.3
5 to 9	21.8	20.4	23.9	14.3	16.7	23.7	24.6	18.2	25.4
10 to 14	13.7	13.0	12.7	11.9	14.8	14.5	9.2	18.2	17.3
15 to 24	10.9	9.6	7.5	11.9	13.0	12.7	16.9	6.0	12.0
25 or more	9.4	11.7	11.9	21.4	3.7	6.4	4.6	3.0	9.3
Not given	.3	.....	.....	.....	.....	.6	1.5	.....	.....
Median =	6.4	6.2	6.3	8.4	4.8	6.6	6.3	4.7	7.8
Years in Broadcast Industry									
Less than 5	8.7	9.1	9.0	9.5	9.3	5.2	1.5	12.1	12.0
5 to 9	17.4	18.7	17.9	14.3	24.1	18.5	16.9	15.2	14.7
10 to 14	16.9	14.4	17.9	9.5	9.3	20.2	18.5	21.2	21.3
15 to 24	25.0	22.6	20.9	28.6	22.2	28.3	35.4	33.3	20.0
25 or more	30.0	33.9	33.5	35.7	33.3	24.9	26.2	18.2	26.7
Not given	2.0	1.3	.8	2.4	1.8	2.9	1.5	.....	5.3
Median =	17.2	18.2	17.3	20.4	17.9	16.4	18.4	15.3	14.9
Do Part-Time or Free-Lance Work	46.2	37.0	29.9	38.1	53.7	58.4	55.4	60.6	60.0
Licenses Held									
First Phone	84.9	83.0	79.9	95.2	81.5	87.3	95.4	81.8	82.7
SBE Certificate	14.9	14.8	16.4	9.5	14.8	15.0	20.0	18.2	9.3
Education									
High school	26.8	24.4	17.9	33.3	33.3	30.1	27.7	33.3	30.7
Two years of college	35.0	36.5	35.8	35.7	38.9	33.0	36.9	36.4	28.0
Four years of college	25.1	24.4	29.9	14.3	18.5	26.0	27.7	21.2	26.7
Post-graduate college	6.2	7.0	9.7	4.8	1.9	5.2	3.1	3.0	8.0
Voc/tech school	42.9	46.5	41.0	66.7	44.4	38.2	36.9	36.4	40.0
Not given	.3	.....	.....	.....	.....	.6	.....	.....	1.3
Age, Years									
Under 25	5.5	3.9	4.5	4.8	1.9	7.5	4.6	12.1	8.0
25 to 34	30.0	31.8	32.8	23.8	35.1	27.8	26.2	39.5	24.0
35 to 44	26.1	23.0	23.9	28.6	16.7	30.0	32.3	30.3	28.0
45 to 54	17.6	20.0	16.4	21.4	27.8	14.5	16.9	6.0	16.0
55 or over	20.8	21.3	22.4	21.4	18.5	20.2	20.0	12.1	24.0
Not given	.....	.....	.....	.....	.....	.....	.....	.....	.....
Median =	40.6	41.2	40.3	42.5	42.8	41.8	41.0	34.6	41.4
Base =	403	230	134	42	54	173	65	33	75

*Engineering and technical staff: technical manager, chief engineer, engineer.



The TASCAM 58 puts the 1" 8-track in its place.

Everyone loves the oldies but goodies. Bell's phone and Granny's victrolla. And of course the 1" 8-track.

But all things must change. Touch-tone and stereo put the old crank phone and Victrola in their place. And now the new TASCAM 58 does the same to the 1" 8-track.

For the first time 1" high performance production capabilities have been squeezed into a compact ½" machine. Giving you truly professional sound at a fraction of the cost.

Built Smarter.

The TASCAM 58 assures you of outstanding sound through advanced electronics technology. You get fully servoed microprocessor control of take-up, capstan, and reel motors, for longer tape life and impeccable performance. No more wasted time from runaways, code hunts, or hand cueing.

Built Stronger.

The 58's ultra-rugged design is built to handle rapid high-torque tape shuttling, ensuring trouble-free operation even in the rigorous world of SMPTE editing. Our Omega Drive ensures superb tape path stability while providing the ultimate in tape to head contact. And the 58 is fully compatible with leading controllers and synchronizers. You get a high performance 8-track that's both +4dBm balanced and -10dBV unbalanced, with sync response equal to repro response. All this and a great deal more puts the TASCAM 58 in a unique place in the industry. For its price, performance, and compact versatility, isn't it time you put our 8-track in your place?

To find out more about the machine that, until now, couldn't be built, visit your TASCAM dealer. Or contact TASCAM Production Products, 7733 Telegraph Road, Montebello, CA 90640, (213) 726-0303.

TASCAM
TEAC Production Products

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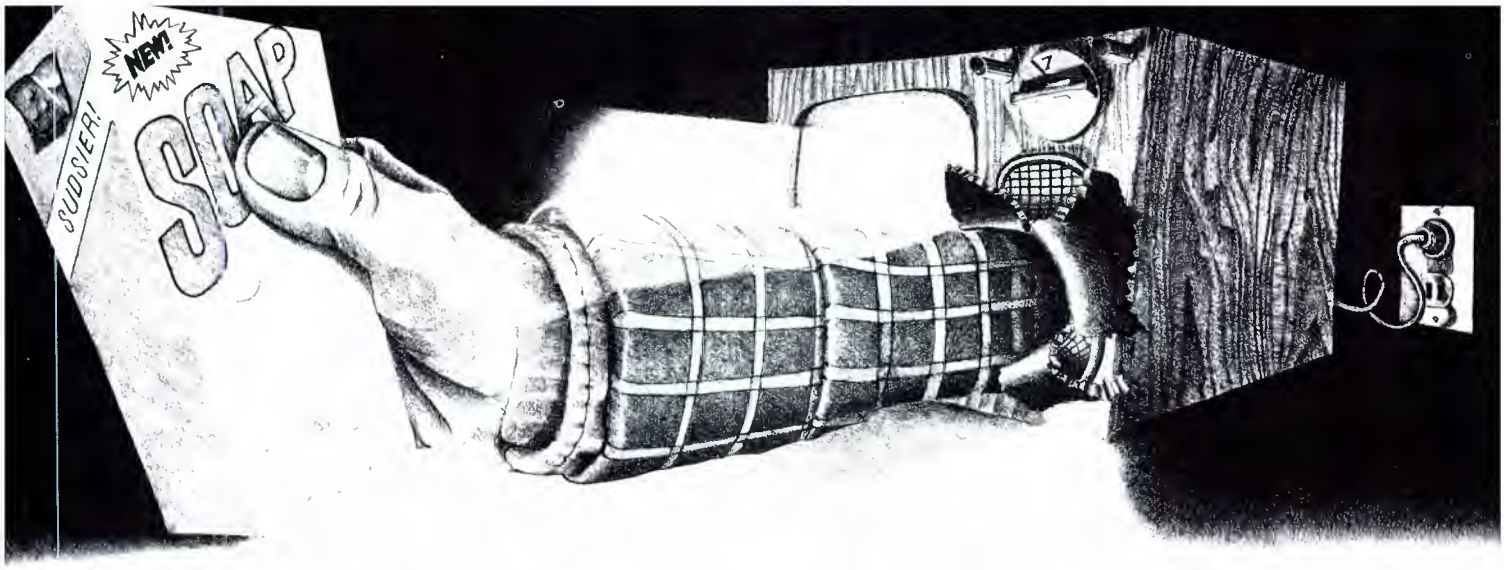
TABLE III – OPERATIONS STAFF PROFILE*

	TV + RADIO	TELEVISION				RADIO			
	Total %	All Markets %	Top 50 %	Top 100 %	Below Top 100 %	All Markets %	Top 50 %	Top 100 %	Below Top 100 %
Salary Level									
Less than $15,000	19.5	8.3	3.3	9.7	16.7	33.8	20.0	24.0	42.3
$15,000 to $24,999	45.0	42.7	35.5	48.4	52.0	48.0	43.4	68.0	43.6
$25,000 to $34,999	20.2	27.8	30.0	25.8	25.0	10.5	23.3	4.0	7.7
$35,000 to $49,999	12.3	17.6	25.6	12.9	6.3	5.3	10.0	.....	5.1
$50,000 to $74,999	2.0	3.0	5.6	.....	.....	0.8	3.3	.....	.....
$75,000 or more	0.3	.....	.....	.....	.....	0.8	.....	.....	1.3
Not given	0.6	0.6	.....	3.2	.....	0.8	.....	4.0	.....
Median =	$21,300	$24,750	$28,700	$23,350	$21,500	$17,350	$22,150	$17,758	$16,050
Received Salary Increase During Past Year									
Percentage of Increase	73.8	80.0	84.4	83.9	68.8	66.1	66.7	72.0	64.2
Less than 5%	10.9	10.1	11.1	12.9	6.3	12.0	6.7	20.0	11.5
5% to 9%	38.1	43.8	44.4	51.6	37.5	30.8	33.3	28.0	30.8
10% to 14%	15.2	16.6	18.9	12.9	14.6	13.5	16.7	20.0	10.3
15% or more	6.6	5.9	6.7	.....	8.3	7.5	3.3	4.0	10.3
Not given	3.0	3.6	3.3	6.5	2.1	2.3	6.7	.....	1.3
Median =	8.2	8.2	8.3	7.5	8.6	8.3	8.5	7.9	8.3
Fringe Benefits									
Medical insurance (paid)	80.1	85.8	86.7	87.1	83.3	72.9	80.0	76.0	69.2
Dental insurance (paid)	34.8	42.0	50.0	45.2	25.0	25.6	40.0	28.0	19.2
Life insurance (paid)	64.2	71.6	75.6	74.2	62.5	54.9	60.0	64.0	50.0
Sick leave	86.1	95.3	96.7	93.6	93.8	74.4	86.7	72.0	70.5
Vacation	97.4	100.0	100.0	100.0	100.0	94.0	93.3	96.0	93.6
Stock purchase plan	14.2	21.9	31.1	19.4	6.3	4.5	10.0	.....	3.9
Profit sharing plan	15.2	20.7	21.1	12.9	25.0	8.3	3.3	8.0	10.3
Savings plan	14.9	20.1	25.6	19.4	10.4	8.3	10.0	8.0	7.7
Pension plan	44.0	55.6	56.7	61.3	50.0	29.3	30.0	28.0	29.5
Bonus	19.5	17.8	24.4	3.2	14.6	21.8	10.0	8.0	30.8
Tuition refund plan	26.2	30.2	35.6	22.6	25.0	21.1	20.0	32.0	18.0
Automobile furnished	8.3	9.5	5.6	6.5	18.8	6.8	.....	12.0	7.7
Years in Present Job									
1 or 2	37.2	36.6	40.0	32.2	33.3	37.6	26.7	44.0	39.6
3 or 4	19.2	19.5	15.6	22.6	25.0	18.8	26.7	20.0	15.4
5 to 9	23.2	22.5	22.2	22.6	22.9	24.1	26.7	32.0	20.5
10 to 14	9.9	10.7	10.0	12.9	10.4	9.0	10.0	4.0	10.3
15 to 24	7.6	7.7	7.8	6.5	6.3	7.5	6.6	.....	10.3
25 or more	2.9	3.0	4.4	3.2	2.1	3.0	3.3	.....	3.9
Not given	.....	.....	.....	.....	.....	.....	.....	.....	.....
Median =	4.3	4.4	4.3	4.6	4.3	4.3	4.8	3.6	4.3
Years in Broadcast Industry									
Less than 5	11.3	10.1	6.7	12.9	14.6	12.8	16.7	12.0	.....
5 to 9	22.2	21.9	23.3	16.1	22.9	22.6	16.7	28.0	.....
10 to 14	28.4	27.1	27.8	32.3	22.9	30.0	30.0	32.0	.....
15 to 24	24.5	24.3	24.4	22.6	25.0	24.8	23.3	24.0	.....
25 or more	13.3	16.6	17.8	16.1	14.6	9.0	13.3	4.0	.....
Not given	0.8	.....	.....	.....	.....	0.8	.....	.....	.....
Median =	12.9	13.3	13.6	13.2	12.8	12.3	12.8	11.6	.....
Do Part-Time or Free-Lance Work	53.6	46.2	45.6	54.8	41.7	63.2	73.3	68.0	57.7
Licenses Held									
First Phone	20.8	17.2	17.8	12.9	18.8	25.6	20.0	20.0	29.5
SBE Certificate	8.3	3.0	1.1	9.7	8.3	15.0	13.3	16.0	15.4
Education									
High school	11.6	6.5	3.3	9.7	10.4	18.1	10.0	8.0	23.1
Two years of college	19.2	18.9	20.0	3.2	27.1	19.6	20.0	28.0	16.7
Four years of college	48.0	52.1	55.6	61.3	39.6	42.9	53.3	44.0	38.5
Post-graduate college	18.8	20.1	18.9	25.8	18.8	17.3	16.7	20.0	16.7
Voc/tech school	11.6	10.7	10.0	9.7	12.5	12.8	6.7	12.0	15.4
Not given	1.3	0.6	1.1	.....	.....	2.3	.....	.....	3.9
Age, Years									
Under 25	7.3	4.1	4.4	3.2	4.2	11.3	6.7	16.0	11.5
25 to 34	51.2	48.5	50.0	54.8	41.7	54.1	63.3	48.0	52.6
35 to 44	25.5	27.2	23.3	22.6	37.5	23.3	10.0	32.0	25.6
45 to 54	12.6	14.2	15.6	19.4	8.3	10.5	20.0	4.0	9.0
55 or over	3.1	5.3	5.6	.....	8.3	0.8	.....	.....	1.3
Not given	0.3	0.6	1.1	.....	.....	.....	.....	.....	.....
Median =	33.3	34.4	34.0	33.5	36.1	32.2	31.8	32.1	32.3
Base =	302	169	90	31	48	133	30	25	78

*Operations staff: operations manager, station manager, production/program manager.



Finally, commercial loudness is tamed.

Introducing the new, second-generation OPTIMOD-TV Model 8182A with built-in loudness controller.

Licensed from CBS Technology Center and incorporating the results of their latest research, the loudness controller automatically recognizes program material whose perceived loudness exceeds a certain threshold. It then quickly and indiscernably lowers the gain until the loudness is consistent with the rest of the program.

The result is smoother, more easily-listenable audio. Operator errors are corrected. Obnoxious commercials are tamed. Viewer complaints are eliminated.

Because some programs utilize loud sound-effects for dramatic impact, we've made the loudness controller circuit remote-controllable. You can defeat it during entertainment programs, and turn it on at other times—either manually or through your automation computer.

The new 8182A also incorporates our new Hilbert-Transform Clipper* to perform the peak limiting function. By using complex, real-time analog computation techniques to control the spectral distribution of the distortion products, our circuit dramatically reduces audible clipping distortion on voice—particularly from optical film sources. Yet music reproduction remains superbly clean and free from pumping and other forms of unnatural gain modulation.

Like its predecessor, the new Optimod-TV features exceptionally subtle multiband compression, with intelligent gating to prevent noise rush up. And stereo is supplied standard.

If you already own the Model 8180A, we can retrofit it with the new features quickly and at reasonable cost—your investment remains protected.

The new OPTIMOD-TV Model 8182A is the *complete* systems solution to TV audio processing problems. See your Orban broadcast products dealer for further information. Or, call us toll-free for more information.

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ORBAN PROCESSING KEEPS YOU COMPETITIVE

*Patent pending

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TABLE IV.—MEDIAN SALARY SUMMARY FOR 1982 AND 1983, TV

	1982 SURVEY				1983 SURVEY			
	All Markets	Top 50	Top 100	Below Top 100	All Markets	Top 50	Top 100	Below Top 100
Management	$52,000	$70,250	$62,500	$42,500	$60,000	$68,750	$62,500	$51,000
Engineering	$29,000	$31,800	$24,400	$23,000	$27,600	$31,600	$23,500	$23,000
Operations	$23,800	$27,900	$24,050	$18,250	$24,750	$28,700	$23,350	$21,500

TABLE V.—MEDIAN SALARY SUMMARY FOR 1982 AND 1983, RADIO

	1982 SURVEY				1983 SURVEY			
	All Markets	Top 50	Top 100	Below Top 100	All Markets	Top 50	Top 100	Below Top 100
Management	$26,900	$46,250	$27,000	$24,600	$28,600	$38,000	$45,500	$25,300
Engineering	$20,700	$27,900	$19,500	$16,250	$20,850	$30,500	$19,400	$17,500
Operations	$18,650	$25,000	$18,750	$17,150	$17,350	$22,150	$17,750	$16,050

TABLE VI.—MEDIAN SALARIES ACROSS ALL MARKETS

	TELEVISION			RADIO		
	1981	1982	1983	1981	1982	1983
Managers	$47,150	$52,000	$60,000	$25,800	$26,900	$28,600
Engineering	$25,800	$29,000	$27,600	$19,900	$20,700	$20,850
Operations	$25,650	$23,800	$24,750	$19,100	$18,650	$17,350

TABLE VII.—MEDIAN VALUE PROFILE OF BROADCASTERS (Radio and TV Combined)

	MANAGEMENT		ENGINEERING		OPERATIONS	
	1982	1983	1982	1983	1982	1983
Salary Level	$33,900	$37,550	$25,300	$24,600	$21,500	$21,300
Received Salary Increase	54.6%	57.5%	79.8%	73.0%	74.9%	73.8%
Amount of Increase	12.3%	10.3%	8.7%	8.1%	10.2%	8.2%
Years in Present Job	7.2	7.1	7.8	6.4	3.5	4.3
Years in Broadcasting	21.4	21.2	18.3	17.2	13.0	12.9
Does Free-Lance Work	25.2%	23.4%	48.2%	46.2%	51.7%	53.6%
College, ≥2 years	83.3%	80.5%	63.1%	66.3%	84.5%	86.0%
Age, Years	44.3	44.9	41.7	40.6	33.6	33.3

Top 50 and Top 100 markets. The median salaries for these two markets are reversed from what would be expected, and differ considerably from the 1982 results shown in Table V.

The explanation for this anomaly lies in the response rate and the way that median values are computed. Note that in the top 100 market, a higher percentage of questionnaire respondents were in upper salary brackets. For the top 50 market, respondents were fairly evenly spread out over the salary range listed.

In last year's report, which had a somewhat better response rate from the radio industry, the data showed the top 50 market paying a higher median salary level, as normally expected. In part, the skewing of the data in the 1983 survey results from the moderately low response rate to our mailing from the radio industry this year.

Another compilation of salary survey results is shown in Table VI, for the years 1981-1983. (Data for 1980 are not included because a different analysis method was used that year.) As can be seen in Table VI, salaries for managers have edged upwards; those for engineers have remained relatively stable; and those for the operations staffs have edged downward.

The downward trend in operations, first noted in last year's report, is especially interesting because all markets are reporting salary increases. These increases ranged from 8.5% to 12.5% for 1982 and 8.1% to 10.3% for 1983. With these steady increases being reported, the trends shown in Table VI become more difficult to explain.

To shed some light on all these trends, we summarized the median data for the 1982 and 1983 surveys in Table VII. In effect, Table VII provides a median profile of broadcasters at three levels of station management, with data smoothed out across all markets in radio and television. Several points are noteworthy:

- Salary levels of managers remain consistently higher than for engineering and operations staff members.
- Fewer managers received raises both years, but those that did received higher raises than did engineers or operators.

The broadcast microphone with hidden talents for all your talent. The SM7.

To help broadcast engineers contend with a wide variety of voices, the Shure SM7 is really four microphones rolled into one. That's because the SM7 Unidirectional Dynamic Microphone features two frequency-tailoring switches that provide a choice of four different response curves—to best suit each individual voice and situation.

Depending on the switch settings, the SM7 can provide an extremely wide-range flat frequency response, add presence and crispness to speech, boost vocal clarity, roll off low frequencies to provide natural closeup miking, or help reduce sibilance.

At the same time, a tight cardioid pattern effectively rejects unwanted background noise and minimizes off-axis coloration.

Beneath the SM7's integral foam windscreen is a rugged steel cage that surrounds and protects the cartridge from damage. And Shure's patented air suspension shock mount offers uncompromising isolation, cutting down on the effects of mechanical vibration in the studio.

Engineers will also appreciate the built-in humbucking coil that guards the SM7 against electro-magnetic interference.

With so many talents, it's no wonder the SM7 is following in the successful footsteps of Shure's legendary SM5. And that's quite an act to follow.

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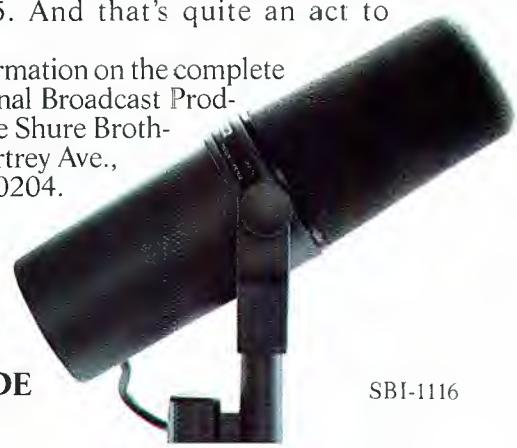

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• The operations staffs have been in their present positions and in the industry for the shortest time of all three groups. Also, operations is the youngest group, has the highest percentage reporting college education of two or more years, and does the most free-lance work.

• Managers consistently win the award for longevity on the job and in broadcasting. This could explain their higher levels of pay and raises, because stations compensate them for their added years of service and experience. Managers also do the least amount of free-lancing, indicating that they have adequate income or are too busy to take on added tasks.

Fringe benefits

A key question in this survey has been broadcasters' fringe benefit packages. A wide range of benefit packages was reported, with managers receiving most of these add-ons.

Special attention should be given to the *pension plans, bonuses* and *furnished automobiles* categories. The data for these categories, nearly identical for 1982 and 1983, follow:

• For pension plans, managers trail significantly.

• For bonuses, managers lead the way, with 45.4% receiving them in 1983, compared to 14.6% for engineers and 19.5% for operations people.

• In terms of furnished automobiles, there is an even larger gap: 52.4% for managers; 15.9% for engineers; and 8.3% for operators.

Thus, it is clear that upfront, immediate fringe benefits such as bonuses and furnished automobiles are used to entice, keep and compensate skilled managers in broadcasting. But, in to two other areas—*pension plans* and *tuition refunds*—engineers and operators enjoy superior benefits over managers. These long-term, growth incentives provide job stability and enhance skills at these key positions in broadcast stations.

Final notes

One of the most interesting parts of our annual survey form is the write-in section. We have included selected entries from this year's survey in an accompanying sidebar.

Plans are already under way for next year's salary survey. If you would like to see something added to our coverage, let us know. We will consider adding data that would make the survey more informative and helpful.

Editor's note:
For your reference, last year's survey appeared in our October 1982 issue, pages 26-44.

BE salary survey methodology

By Kate Smith, market researcher

This study was designed to enable readers to compare their job compensation packages with those of their colleagues in similar jobs within comparably sized markets. Separate graphics illustrate returns for television and radio, showing job title (management, production and engineering) and market size (top 50, top 100 and below top 100 markets). They also report broadcast category, length of time in broadcasting, salary levels, fringe benefits, salary increases in the past year and other factors.

On July 18, 1983, 3170 questionnaires were mailed to recipients of **Broadcast Engineering** on an "nth" name basis. On Aug. 15, 1983, the cut-off date for this report, 978 (31%) questionnaires had been returned. The data in this article are based on those responses.

Summaries of the data are presented in terms of the *median* value for each survey category. A median represents the midpoint. In the case of salaries, half of the people make more than the median salary and half make less.

"I'm glad we had Perrott Silver 110s the last time we went to war."

—Bernie Nudelman
Video News, Inc.
Miami, Florida

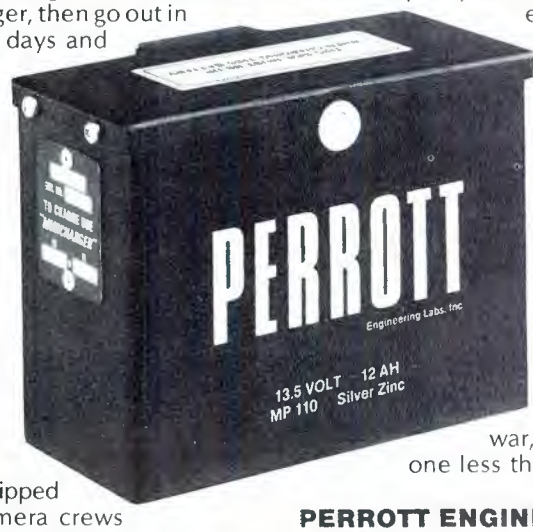
ideo producer Bernie Nudelman and ameraman Steve Born have spent the etter part of the last four years covering ie battlefields of Latin America—with a amera, a recorder and two Perrott MP-10 batteries.

"Nicaragua. El Salvador. Honduras. uatemala. They're all routine assign-ents to us," explains Steve. "And when e networks hire us to cover these hot ıots, they expect us to come back with e story every time. That's why we use e MP-110s. They're the most reliable atteries we've ever worked with."

"And that's why we took only two MP-110s with us to cover the war in the Faulklands," adds Bernie. "We'd charge them both up overnight on the Perrott PE-100 dual charger, then go out in the field for two days and leave the charger behind. We did this for six weeks straight—all over Chili, Argentina and Uruguay. And the MP-110s came through every time—even in 30° below temperatures off Antarctica. You can't beat that."

With that kind of record, it's no wonder Video News, Inc. has equipped all four of its camera crews with Perrott MP-110 batteries. And no wonder the Perrott MP-110 silver zinc on camera battery is the high performance choice with news teams throughout the country.

After all, the Perrott MP-110 has the highest capacity of any on camera battery—three times the running time of Nicads*. This top-of-the-line favorite fits in your hand and weighs only 4.5 pounds.



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Survey respondents' comments

Introduction by Bill Rhodes, editorial director

Excerpts of write-in comments from this year's survey paint a broad picture of the broadcast industry. Outlooks range from delight to gloom; future prospects range from bright to dim; and there is considerable concern about signal quality degradation as the FCC continues deregulating the industry.

• We will have been broadcasting two years, and our class A station has been quality from day one. But, as a new FM stereo station, with the slow economy, our problem has been lack of sales. However, the opportunity is there and we're going for it!

• I don't think radio has used its imagination enough. Formats are generally staid and boring. AM problems have just begun to bring about some creative formats. Smart broadcasters are beginning to make full use of modern technology. If we don't make use of it, we'll be left behind by television, cable and other media.

• As new services (LPTV, DBS, etc.) develop to erode TV audiences, radio will look better to buyers, despite Docket 80-90. The last half of the '80s will be great.

• Engineering, thanks mainly to the FCC and NAB, is going downhill quickly. The smart ones have already gotten out.

• With the increase of satellite communications, some jobs, such as announcer, production manager and some engineering staffs, will decrease, as groups will centralize operations around their flagship stations. Automation will increase.

• Opportunities are diverse and numerous, largely due to computer technology, satellites, ENG and general industry growth. I am always amazed and humbled when I remember there were just 900 stations at the end of World War II. Now there are more than 8000.

• Opportunities are limitless, but we are plagued by too many apathetic attitudes in management positions. Behind every success in the industry is a guy who had a good idea and wasn't afraid to try something different.

• Familiar only with my own situation, compensation is insufficient, considering I pay for my own long distance calls, gas, tapes, batteries, tape recorder, etc. With too much deregulation already, stations are now starting to pull the stops in what they can do as far as commercial loads, public service requirements, etc. I work some with NPR stations, and while they are threatened by defunding and the weakening links between them, it is an opportunity for generating better local programming.

• Automation trends belie the need for qualified personnel to be in attendance. Quite the contrary is true. We are allowing automation and state-of-the-art to dictate decisions we should be making.

• There is a push to promote female employees, as decreed by the FCC ruling. The problem is that unqualified female employees advance as overqualified males remain stagnant in low paying positions.

• At 31, I can see there used to be a professional quality in small markets. I wonder if the lack of money for the guy that prefers Butte to Detroit has that much to do with it.

• Management sacrifices technical quality for cost-cutting by hiring less than technically qualified persons into engineering positions. If you don't know what happens inside the machine when you push the button, then you have no business pushing the button. The hiring practice has resulted in stations' failures to maintain technical standards. Many engineers today don't even know what horizontal blanking is, much less how to measure it. The commission is partly responsible, by reduction of licensing requirements and lax enforcement of regulations. But when I asked SBE for its official position on this trend, its attitude was one of indifference.

• Keeping up technically is a never-ending battle, especially if you're the only engineer at the station. Also, if you enjoy your work, a little less pay isn't too bad. Great technical advances in the coming years are obvious, and I hope to be a part of it.

• Managers believe bandaid servicing is cost-effective over buying new equipment. When the equipment dies, though, it's panic time. Also, there are few real training (hands-on) engineering opportunities in broadcasting.

• Education is lacking in the basics of broadcasting. Running an automation system is not all there is to broadcasting. The opportunities are good for those with drive and wide abilities.

• With deregulation, especially in radio, there is a definite backward step in operation, maintenance and employment. There is no future in this business. Even the unions cannot hold the business together.

• Four-year EE degree holders can't follow a manufacturer's tuneup/alignment procedure or follow through an audio proof without help.

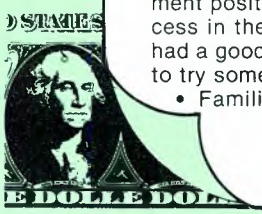
• Modern TV transmitters and equipment require more expertise to keep them in top shape than did previous models.

• Technical deregulation has degraded the overall air signal quality. In programming, deregulation has started a production boom, which seems positive to me. The new diversity of program sources is great.

• Secondary education does not prepare individuals properly for work in the industry. The industry should support programs that produce well-trained graduates. The present glut of half-trained, half-literate graduates helps no one.

• The biggest problem is the lack of technical-minded people in the operations area. Although 80% of our people are college graduates, they have a 9-to-5 attitude, with an energy button that will only be pushed if they see an opportunity for themselves, rather than for their station or co-workers.

• Trends are upward. The problems will always be with us, but they masquerade as opportunities. There's never been a better time for people who can recognize the problems and the opportunities to enter this business. It is a winning business... meant for winners.



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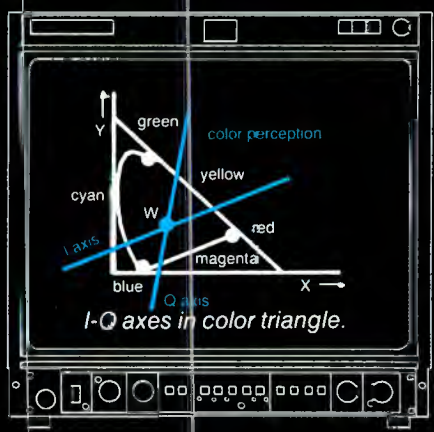

I-Q axes in color triangle.

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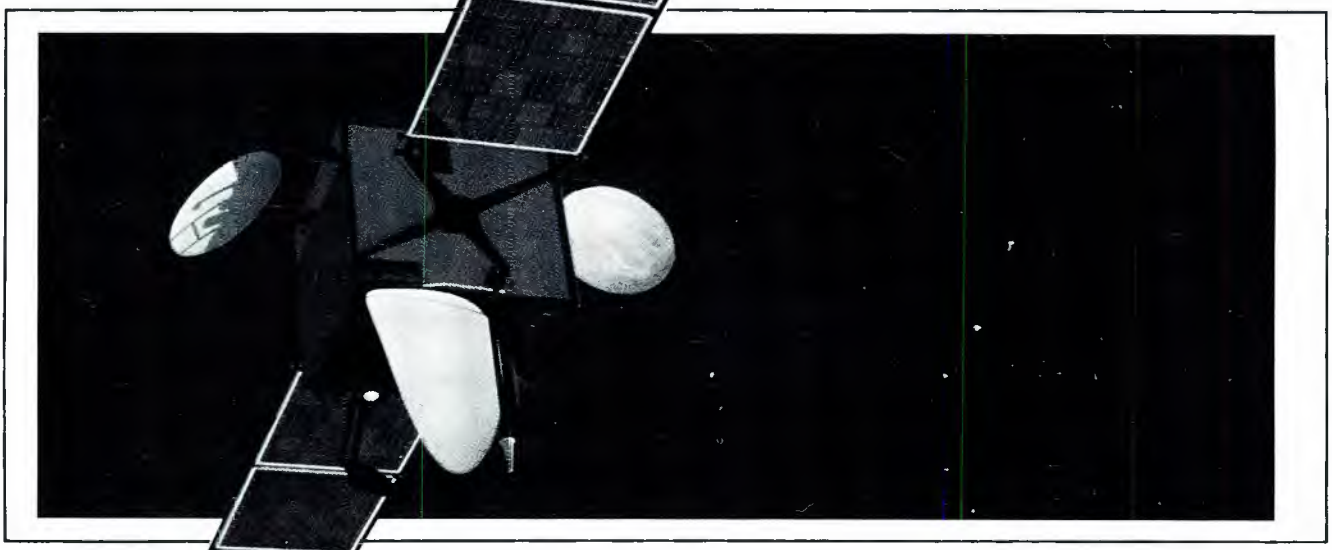
UNISAT:

DBS plans for the United Kingdom

By the staff of Marconi Space & Defence Systems, Portsmouth, England



UNISAT 1

Direct broadcast satellites (DBS) have been a discussion topic at many technical seminars in the past several years. In the United States, Japan and Europe, plans toward implementing DBS broadcasts have progressed. The United Kingdom's plans for a DBS service are discussed here.

Background

In 1977, when technical feasibility of DBS transmissions was recognized, a World Broadcasting-Satellite Administration Radio Conference was held to organize systems and allocate frequencies so that interference would be reduced as much as possible. At the conference, the United Kingdom was allocated a geostationary satellite position at 31° west longitude and five TV transmission channels. Each channel would provide a signal with high enough quality for reception over the whole United Kingdom. Although it was not intended that UK satellites should broadcast to other countries or other countries to the United Kingdom, the oval shape of the transmitted beam will produce some inevitable spillover. For example, high quality reception of signals will be possible in Eastern Eire and Normandy.

In 1981 British Telecom, British Aerospace and Marconi jointly formed a company called UNISAT. UNISAT's purpose is to construct the broadcasting spacecraft and launch it into the correct place in the sky. Transponders will be sold or leased to the appropriate broadcasting body. This body will then beam the program signals up to the spacecraft from an uplink antenna site on the ground. Because the satellite would focus the program signals back onto the entire United Kingdom, unlike the slow coverage by the ground repeater stations used now, 99% of the UK population would be able to receive the new channels immediately with appropriate reception equipment.

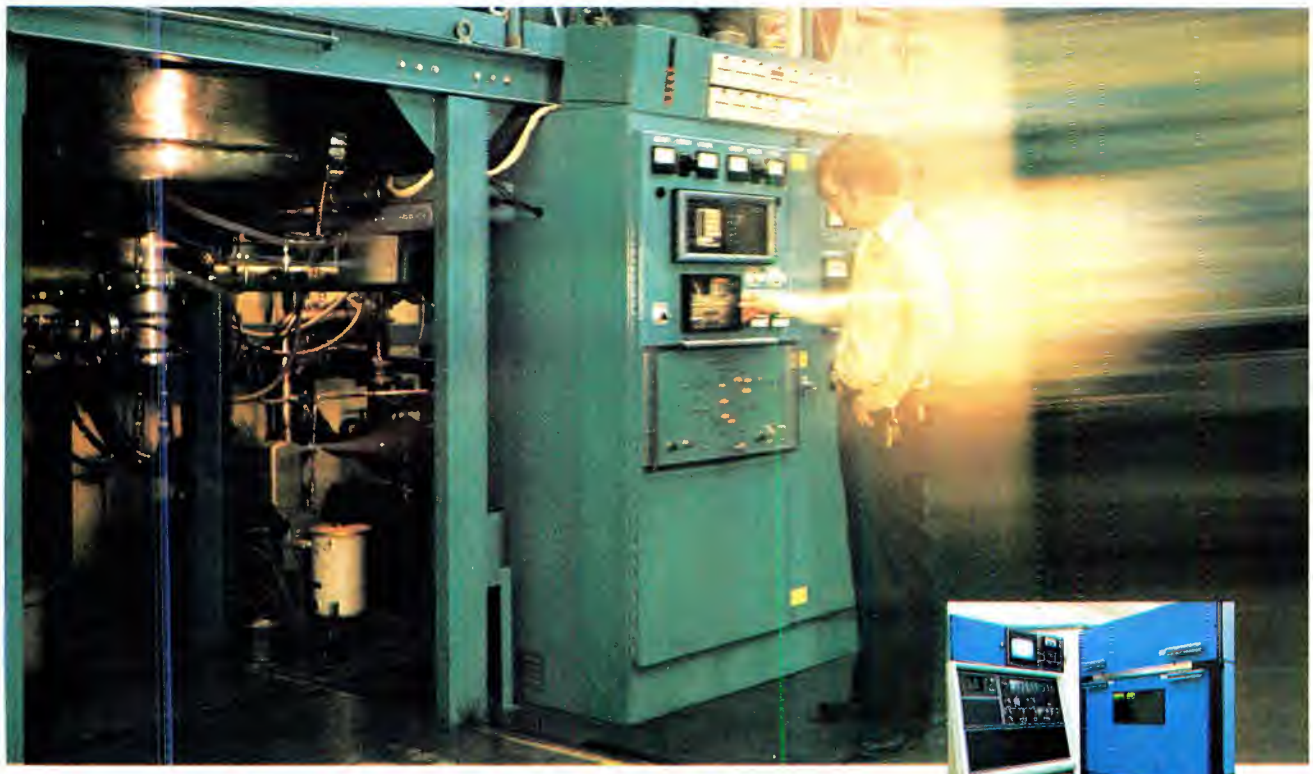
Late in 1982 the BBC obtained government approval to broadcast two new TV channels from satellite. After discussion with UNISAT, the design of the first spacecraft began early this year. The communications and TV repeater package on the spacecraft will be designed and built by Marconi Space and Defence Systems.

The system

The BBC now has proposed two new national TV services: DBS 1 and DBS 2, to be carried on UNISAT 1. DBS 1 will be a national subscription service showing first-run feature films and special BBC productions, with special arts and extended sports features. DBS 2 will be a national public service showing a varied diet of the best programs drawn from BBC1 and BBC2 and from sources around the world. Both channels will offer high quality, stereophonic sound and support additional high quality sound channels for radio and new data services. Teletext will be available with the DBS television.

DBS 1 will be financed by subscription. Several subscribing methods are being considered. The signal arriving at the antenna will require a converter to alter it from the satellite signal to

Continued on page 38



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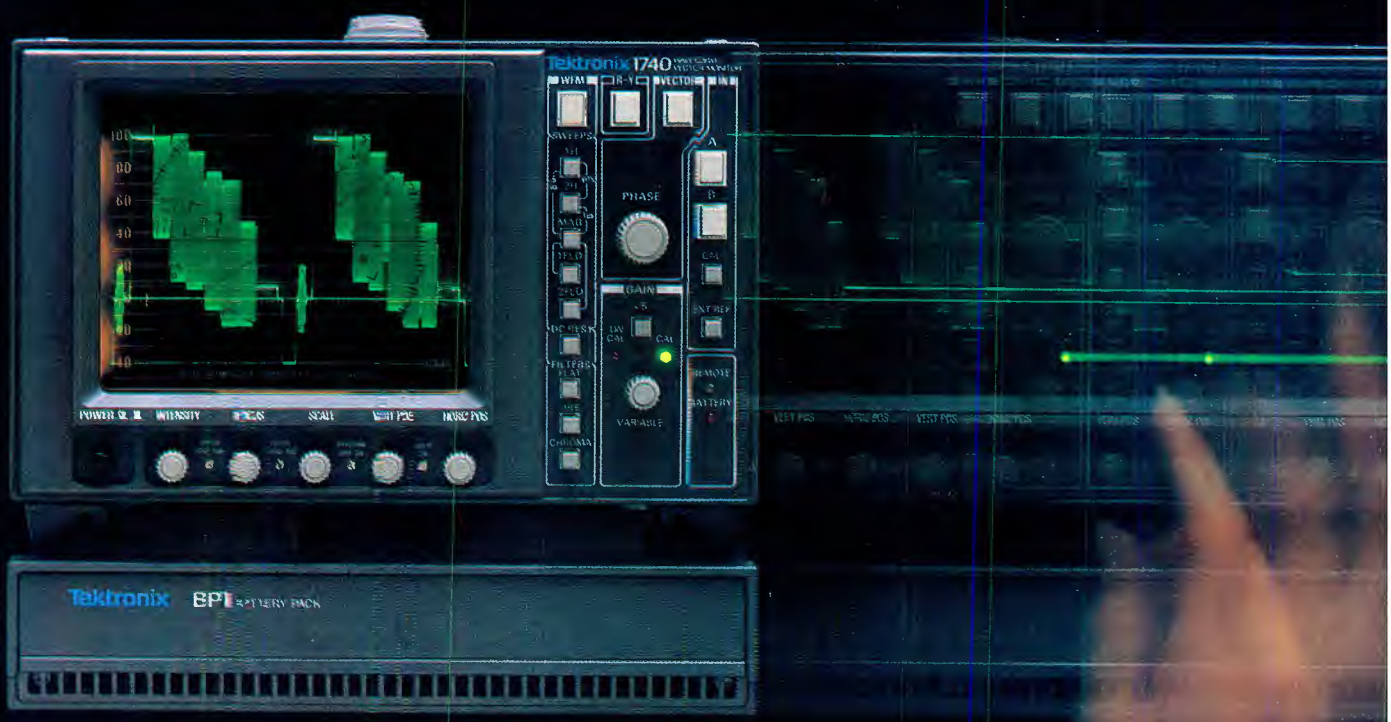

The model above is pictured with the optional battery pack.

Tektronix introduces a new product to help improve your signal quality. The 1740 series portable waveform/vector monitor.

We know that in-studio or out-of-remote, space is critical. And the smaller the equipment is, the better. So we've combined our waveform and vector monitoring functions, and integrated them into one compact, go-anywhere package.

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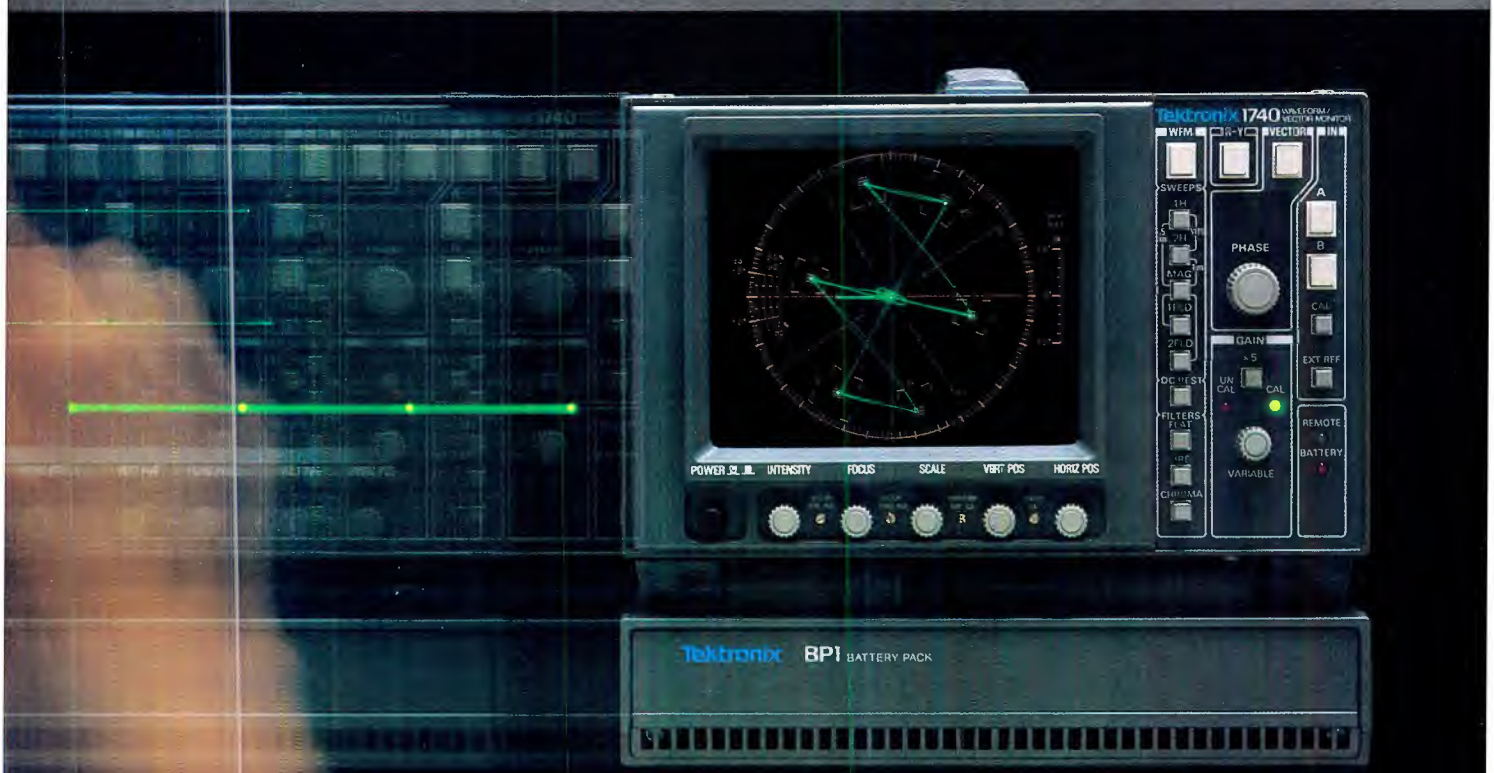

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Using one monitor where two were needed before lowers your equipment costs. And because the 1740 series is completely portable, it makes a sensible purchase for either studio or field use.

And there's more. The 1740 series operates on only 50 watts of power. And that means less heat build-up (which is important in crowded equipment racks).

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Continued from page 34

one suitable for the TV set. The converter can be in a small box near the aerial cable outlet, and if the signal is scrambled, would require a descrambler in the unit. Subscription could be by a coin-in-the-slot method to make the descrambler work or by an essential part (for example, a magnetic card) obtained when the subscription is paid. In this second method, the scrambling code would be altered from time to time. An alternative system more likely to be used with a future IBA DBS service is for reception to be by common antenna with distribution by CATV, as is widely used in the United States.

Technical details

Transmitters aboard UNISAT 1 have been deliberately designed to make reception equipment simple and, therefore, low cost. The receiving antenna will be a parabolic reflector about 24 inches across, pointed at the spacecraft, which will be in a southwest direction with an elevation of about 24° south and azimuth of about 35° west. The exact angles will vary across the United Kingdom. The antenna will have to be installed more carefully than the present aerials. The 2° to 3° beamwidth requires highly accurate pointing and a stable mount. An inclinometer and prismatic compass sighted across the edge of the reflector will be accurate enough to get the angle nearly right. Then slight adjustment may be made to achieve the best picture quality. This antenna may be mounted on a house wall if a clear view of the satellite is possible.

TV signals uplinked to UNISAT 1 will be transmitted between 17.3-17.7GHz. In the spacecraft, they will be downconverted to the 11.7-12.1GHz band and multiplexed into four separate channels, each approximately 50MHz wide. Using two-from-four redundancy, two of these channels will be transmitted with a total power of 240W.

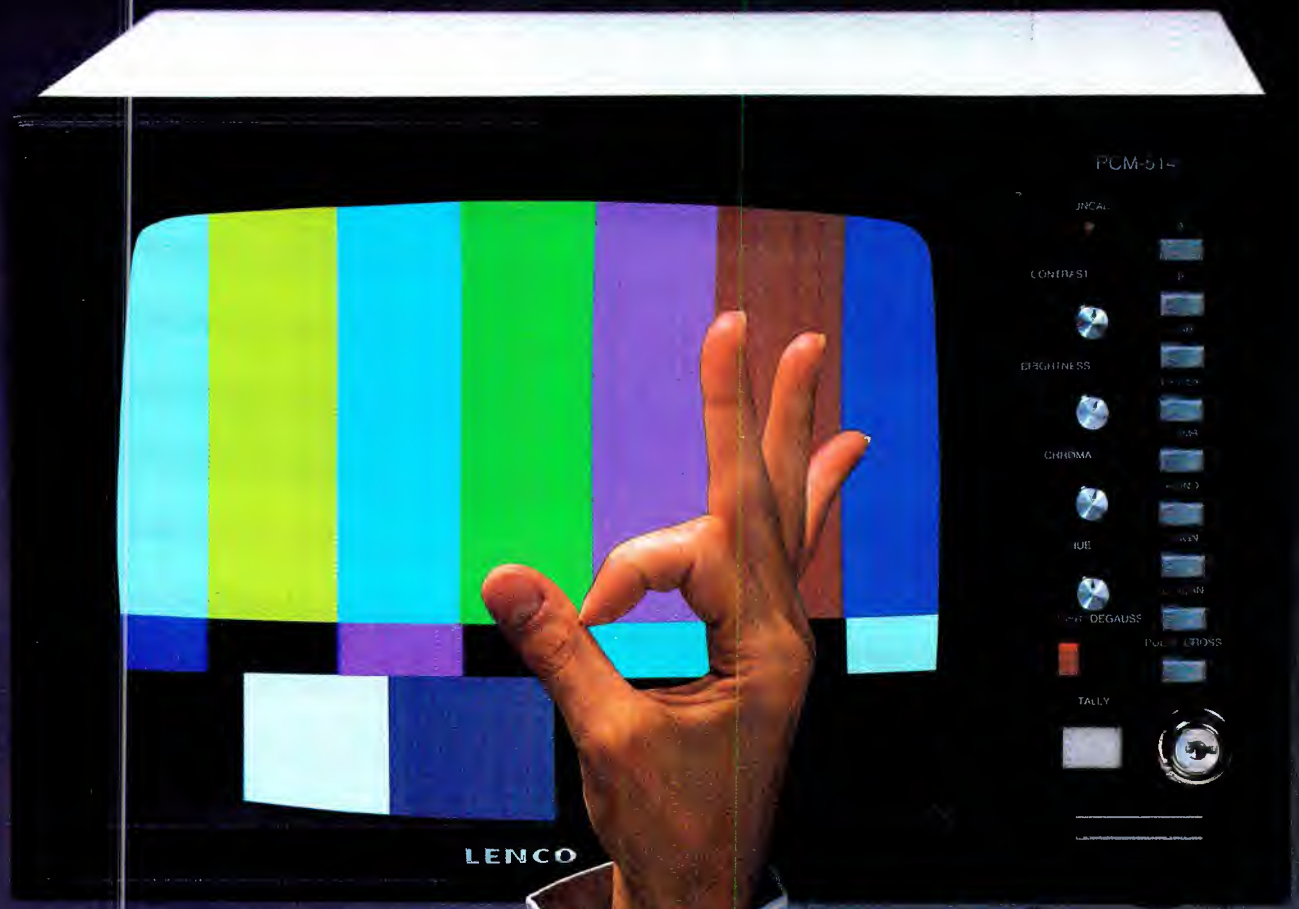
The United Kingdom has adopted a new coding and modulation standard for DBS based on the technically superior 625-line, 50 field/s multiplexed analog components (C-MAC) video system developed by IBA. The EBU has tried to have C-MAC adopted as a common standard throughout Europe, but no agreement has yet been reached.

The C-MAC system differs from the conventional PAL I systems, used in the United Kingdom at present, in using time division rather than frequency division multiplexing to combine its constituents. Analog color components and video signals are time compressed and multiplexed with a digital signal burst in each TV line. Time compression factors of 3:2 for luminance and 3:1 for color difference signals give a baseband spectrum extending to 8.4MHz for 5.6MHz luminance bandwidth. Two color difference signals are transmitted on alternate lines with a bandwidth limited to about 1.6MHz, but are allowed a larger peak excursion than for luminance to obtain the best compromise among color resolution, distortion and noise. The digital signal burst contains system synchronization information and a reassignable digital multiplex scheme to accommodate eight high quality digital sound channels and additional data services. A small part of the data channel is reserved for service identification information. Intelligent receivers will read the service identification information to enable the desired service to be selected and decoded.

The satellite

The basic characteristics of the UNISAT 1 have been determined. Externally, it is a 2m cube with two 5-section solar panel arms to be deployed in space. For launch these are folded up against the sides of the

AT LAST A MONITOR WITH ITS FOCUS ON YOUR NEEDS.



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cube. The TV repeater antenna is mounted on the Earth-facing side, with a small deployable feeder reflector. The Telecom payload antennas mount on the two unoccupied sides of the cube, lay flat against them for launch and hinge out at an angle in space. The back of the cube accommodates the motor to move the craft from its transfer orbit to the geostationary position. The spacecraft is 3-axis stabilized to maintain antenna focusing. Stability is achieved by using a system of small jet thrusters that use hydrazine gas. The satellite tanks contain enough fuel to control the spacecraft for 10 years at the estimated rate of use.

A launch from the shuttle is preferred, but the envelope of the folded 1600kg spacecraft has been designed to fit inside the heatshield of Ariane III as well. The expected launch date is fall of 1986.

At present, transponders are inefficient. Most of the electrical power supplied to them becomes heat. For a transmission power of 290W, more than 1kW of raw electrical power is needed, demanding the large-sized solar cell array. Because the spacecraft is totally insulated in a vacuum, the waste heat from the transponders could make it extremely hot. To prevent heat failure, radiators pass the heat into deep space.

The UNISAT 1's design ensures high reliability through the use of specially chosen and tested components and redundant circuitry, so that if one fails, a spare can be switched in. The design lifetime of the spacecraft is seven years, without serious failures on board, based on the amount of hydrazine fuel on board. To guard against breakdown of service caused by an early major failure, a spare spacecraft will be available. It has not yet been determined whether there will be one shared or two spare spacecraft for the two broadcasting companies, or whether these spacecraft will be placed in orbit (not switched on) or stored on the ground ready for a quick launch.

Not all of the UNISAT satellite will be built in England. Marconi Space and Defence Systems, based at Portsmouth, is supplying the payload. British Aerospace will manufacture the TV signal reflector, and will subcontract the manufacture of the entire structure to MATRA in France and the solar array source to a company as yet undecided.

Communications capabilities

In addition to the TV repeater, the satellite carries a Telecom payload for trans-Atlantic business communications. This part of the payload uses six transponders that can be switched to provide Europe-Europe, trans-Atlantic or North America-North America communications.

The international frequency plan allows only three links to start and finish in America, while Europe-Europe communication can use six channels. Two extra antennas for this payload will focus on the Eastern seaboard of the United States and Eastern Canada and one on Western Europe and parts of Eastern Europe. The systems operating characteristics have been designed to keep ground station complexity to a minimum and cost to the small user relatively low. The uplink frequency band from Europe is between 14-14.25GHz; from North America between 14.25-14.5GHz. The downlink frequency bands are between 12.5-12.75GHz for Europe and 11.75-12GHz for North America.

Within these ranges, six frequencies are allocated to Europe and three to North America. The 36MHz bandwidth channels use 41.5MHz center-frequency spacing. The transmission power for each channel is 25W.

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Satellite audio distribution:
RKO digital has arrived

By Jerry Whitaker, KRED/KPDJ Radio, Eureka, CA

As several radio networks move toward completing digital audio distribution systems, the author views various aspects of the RKO network.

Despite assurances to the contrary from proponents, many engineers and managers are reluctant to plunge into the *state-of-the-art*, thinking that the *art* may have exceeded the need. There is an air of confidence surrounding analog technology, a system steadily perfected over the years, recently simplified by integrated circuitry. In fact, you may ask why we should bother with digital audio. A well-designed analog system (generally lower in cost) can deliver performance about as close to transparent as a medium can be. Who will be able to tell the difference between 0.05% and 0.01% harmonic distortion or between a −70dB and −80dB noise floor?

If the intent of a digital audio system is to provide the significant, but imperceptible improvements mentioned previously, its usefulness at this state of development must be questioned in the world of radio and TV broadcasting. Recording studios or production facilities, on the other hand, can justify such improved handling, because of multi-track work needed to produce the finished program. Other applications for which digital techniques are ideally suited include multigeneration work and network interconnections via satellite or terrestrial links. Although some broadcasters would be hard pressed to show how a change from a nearly perfect analog system to a more than nearly perfect digital plan would be noticed by any of their listeners, nationwide networking has arrived at a digital scheme.

Digital audio is not without its critics in any application. A reluctance exists on the part of engineering personnel to buy into a technology about which they know little. Detractors point to quantization errors that are a part of an economically viable system. Psychoacoustic aspects of digital audio have been questioned. Financial considerations must be taken into account, particularly because a universally agreed upon standard for recording does not exist at this time. However, progress toward a standard is being made.

Despite arguments, digital communication has proceeded at a rapid pace at the satellite interconnection level. The movement results from knowledge that long-distance,

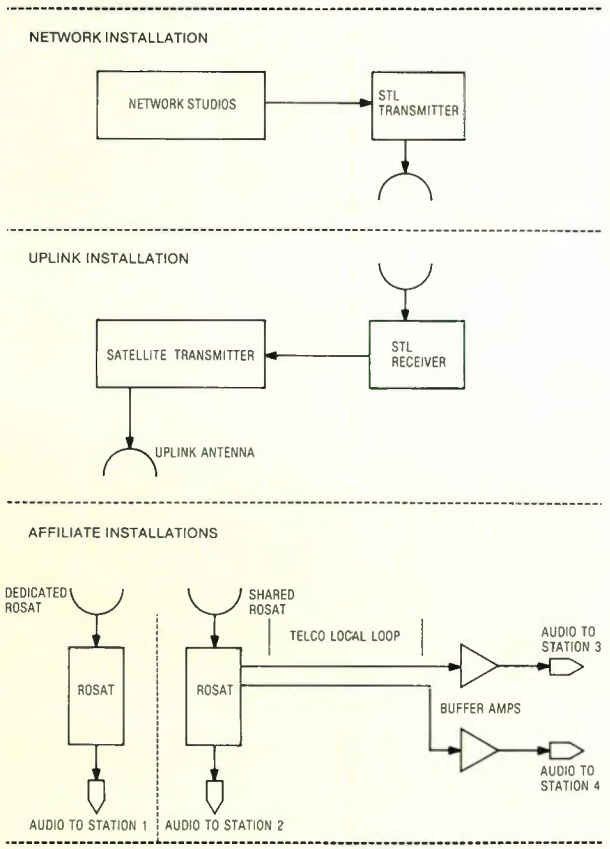

Figure 1. A basic analog radio satellite network.

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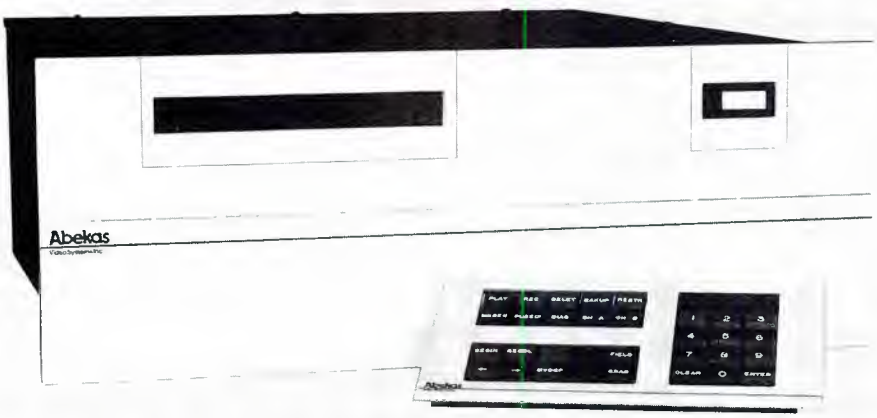

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multihop links, like multigeneration recordings, can be better performed by a digital system. Advanced microelectronics have made an all-digital audio network feasible from technical and economic standpoints. For these reasons, four major networks (ABC, CBS, NBC and RKO) have been busy constructing their own digital distribution systems, using equipment supplied by Scientific-Atlanta and transponder space on RCA's Satcom F-1R.

Basic audio networking

A basic analog radio network arrangement is shown in Figure 1. Programming originates at a central studio site and is transferred to a satellite uplink location via a studio-to-transmitter link (STL). At the uplink plant, the audio is combined with other transmissions to the satellite.

Receiving terminal plans fall into two categories: a dedicated receive-only satellite system (ROSAT) and local telephone loops from a central ROSAT system. The obvious benefit of the dedicated arrangement is that all of the system's equipment is under control of the station or the network. The familiar bottleneck to high quality audio imposed by Telco loops is eliminated as well, creating a network system that is nearly transparent to program material.

The situation can change, however, when telephone companies become a link between the ROSAT and the affiliate stations. It is possible to get a good quality 15kHz, 2-channel loop with low noise, distortion and phase differences, but such lines are expensive to install and can be difficult to maintain.

A digital network, shown in Figure 2, overcomes many problems inherent in an analog system, by placing into the entire transmission path a stream of digital bits. With this arrangement, analog information (program audio) is digitized at the network studio and remains encoded through the STL, uplink facility, satellite, ROSAT downlink and local Telco loop. It is reconverted to analog only at the affiliate station's facility. Special digital Telco loops are used, if available, between a centrally located ROSAT and the stations. Where such T-1 lines are not present, standard analog equalized local loops tie centrally located ROSAT demods to the affiliates.

A lack of T-1 lines and the high cost of multiple 15kHz equalized loops have caused many stations to purchase their own ROSAT systems, thereby eliminating the Telco link in the network chain. Other potential problems of a shared ROSAT, such as the lack of flexibility for the *linked* affiliates and responsibility questions that could arise in the event of equipment failure, are avoided.

Digital transmission is tolerant of noise, line distortion and other problems that might make an analog loop unusable. The digital link either works or it does not. If the Telco line is complete and operating reasonably well, transparent audio will be delivered to all affiliates. Troubleshooting the Telco connection is simplified with a digital system, because disagreements over noise floors or amounts of distortion are essentially eliminated. Engineers need no longer hear the familiar, "It sounds fine to me," or "It's leaving here okay," from the toll test board.

The RKO system approach

Getting the program signal out of the highly RF-congested environment of New York City to the uplink facility has been difficult. For the RKO system, many of the problems have been overcome by the use of dedicated, redundant optical fibers beneath the streets of New York City. As indicated in Figure 3, program audio is converted to a T-1 format at the network control center and transported to a central microwave transmission site via the fiber-optic materials. At the microwave link site, RKO signals are multiplexed with similarly formatted information from

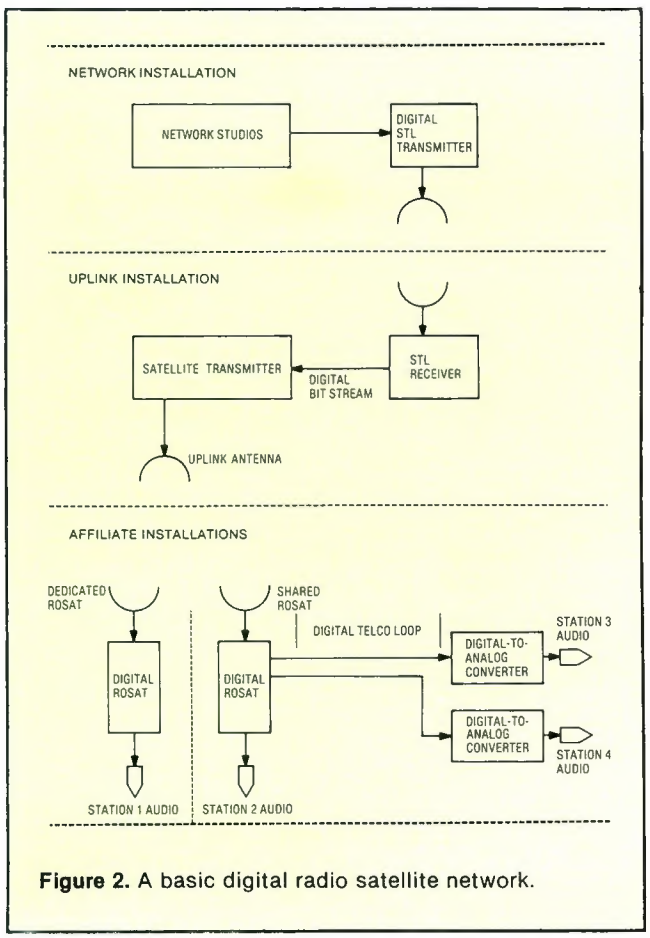

Figure 2. A basic digital radio satellite network.

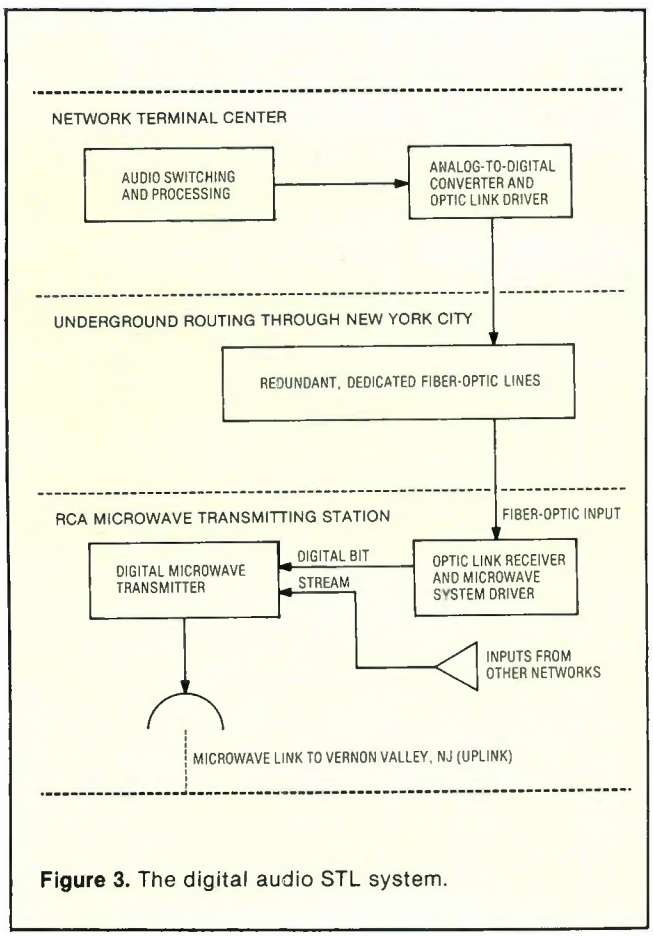

Figure 3. The digital audio STL system.

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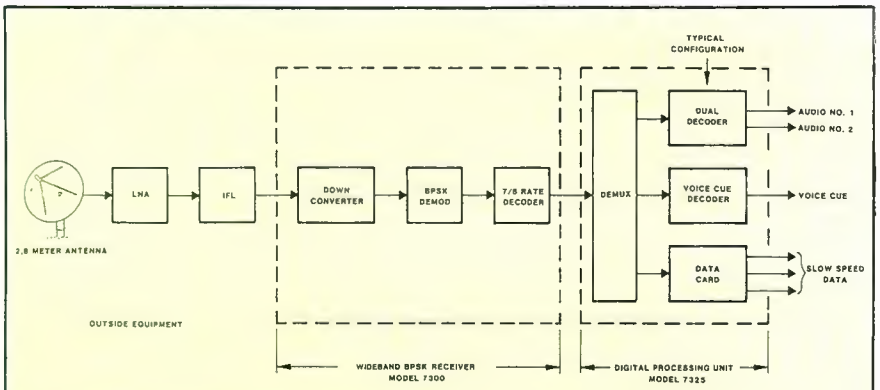


Courtesy of Scientific-Atlanta

Figure 4. A 2.8m digital audio terminal.

other radio networks and applied to the link for transmission to the satellite uplink facility in Vernon Valley, NJ.

RKO established its analog system in 1979. At the time, digital technology had not progressed to a point of acceptable audio quality delivery. Analog, via satellite, was found to be acceptable. Between then and now, however, the situation has changed.

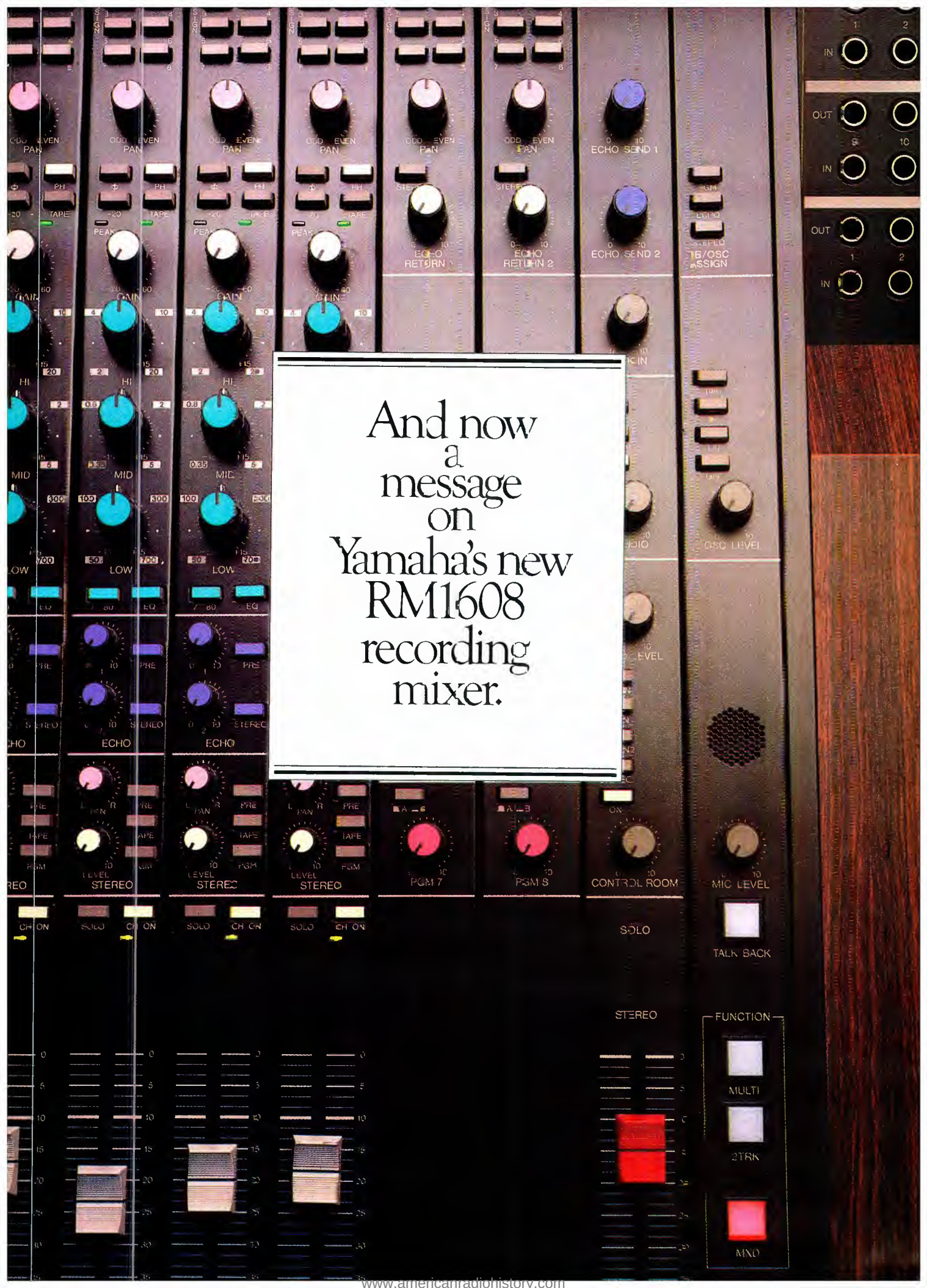
With full operation of the system scheduled for Oct. 1 of this year, RKO has furnished and installed complete receiving systems to about 300 radio stations. Affiliates wishing to purchase their own equipment have been allowed to do so at a cost of about $10,500 from Scientific-Atlanta, the developer of the encoding/decoding equipment and the earth terminals. RKO and other radio network organizations have made commitments to this transmission system for at least five years. Therefore, stations that opt to purchase the digital gear do not have to worry about a new system making the present equipment obsolete in a year or two. Certainly some modifications and options may be developed by S-A and others, but the basic system will remain intact.

A significant benefit to stations with their dishes pointed at F-1R is rapid access to a wide variety of audio services, because the other major networks are also relayed from that satellite. CBS, NBC and RKO all are using the same transponder, making reception of other services possible by plugging in an appropriate network decoder board. An additional capability is the availability of multiple channels for each radio entity. The RKO system alone includes six 15kHz channels for various program feeds to affiliates simultaneously. The analog system accommodated only four 15kHz channels.

A question of quality

The quality of the audio delivered by the satellite system is of prime importance to a successful network operation. Experience has shown that even with the relatively low sampling rate of 32kHz, audio quality does not suffer appreciably. The sampling rate for studio quality digital recording has been tentatively set at 48kHz, but such a sampling rate, even for satellite transmission, is inefficient in terms of spectrum usage. A wider bandwidth than the 32kHz sampling requirement translates into higher costs of operation for the network and fewer transponder spots available for the broadcast industry as a whole.

RKO began the network service in 1979 with a totally analog system. After about a year, and without notice of its affiliates, it switched to a



RM1608

SPECIFICATIONS

TOTAL HARMONIC DISTORTION (T.H.D.)
Less than 0.1% at +4dB *output, 20Hz to 20kHz (all Faders and controls at nominal)

HUM & NOISE (20Hz to 20kHz) Rs = 150 ohms
(INPUT GAIN "–60")

–128dB	Equivalent Input Noise (E.I.N.)
–95dB	residual output noise: all Faders down.
–80dB	(84dB S/N) PGM Master volume control at maximum and all CH PGM assign switches off.
–64dB	(68dB S/N) PGM Master volume control at maximum and one CH Fader at nominal level.
–73dB	(77dB S/N) STEREO Master Fader at maximum and all CH STEREO level controls at minimum level.
–64dB	(68dB S/N) STEREO Master Fader at maximum and one CH STEREO level control at nominal level.
–80dB	(70dB S/N) ECHO SEND volume at maximum and all CH ECHO volumes at minimum level.
–75dB	(65dB S/N) ECHO SEND volume at maximum and one CH ECHO volume at nominal level.

CROSSTALK
–70db at 1kHz: adjacent Input.
–70db at 1kHz: Input to Output.

MAXIMUM VOLTAGE GAIN (INPUT GAIN "–60")

PGM	74dB: MIC IN to PGM OUT.	ECHO	70dB: MIC IN to ECHO SEND.
	24dB: TAPE IN to PGM OUT.	C/R	74dB: MIC IN to C/R OUT.
	34dB: ECHO RETURN to PGM OUT.		24dB: 2 TRK IN to C/R OUT.
	14dB: PGM SUB IN to PGM OUT.	STUDIO	74dB: MIC IN to STUDIO OUT.
STEREO	74dB: MIC IN to STEREO OUT.		24dB: 2 TRK IN to STUDIO OUT.
	24dB: TAPE IN to STEREO OUT.		
	34dB: ECHO RETURN to STEREO OUT.		

CHANNEL EQUALIZATION
± 15 dB maximum
HIGH: from 2k to 20kHz PEAKING. MID: from 0.35k to 5kHz PEAKING. LOW: from 50 to 700 Hz PEAKING.

HIGH PASS FILTER –12dB/octave cut off below 80Hz.

OSCILLATOR Switchable sine wave 100Hz, 1kHz, 10Hz

PHANTOM POWER 48V DC is applied to XLR type connector's 2 pin and 3 pin for powering condenser microphone.

DIMENSION (W x H x D) 37-1/2" x 11" x 30-1/4" (953 mm x 279.6 mm x 769 mm)

Hum and Noise are measured with a –6dB/octave filter at 12.47kHz; equivalent to a 20 kHz filter with infinite dB/octave attenuation.
*0dB is referenced to 0.775V RMS.
• Sensitivity is the lowest level that will produce an output of –10dB (245mV), or the nominal output level when the unit is set to maximum gain.
• All specifications subject to change without notice.

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YAMAHA

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Table I.
2.8m antenna specifications

Characteristic	Specification
Operating Frequency	3.7 to 4.2 GHz
Antenna Type	Prime Focus, paraboloidal
Polarization	Single linear
Polarization Adjustment	180° continuous, manual from edge of reflector
Antenna Gain @ feed output	39.0 dBi (midband)
VSWR	1.3:1 maximum
Axial Ratio	35 dB minimum
Beamwidth	1.9° (midband)
First Sidelobe	-20 dB
Radiation Patterns	29-25 log θ dBi, mainbeam $< \theta < 7°$; +8 dBi, $7° < \theta < 9°$; 32-25 log θ dBi, $9° < \theta < 48°$; -10 dBi, $48° < \theta < 180°$.
Pointing Accuracy	0.12° rms in 45 mi/h winds, gusting to 60 mi/h.
Survival Wind	100 mi/h at standard air.

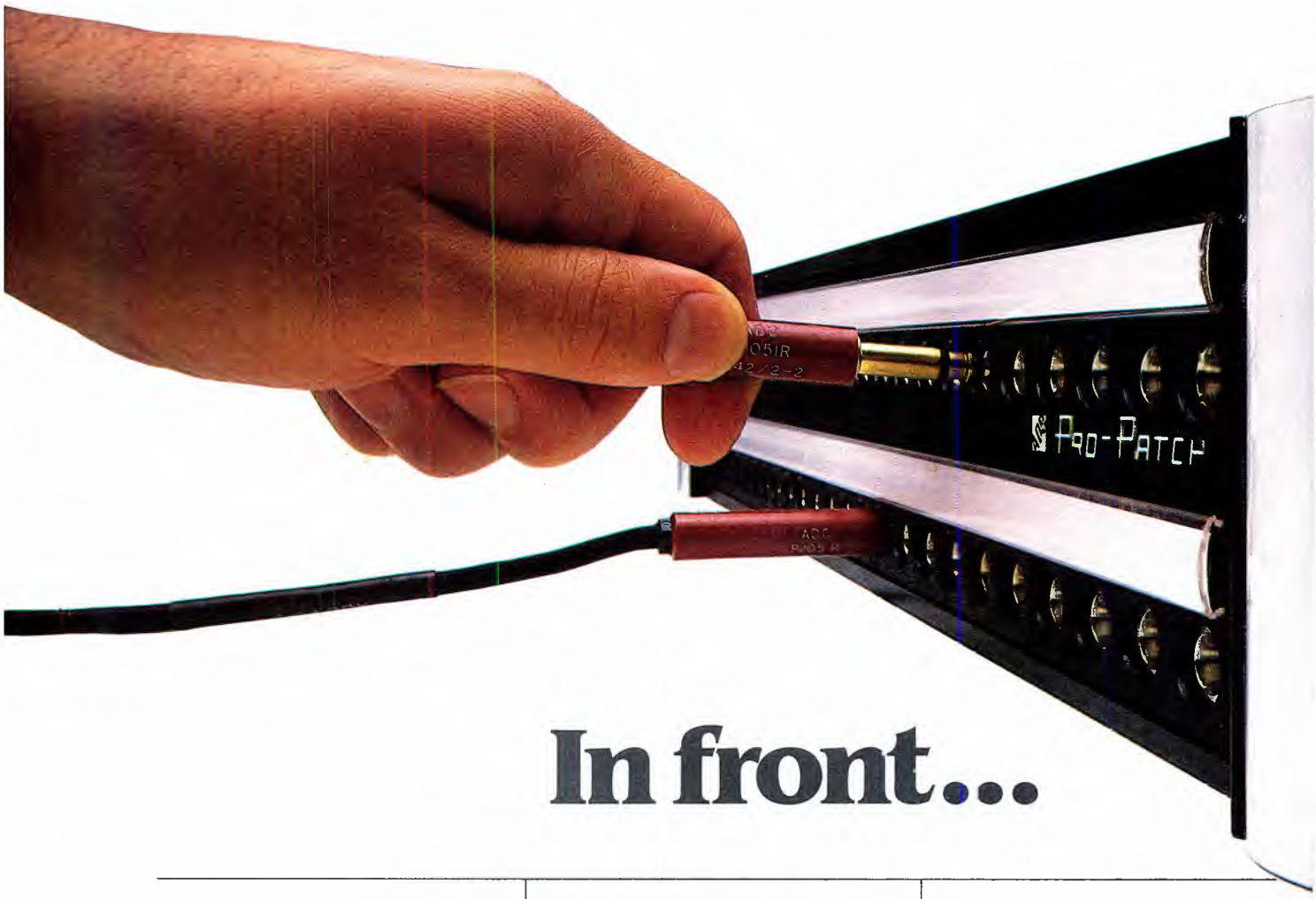
digital microwave STL to feed the uplink. The STL used a 32kHz sample rate, and with more than 150 affiliates on the line at the time, there were no complaints. The STL still is in use and the subjective audio quality from the system is considered excellent.

ROSAT equipment

The affiliate earth station consists of a 2.8m digital audio earth terminal, designed to receive high speed time division multiplex (TDM) digital information at a rate of 9Mbits/s. A digital processing unit (DPU) takes the digital baseband signal and decodes it for reconversion to analog audio. Figure 4 shows a block diagram of the receiving system.

The Scientific-Atlanta antenna is a high performance receive-only dish for use in the 4GHz and 12GHz downlink bands. The dish combines with a 120°K low noise amplifier (LNA) to provide high quality digital audio to most locations throughout the United States. Eight interchangeable panels make up the reflector, designed to be efficient. The panel

PRE-WIRED JACKFIELDS

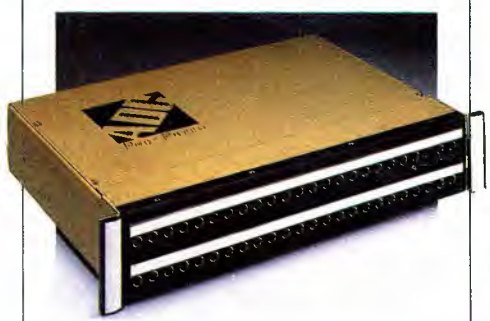


In front...

Your engineering staff has more important things to do than soldering patch panels. That's why you'll find a big advantage in ADC's 100% pre-wired Pro-Patch™ jackfields and Ultra-Patch™ panels. Featuring ADC's new split cylinder contacts, these units allow for fast, reliable, hassle-free installation.

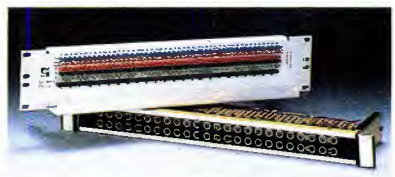
Fully assembled, computer tested and ready to hook up, Pro-Patch and Ultra-Patch completely eliminate labor intensive soldering or crimping operations.

In fact, hooking up to the back of a Pro-Patch unit is almost as easy as plugging into the front. Just a push on a special hand tool bares a wire, locks it into a split-cylinder contact inside an insulated housing and trims off excess length.

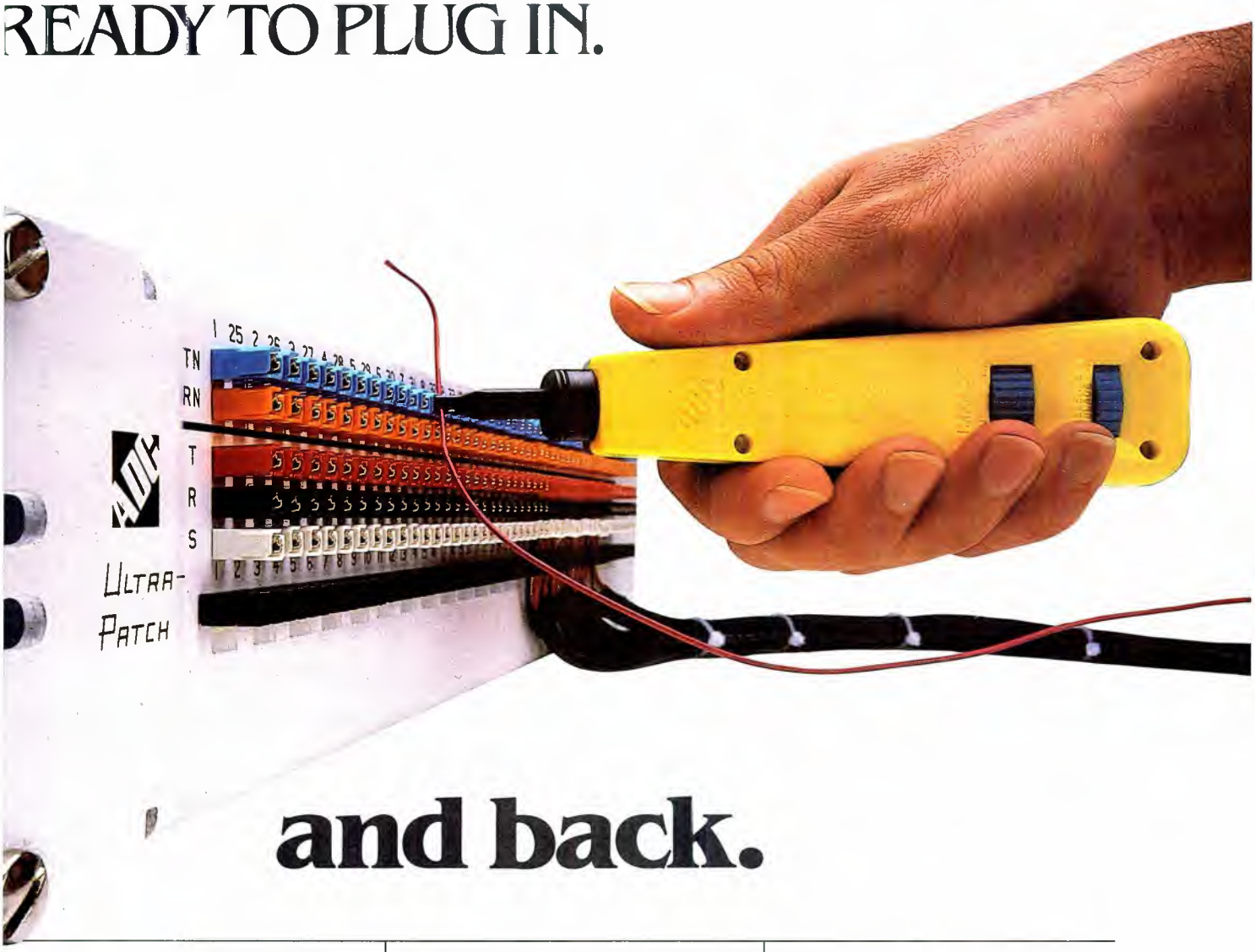


Pro-Patch jackfields and Ultra-Patch panels cut installation time from hours to minutes and allow circuit or normalling configuration changes in seconds.

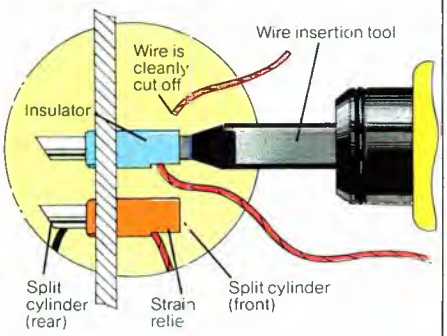
Since their introduction last April at NAB, Pro-Patch jackfields and Ultra-Patch panels have appeared in virtually every segment of the Broadcast industry.



READY TO PLUG IN.



and back.



ADC's unique split-cylinder system features contacts that will accept 22,24 or 26 AWG solid or stranded wires. The cylinders are housed in plastic insulating modules and are recessed to virtually eliminate shorting at the contacts. Both sides of the contact have two-wire capability providing for four gas-tight terminations per contact. The cylinders are also rated for a minimum 100 cycles and are easily replaceable. Triple strain reliefing is provided on all units.

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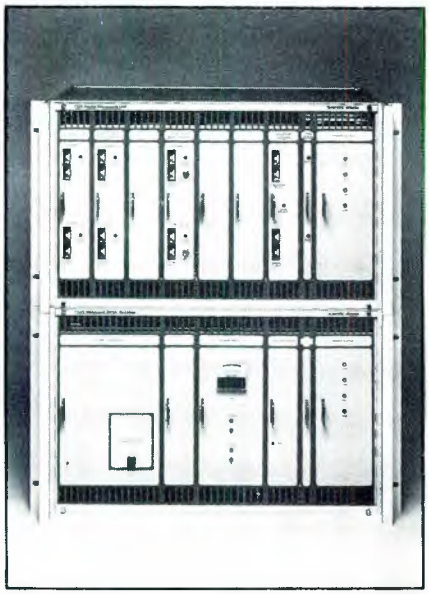

Courtesy of Scientific-Atlanta

Scientific-Atlanta 7325 digital processing unit and 7300 wideband BPSK receiver detect and decode all signals.

has a sidelobe envelope to meet 2° spacing requirements. No special tools or test instruments are required for installation or maintenance. The antenna system may be peaked onto the satellite by using a standard FM/TV field strength meter. Specifications for the antenna are given in Table I.

The design of the feed system allows polarization to be set accurately from the edge of the antenna, thus simplifying the alignment procedures.

The LNA output is carried indoors by a ½-inch, foam-filled, low-loss coaxial cable up to 200 feet long. Longer cable runs can be used, if necessary, to reach the receiving/decoding equipment. Operating power for the LNA is developed in the two rack-mounted electronic packages through the use of a bias-tee arrangement.

The electronics include downconversion and digital decoding circuits to produce a 70MHz IF, which is further processed to output a 7.68Mbits/s datastream. The DUP chassis processes the datastream for frame synchronization and descrambling of several output options, including 15kHz audio, 7.5kHz audio, cue audio and medium speed data.

System particulars

The digital process samples 15kHz audio at a rate of 32kHz, creating 15-bit samples. An analysis of each sample determines which bits may be considered insignificant to allow companding of the information. As a result, 15-bit words are shortened to 11-bit lengths. Then a parity bit is added, resulting in the 12-bit word length for the system.

ABC Radio Networks swings into satellite delivery

ABC Radio Networks announced in late August the beginning of the rollback of its landlines to certain affiliates in the Mountain time zone. In making the announcement, Edward F. McLaughlin, network president, said, "This marks the beginning of ABC's transition into the new age of satellite distributed radio networks. Satellites offer both stations and networks better quality of programs and services and will add tremendous value to the industry as a whole."

In January, the ABC Radio Networks were the first networks to broadcast programming to affiliates digitally, via satellite. More than 400 ABC radio affiliates already are receiving network service via satellite. ABC, in its move to satellite distribution, has been converting stations at a rate of about 100 a month.

The switchover marks the beginning of the withdrawal of the terrestrial telephone line connection system that has been the means of distribution for all radio networks since the 1920s.

ABC, with more than 1800 affiliated stations, will continue to eliminate its landlines as satellite dishes are installed. The first states to go fully satellite are those of the Mountain time zone. Landlines to most of the affiliates in Wyoming, Nevada, North Dakota, Montana and Idaho have been closed. At press time, other states in the zone were to follow shortly.

"There are a few stations that will have temporary interruption of service," William Battison, vice president, Satellite Development, said. "These stations were all informed almost six months ago of these cutoff dates, and all affiliate contracts have been modified to reflect the change to satellite distribution. Some stations just did not order their satellite equipment in time." Battison said, however, that some stations that had ordered and received their dishes were not cut because problems arising from the national telephone workers' strike delayed local loop installations beyond the stations' control.

At press time, ABC was in full swing of the transition to satellite distribution, with status as follows:

- For the first zone (of five), the Mountain time zone, switchover has begun.
- Of the 1776 ABC Radio affiliates, 82% have signed up for the new distribution service. Some 1405 are already covered, with either private or shared satellite receivers.
- ABC is in final negotiations to pin down the remaining 300-plus stations for conversion to the new satellite service.
- By mid-October, the second zone's (New England states plus Pennsylvania) switchover will commence.
- By the end of October, transition in the Central time zone will begin.
- Late December or January 1984 should see the conversion process completed with cutoff of the remaining landlines.

In an exclusive interview with **Broadcast Engineering,** key sources at ABC Radio expressed pleasure at the smoothness with which the transition to satellite distribution has been accomplished. Also, they said that the other networks were progressing well with their switchover programs. In general, they view this as an encouraging sign, a recognition by stations that new techniques must be adapted to keep pace with advancing technology. This also means reinvestment of profits and commitments to improving services.

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Photo: Merle Shuster

The author stands in front of the newly installed Scientific-Atlanta receiving antenna at KRED/KPDJ Radio. A second antenna, from Harris, has been in use for more than a year, receiving the RKO analog network and UPI information.

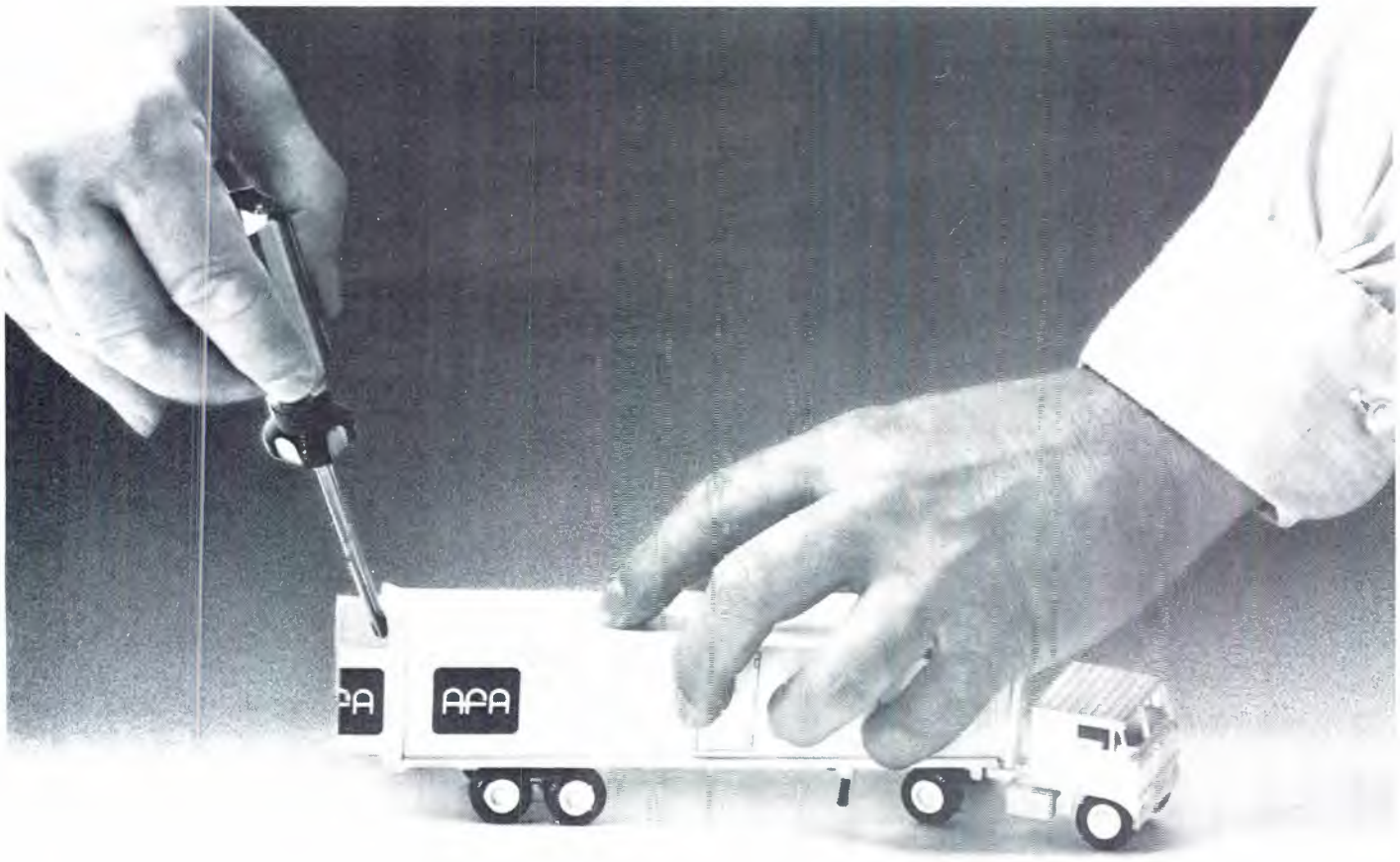
The signal-to-idle-noise ratio of reconverted audio is greater than 80dB, while the sine-wave-to-quantization noise ratio is at least 56dB. Total harmonic distortion at peak system level is 0.3%. With a maximum output from the DPU of +24dBm into 600Ω, balanced, a +16dB headroom allowance is available if +8dB output levels are used.

The cue channel will be used for scheduling and affiliate instructions. Continuously variable, variable-slope, delta-modulation encoding is used to provide a voice quality service. And for additional communications, the data channel can decode as many as three medium speed asynchronous sources simultaneously. Such a link could be used to provide hard-copy printouts of network schedules or leased common carrier services.

The Scientific-Atlanta system, selected independently by the major networks, has become a defacto standard at present. Undoubtedly, other manufacturers will enter the marketplace, providing other sources of equipment. To date, the only announcement has come from Comtech Data Corporation, Scottsdale, AZ, which expects to have its digital audio receive satellite system (DARSS) available next month. The complete package, said to be compatible with the Scientific-Atlanta equipment, will include a 3.8m antenna designed to meet 2° satellite spacing and an antenna-mounted downconverter. The package will provide turnkey installation.

Editor's note:
The RKO system, using analog technology, was running on Westar III, T1 and T4, as this issue of **BE** was prepared. A simulcast of analog signals (on Westar III) and digital signals (on F-1R) was planned for Sept. 1, providing signal comparisons and a chance to work out any difficulties. A switch to all-digital operation was expected on Oct. 1. Results of the comparison will be carried in a future issue of **BE**.

Acknowledgement
Appreciation is expressed to the RKO Radio Networks and Scientific-Atlanta for their assistance in preparing this report.



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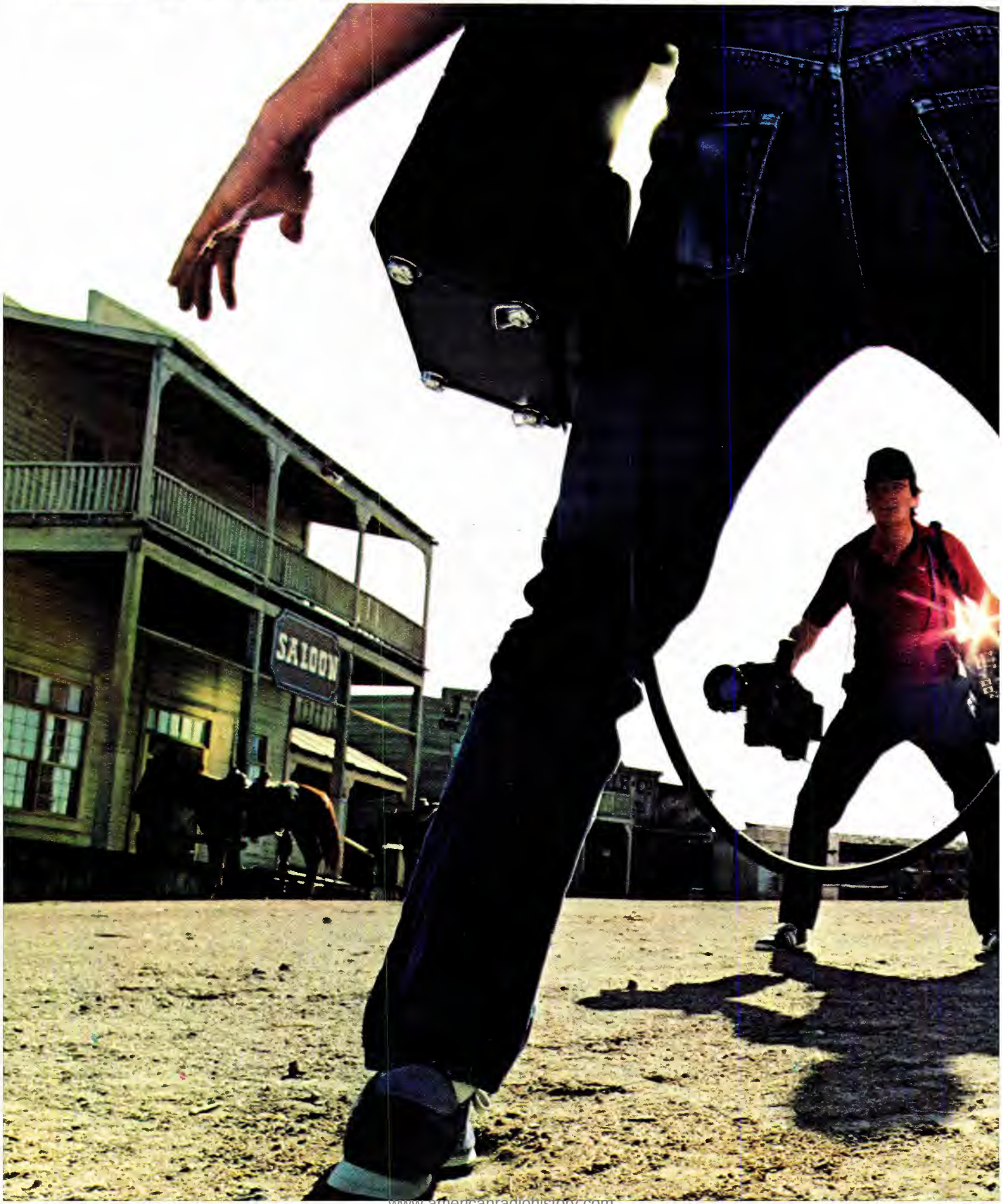

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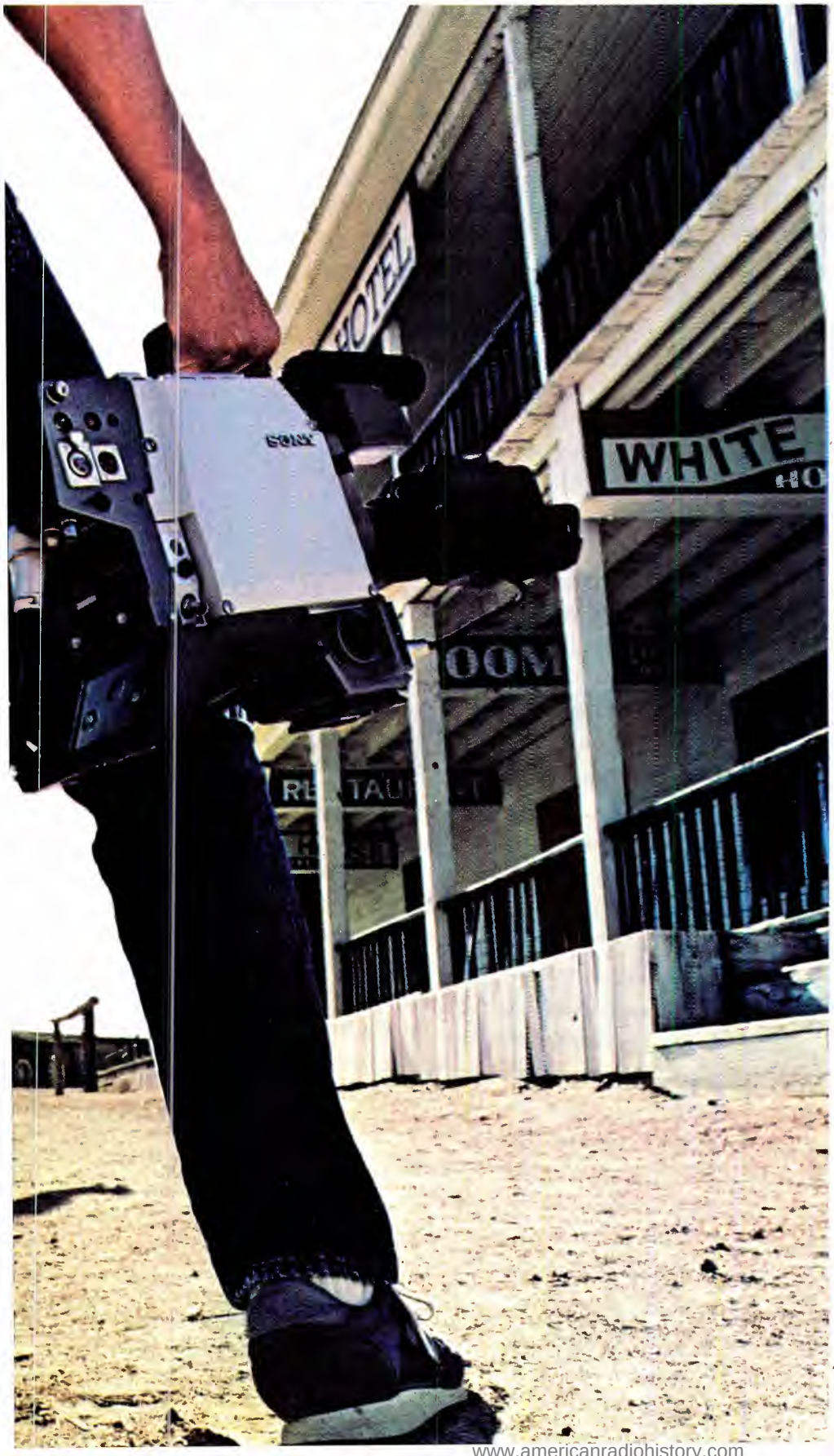

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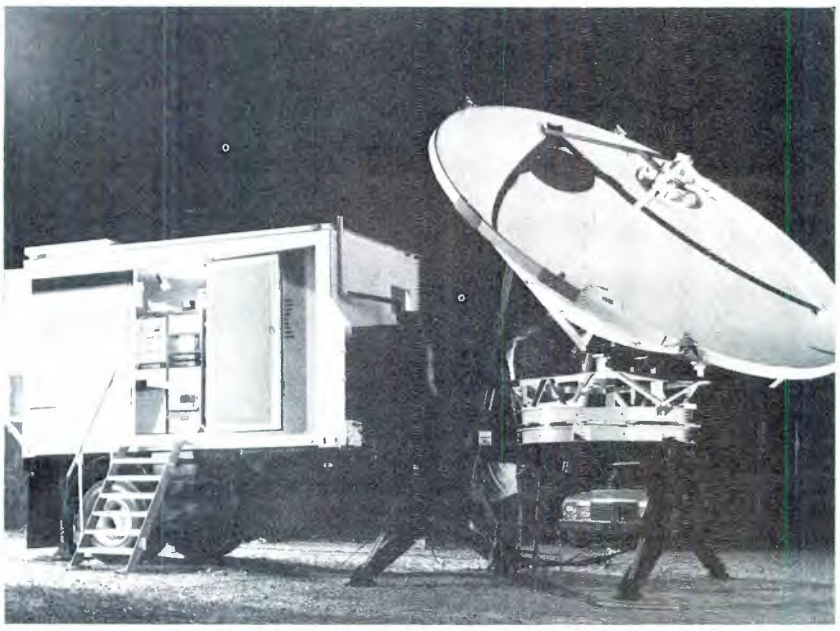
Ku-Band milestone reached

By Carl Bentz, technical editor



A self-contained Ku-Band transportable uplink, the VideoStar Express, was provided by VideoStar Connections, Atlanta, for the shuttle launch coverage.

A spectacular night launch of the Challenger space shuttle on Aug. 23, 1983, marked a number of firsts for the NASA space program. Among the crew were Guion Bluford, the first black astronaut on an orbital mission, and William Thornton, age 54, who is the oldest member of a flight. Another first for US communications and for the ABC network was the use of the Ku-Band spectrum as part of the live coverage for nationwide broadcast of the mission launch.

The first night launch was partially dictated by a portion of the shuttle's payload, the first communications satellite for India to be placed into the geosynchronous arc via the resusable craft. The SBS III satellite used for the relay during the launch is renowned because it was one of the first communications satellites that had been taken into space on a previous flight. During that mission, the United States' first female astronaut, Sally Ride, was in charge of releasing the Hughes spacecraft from the shuttle's cargo bay. Using the shuttle for such satellite launching results in substantial savings in launch procedures.

According to Charley Frey, producer for ABC's launch coverage, both C-Band and Ku-Band equipment were in use during the 45-minute presentation. The Ku-Band transmissions from the Kennedy Space Center were provided by a 5m uplink sysem, furnished by Video Star of Atlanta. The 12GHz/14GHz interlink, through the SBS III satellite, was received in the New York ABC parking lot on 66th Street with a 3.6m downlink system. Meanwhile, all C-Band coverage was downlinked into New Jersey and transported to the network headquarters by terrestrial microwave.

Throughout the broadcast period, both satellite-relayed signals were used. Although it was in a test situation, the Ku-Band system was equal in quality to that of the C-Band signal for at least 98% of the time. Frey said that he was not certain that the higher frequency signal would present the picture ABC hoped for, but he was pleased to find few problems.

The problems that did occur resulted from inclement weather at Cape Canaveral. Although rain attenuation of Ku-Band energy presents difficulties, it was not known how bad it might be. Frey said that thunderstorms over the area were reported to be as high as 40,000 feet. These thunderstorms created some difficulties on C-Band uplink systems for ABC and NASA. The Ku-Band link was rendered unusable when the storm was at its height. Lightning in the area injected glitching into signals on both systems.

During the critical times, however, the signals provided by the 12GHz/14GHz system were available for use and were interspersed into the program with those from the C-Band link. Frey questioned the use of Ku-Band relays from locations where environmental factors such as heavy precipitation would be more prevalent than at the Florida site. In more arid areas he said there should be no problem.

Signals originating from the Florida site came from a specially constructed studio complex. Built for coverage of a previous launch, the studio structure is elevated to allow better camera angles that avoid low-growing vegetation and dust in the cape area. Appearing to be on stilts, the building sits atop a metal framework that puts the floor some 13 feet off the ground. Inside, the studio floor is raked to provide additional height, if needed.

Below the studio structure is space for a triple trailer complex that houses equipment for origination from the Cape. The modular control room equipment is usually kept by the Peak Load Equipment Group at ABC, New York, and is shipped to Florida as required. Frey said that through the peak load system, the network is capable of originating from almost any major city in the world within 24 hours of crew/equipment arrival in the city. In some locations, ABC maintains at least partial facilities at all times, in case coverage should be required.

Other work with the Ku-Band has been done by NBC. Testing began in January 1983 and included special experiments and demonstrations performed during the NAB-'83 convention, in conjunction with Harris Corporation. The demonstration, presented through the Las Vegas NBC affiliate, KVBC-TV 3, introduced a networking distribution system that

Courtesy of Tektronix

A portable shelter (above) with a satellite receiving antenna outside the studios of KVBC-TV 3, Las Vegas, NV, houses equipment for the Ku-Band experiments. The project combined the efforts of Tektronix, Harris, NBC TV Network and COMSAT General. Inside the shelter, Ronald MacAllister (at left), Satellite Communications Division, Harris, and Dave Walters, Tektronix, check the operation of receiving and test equipment.

involved a sophisticated automated monitoring system. Part of the monitoring operation would sense atmospheric conditions, redirecting signals and re-aiming antennas remotely to avoid heavy precipitation problems. The equipment package developed by Harris Corporation included instrumentation, monitoring and computer controller systems from Tektronix. During the NAB show, the Las Vegas station transmitted signals to its audience that were relayed via the SBS I satellite from NBC Network Center in Burbank, CA.

Fred Paxton, president, WPSD-TV 6, Paducah, KY, and chairman of the NBC Affiliates Board, said that the NBC experiments show that the rain attenuation problem is manageable. Paxton said that the smaller antenna size and reduced terrestrial microwave interference incidence in the 12GHz/14GHz spectrum were advantages of the Ku-Band system.

ABC and NBC have indicated a likelihood of future Ku-Band operation. ABC may use it during the next political convention for network interconnection. NBC hopes to include some network programming feeds early in 1984, if the current schedule is maintained.

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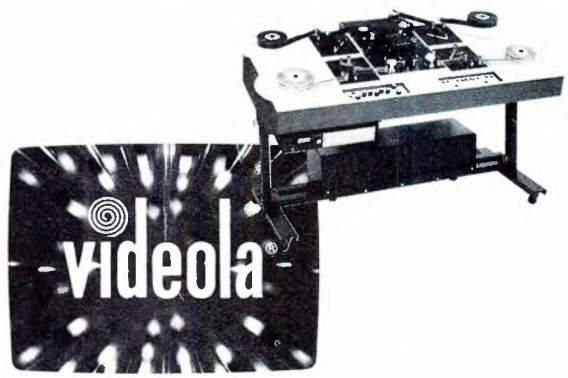

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Reducing satellite spacing to meet demands

By Carl Bentz, technical editor

To alleviate crowding in the geosynchronous arc serving the Western hemisphere, the FCC has elected to reduce satellite spacing to 2° of arc. The impact of reduced spacing and recommendations leading to the decision are presented here.

A continuing demand for satellite *parking* locations in the geosynchronous arc between 55° west longitude and 136° west longitude has caused a scarcity of space. Beginning in 1981, the FCC Office of Science and Technology (OST) launched a study of satellite policies to determine if reduced spacing would be feasible. The future of additional satellites for US demands and interests for Canada, Mexico and South American nations were at stake.

The study examined spacings of 3° and 2° of arc, as well as the problems of mutual interference levels that might result. A reduction to 3° would provide only four parking slots for US service. The 2° spacing, however, would double the available locations.

After much consideration, the FCC adopted the 2° plan on April 27, 1983. The plan would be applied to future use of C-Band (4GHz/6GHz) and Ku-Band (12GHz/14GHz) satellites. The same geosynchronous arc will be required to hold the higher frequency systems, currently spaced at 3°.

Usable arc defined

Proper reception by a 4GHz/6GHz receiving ground station requires a minimum elevation (look angle) of 5° above horizontal. That minimum angle reduces atmospheric attenuation effects to an acceptable level. Using the 5° elevation at the most northwesterly spot in Washington state, a receiving station can properly see a satellite located at 55° west longitude. For a receive site in the Hawaiian Islands, the eastern limit becomes 85° west longitude, while Alaska requires a satellite no farther east than 115° west longitude. From the western limit of 136° west longitude in the 22,300-mile-high orbit, a satellite may serve Hawaii, Alaska and CONUS (the 48 contiguous states). (See Figure 1.)

Greater restraints are placed on satellite orbital limits for 12GHz/14GHz operation. Because a greater rain attenuation factor is involved at the higher frequency, the minimum look angle is set at 10° above horizontal. CONUS coverage by the 12GHz/14GHz signals places east and west arc limits at 63° west longitude and 129° west longitude.

One possible solution to arc crowding, besides closer spacing, would be a subregional plan. Placing a division line along the Mississippi River valley, an eastern arc limit of 25° west longitude could provide acceptable satellite signal footprints to the eastern half of the United States. The western sector would receive from a location as far west as 160° west longitude. This plan has been deemed impractical for now.

Constraints on spacing

The possibility of satellite collisions is small. At 22,300 miles above the equator, one degree of arc is equal to 450 miles. The possibility of interference between signals of the more closely spaced satellites does merit concern, however.

An analysis of possible interference problems must deal with a number of

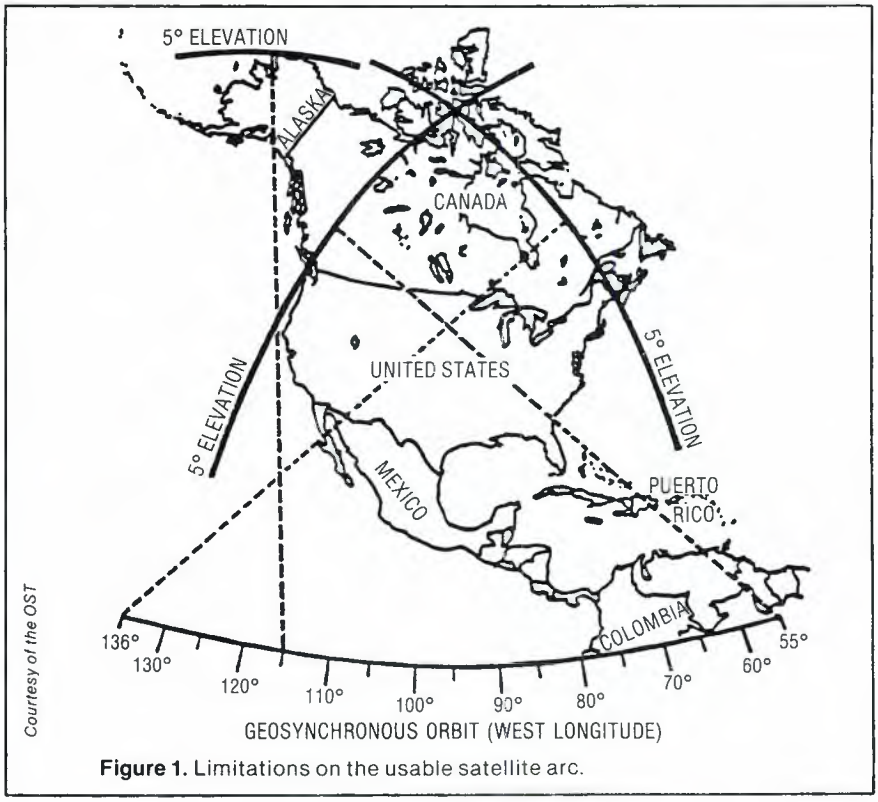

Figure 1. Limitations on the usable satellite arc.

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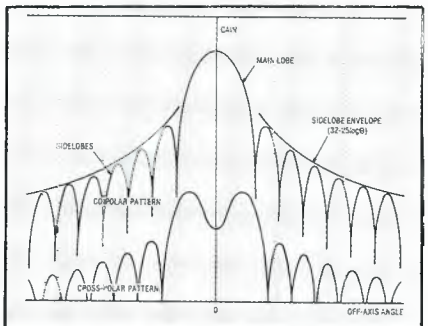
system parameters. Involved in the OST study were transmitting powers, receiver sensitivities, antenna directivities, signal formats, modulation parameters, frequency offsets filtering and the acceptable level of interference.

To a large extent, interference experienced in reception depends on modulation parameters of desired and undesired signals. The various signal formats are closely related. CSSB/AM (companded single-sideband AM) is being used experimentally for carrying up to 7800 voice telephony channels per 36MHz transponder. FM/TV (frequency division multiplexed FM) carries voice channels with up to 3000 voice channels within a 36MHz transponder. FDM/TV (frequency modulated television) places a single TV channel within the 36MHz transponder bandwidth. Research is under way to develop a half-channel scheme, particularly for CATV applications, to place two channels within the 36MHz spectrum. The two signals may be subject to cross-talk and larger antennas and/or higher transmit power may be required to compensate the loss in S/N ratio that results from a smaller FM deviation.

SCPC (single channel per carrier) is a cost-effective system being used by regional radio networks and data transmission. Two forms are common with SCPC/PSK for voice and data and SCPC/FM for audio program distribution. Also for audio, wideband digital is finding more applications with TDMA (time division multiplex audio) and T1 telephony predominating.



Courtesy of the OST

Figure 2. Typical antenna radiation patterns. An improved sidelobe envelope would decrease sidelobe levels.

The receiving antenna system also needs attention. Interference levels can be computed as functions of satellite spacing and antenna performance, in other words, the antenna pattern. (See Figure 2.) An ideal antenna system has a main lobe with no sidelobes and infinite cross-polarization. Unfortunately, practical antennas have a copolar radiation pattern shaped according to $[\sin(x)/x]^2$. In addition, a cross-polar component exists that is typically 30-35dB below the peak main lobe gain. As well as improved cross-polar isolation, an improved antenna pattern (sidelobe envelope) is suggested according to the equation:

$$G(\Theta) = \begin{cases} 29 - 25 \log \Theta \text{ dBi}, & 1^\circ \leqslant \Lambda \leqslant 7^\circ \\ 8 \text{ dBi}, & 7^\circ \leqslant \Lambda \leqslant 9.2^\circ \\ 32 - 25 \log \Theta \text{ dBi}, & 9.2^\circ \leqslant \Lambda \leqslant 48^\circ \\ -10 \text{ dBi}, & 48^\circ \leqslant \Lambda \leqslant 180^\circ \end{cases}$$

Impact of reduced spacing

By initiating three practices, a 2° orbital spacing can be achieved. Any one of the three practices would allow a 3° spacing, according to the interference analysis. The three items include:

- polarization interleaved satellite deployment;
- improved earth station antenna standards; and
- increased frequency coordination between adjacent satellites.

The presently used 4° spacing was based on the premise that adjacent satellites are copolar. The premise is

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not always true, however, for US systems. Three unique polarization/channelization plans have been used in the satellite designs. RCA and Hughes/Western Union systems are completely cross-polar in uplinks and downlinks on all transponders. AT&T's equipment is cross-polar to the other two in the uplink or downlink. By placing satellites in orbit so that each satellite is fully cross-polarized to both its neighbors, orbital spacing reduction can be achieved.

Improving the earth station antenna sidelobe standard from (32-25 log Θ) to (29-25 log Θ) results in a 3dB reduction in interference, and by itself would allow 3° spacing. Coupled with polarization interleaving, 2° spacing is feasible. Adoption of an even lower sidelobe envelope equation between 1° and 3° off the axis of the antenna would lessen the amount of frequency coordination required.

Several design practices can be applied to antennas to meet or exceed the new standard for all antenna sizes. These practices include the following:

- A reduction of antenna illumination lowers the main beam gain slightly, but reduces sidelobes considerably. The effect increases with increasing antenna diameter.
- Corrugated antenna feeds produce lower sidelobe levels.
- Redesign of secondary antenna reflector supports and antenna edges can reduce and minimize re-radiation.
- Offset antenna designs reduce the effects caused by subreflectors and supports.
- Horn antennas have lower sidelobe characteristics than parabolic dishes.
- Improved manufacturing tolerances can reduce sidelobe levels that result from antenna reflector surface errors.

The techniques will have varying degrees of effectiveness in reducing sidelobe levels, particularly in relationship to antenna diameters. For example, in antenna systems smaller than 6m, some of which cannot meet current standards, increased frequency coordination, a corrugated feedhorn and an extension ring around the main reflector may allow the system to remain usable. New designs for 3.6m antennas, designed specifically for 2° spacing, might be quite practical.

For the 6-15m and 30m antennas, a corrugated design feedhorn could substantially improve performance with the reduced spacing.

Probably, the transition from 4° to 3° spacing will be little noticed, even on 3m TVROs. However, some frequency coordination and interleaving of SCPC channels on neighboring satellites will be preferable.

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Figure of merit (G/T) of a receiving installation in the broadcasting-satellite service
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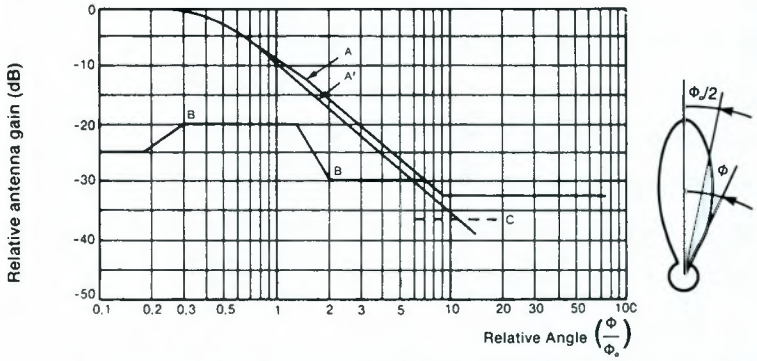
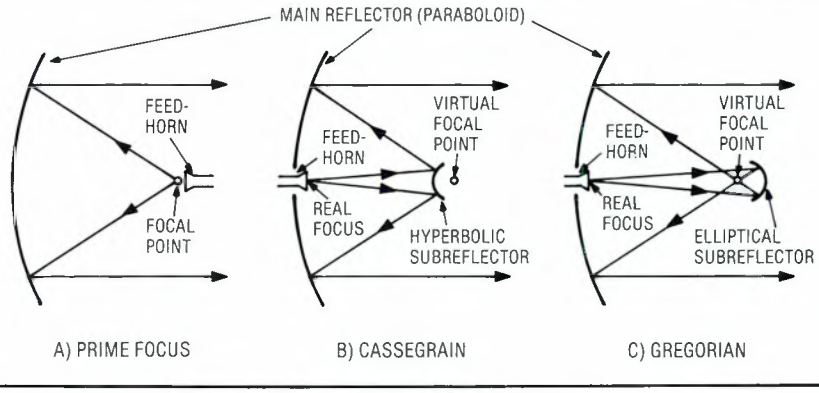
$$G/T = \frac{\alpha\beta G_r}{\alpha T_e + (1-\alpha)T_o + (n-1)T_o}$$

where
α: the total coupling losses, expressed as a power ratio;
β: the total losses due to the pointing error, polarization effects and aging, expressed as a power ratio;
G_r: the effective gain of the receiving antenna, expressed as a power ratio and taking account of the method of feeding and efficiency;
T_e: the effective temperature of the antenna;
T_o: the reference temperature = 290K;
n: the overall noise factor of the receiver, expressed as a power ratio.



Co-polar and cross-polar reference patterns for receiving antenna in Regions 1 and 3
Curve A: Co-polar component for individual reception without sidelobe suppression
Curve A': Co-polar component for community reception without sidelobe suppression
Curve B: Cross-polar component for both types of reception
Curve C: Minus the on-axis gain

A wall chart, the "User's Guide to Antenna Patterns," includes data on patterns for fixed-service satellite communications earth terminals (per CCIR and FCC regulations) and for TV satellite broadcasting (WARC-77). There is no charge for the chart. Contact MCL, 10 North Beach, La Grange, IL 60525, using your letterhead.



Courtesy of the OST

Figure 3. Symmetrical reflector antenna types.

The impact of 2° spacing will require improved antenna standards and polarization interleaving of satellites. New standards for polarization and channelization in satellite design will also require homogeneity of satellite design with respect to coverage patterns, receiver sensitivity and transmitting powers. Upgrading of marginal ground facilities, revised video modulation parameters and close coordination between adjacent satellites may offset problems.

The interference analyses of possible 2° spacing of domestic satellites have led the OST to recommend adoption of the reduced spacing plan. Seven points are suggested for smooth implementation of the plan:

- Adopt an improved earth station antenna sidelobe standard as soon as possible.
- Adopt two orthogonal polarization/channelization standards for US

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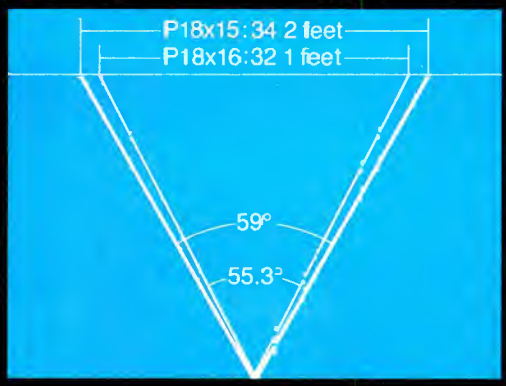

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Antenna efficiency

Antenna efficiency, $\eta\%$, is defined as the ratio, in percent, of the actual power delivered to a given load (as measured at the output flange of the orthocoupler) relative to the maximum power that could be delivered to this same load by the complete aperture of the antenna (as measured at this same output flange) thus:

$$(1)\ \eta\% = 100(P_{actual})/(P_{maximum}).$$

Now, because the maximum power is the incident power density, S (in watts/meters^2) times the actual aperture area, $\pi D^2/4$ (in square meters) of the antenna of diameter D, (meters) we see from (1) that (denoting $\eta = \eta\%/100$):

$$(2)\ P_{actual} = \eta P_{maximum} = \eta S(\pi D^2/4).$$

Thus, efficiency can also be defined as:

$$(3)\eta\% = 100\ \frac{\text{Effective Aperture Area}}{\text{Actual Aperture Area}}$$

where:
Actual Aperture Area $= \eta\ (\pi D^2/4)$.

Antenna efficiency is measured by:

- Obtaining the directivity, DIR (in decibels) of the antenna via pattern integration of the measured 0° to 180° E- and H-plane patterns and taking their average (note that the measured directivity includes all surface RMS errors.)
- Then subtracting the total heat loss (in decibels) of I^2R_{dB} of the entire antenna out to the output flange of the orthocoupler (this includes horn I^2R loss, the waveguide feeder I^2R loss and the orthocoupler I^2R loss.)
- Then subtracting the mismatch loss (in decibels) due to the VSWR measured at the orthocoupler flange, namely $10\log_{10}(1-\Gamma^2)$ where $\Gamma = (VSWR-1)/(VSWR+1)$.
- Finally subtracting (in decibels) the cross-polar energy (obtaining by pattern integration of the cross-polar E-, H-plane and 45° patterns and taking their average and expressing it as a fraction, PX/PC, of the copolar energy patterns above).

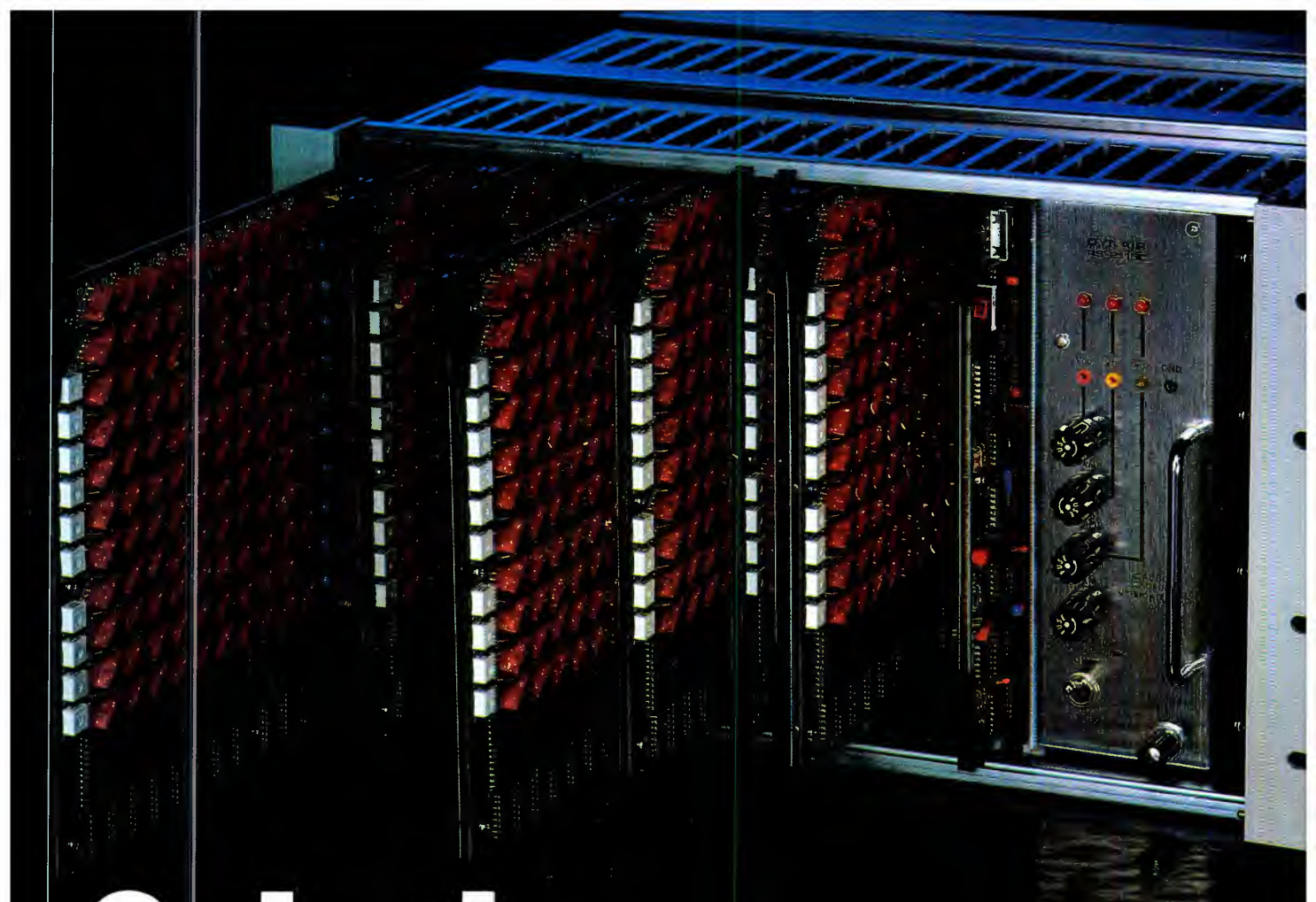
This gives the gain, G, in decibels, of the antenna as:

$$(4)\ G = DIR - I^2R_{dB} - 10\log_{10}(1-\Gamma^2) - 10\log_{10}(1+PX/PC).$$

The efficiency is then given by:

$$(5)\ \eta\% = 100(10^{G/10}/C^2)$$

where (G) $C = \pi D/\lambda$; λ = operating wavelength, meters $= 3000/f_{GHz}$
with: f_{GHz} = operating frequency in GHz.



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Avoidance/Suppression of Terrestrial Interference

A notebook, titled *ASTI The Avoidance/Suppression Approach to Eliminating Terrestrial Interference at TVRO Earth Stations* (from Microwave Filter Company/MFC) can assist TVRO equipment users with their interference problems. It recognizes that all TVRO system components have a finite susceptibility to terrestrial interference (TI). Steps to alleviate such interference may include avoidance, suppression or both.

The first edition of *ASTI* includes 14 chapters. After explaining the ASTI approach, the second chapter tells why satellites are used for signal relaying. Then a logical progression covers the operation of an earth terminal, sources and symptoms of terrestrial interference and guidelines to selecting an antenna to minimize TI problems. Other components of the TVRO system are explained with notes regarding their susceptibility.

Chapters eight through 11 consider the selection of a proper site and how to install the ground terminal defensively, using shielding if necessary, for the best system operation. Should problems remain, two additional chapters cover filtering and signal processing to reduce interference to the acceptable level.

Finally, SMATV systems and MATV installations are described, along with data to assist in aiming the receiving antenna, wind loading data and C-Band frequency/transponder conversions. A second appendix includes a site survey program for use with the IBM 5110 computer.

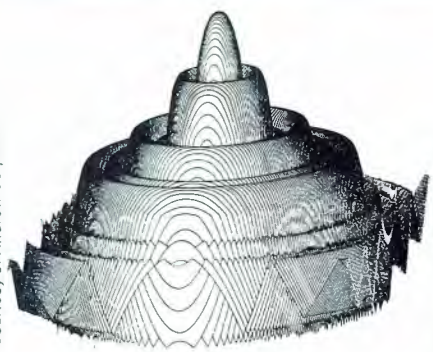
ASTI's loose-leaf binder approach allows easy incorporation of quarterly updates to the material. The annual charge for this information service is $60. Copies of *ASTI* may be obtained by contacting Microwave Filter Company, 6743 Kinne Street, East Syracuse, NY 13057.

Fanwall Corporation, Arlington, VA, has developed an alternative to shielding methods discussed in the *ASTI* manual. Its system uses precast concrete to reduce the incidence of interference. Patterns on the surface reduce RFI reflection and diffraction that might otherwise cause problems.

Interference due to strong carrier below 3700 MHz (Transponder 1).

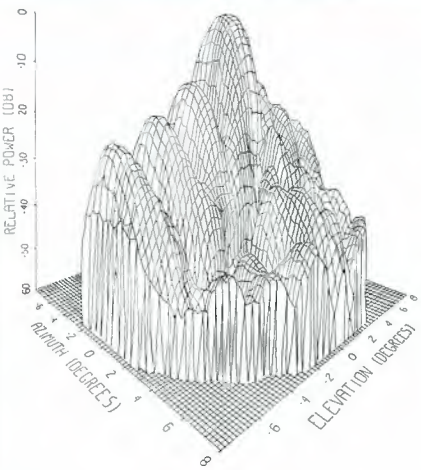
Out-of-band carrier interference eliminated with a bandpass filter.

Photos in the *ASTI* manual illustrate concepts, such as interference on a nearby carrier.



Courtesy of Andrew Corporation

An artificial rotation of a secondary earth station antenna pattern plotted in two directions provides a quick reference of main beam vs. sidelobe ratios.



Courtesy of Antennas for Communications

A digitized radiation pattern from a conical horn reflector antenna, depicted in three dimensions, shows the complex sidelobe structure of the radiated energy.

domestic satellites. (The RCA and Hughes schemes may have already become de facto standards, because Canada has used the Hughes plan on Anik D.)

- Adopt a US domestic satellite orbital deployment plan to aid the transition from 4° to 3° to 2° spacings.
- Encourage standard homogenous satellite designs for receiver sensitivities, transmit powers and antenna coverages.
- Encourage uniformly increasing transmit powers and receiver sensitivity to allow a larger portion of the noise budget to come from interference instead of noise.
- Encourage use/development of modulation techniques that reduce interference sensitivity, such as companding, pre-emphasis, noise weighting, average talker level and coding.
- Identify interference cases requiring routine frequency coordination and develop ways of handling them on a routine, flexible basis.

Spacing satellites at 2° is indeed feasible, but not without some costs. At the same time, the theoretical analyses indicate that certain digital formats may be tolerant of 1° or smaller spacings. One study indicates that the maximum orbit/spectrum efficiency is achieved at spacings equal to λ/D for earth stations of D diameter, for example, a spacing of 0.14° for a 30m antenna, 1.4° for 3m antennas. Further analysis of the subject should be conducted to determine possible impacts of smaller-than-2° spacing.

Editor's note:
This article is based on a report, *Reduced Domestic Satellite Orbital Spacing at 4/6GHz*, prepared by George L. Sharp, FCC Office of Science and Technology. Copies of the 154-page document are available from International Transcription Services, 4006 University Drive, Fairfax, VA 22030; 1-703-352-2400. Check with ITS for price; request OST Report #FCC/OST R83-2.

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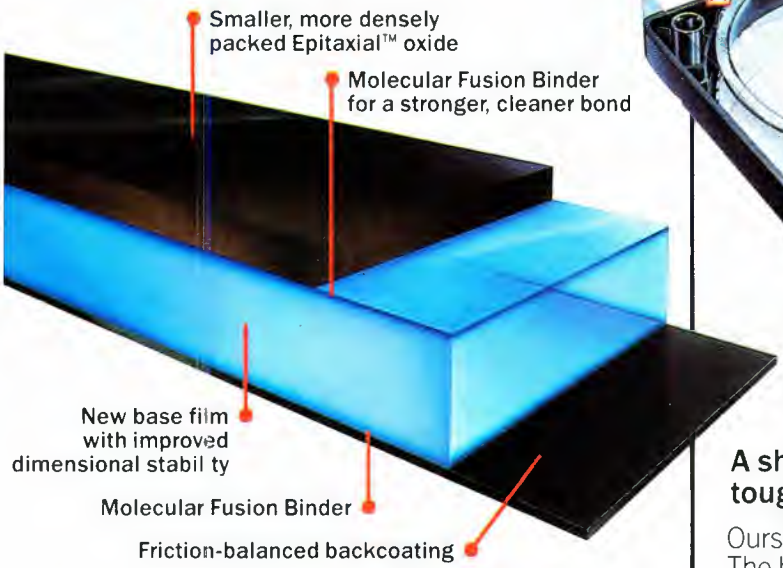

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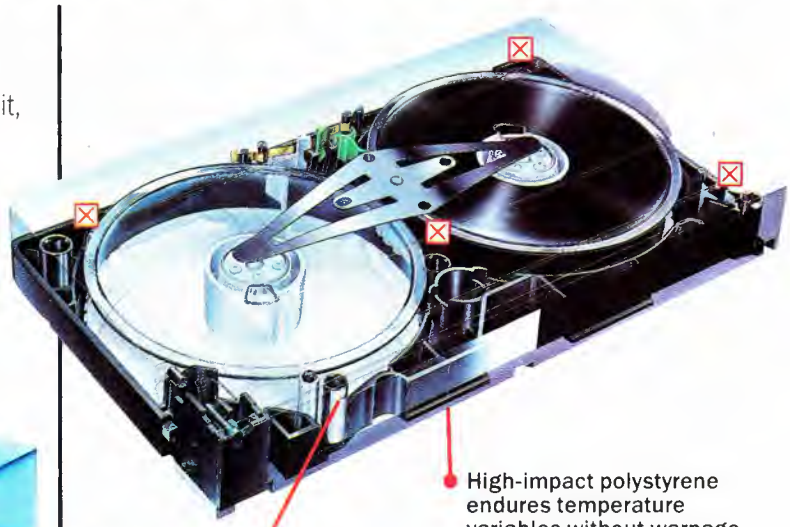

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Local commercial insertion for satellite-programmed facilities

By Paul D. Breneman, chief engineer, Telematrix Videotape Productions, Indianapolis, IN, and president, Breneman Labs, Indianapolis, IN

(A) The automatic commercial insertion center is just visible beyond the left side of the Warner-Amex master control center area.

Satellite-relayed signals are used increasingly as sources of programming for cable. Commercial insertion systems, offering increased revenue, have been used successfully in CATV installations for several years. Commercial insertion answers the needs of LPTV and translator systems as well. This article looks at the engineering side of the Warner-Amex QUBE CATV system in Columbus, OH.

In January 1981, Warner-Amex QUBE, Columbus, OH, began using automatic commercial insertion equipment. One year later, a new 5-channel commercial insertion facility was completed. It was designed for efficient operation and equipment testing based on experience gained during that year.

Because commercial insertion can be performed using various methods, careful thought went into building the new facility.

Initial planning

Before the new facility was designed, the sales and programming departments determined which channels would be sold and how many commercials would be anticipated. The facility was designed to allow for growth, so equipment would not have to be relocated if more channels were added. The type of satellite programming and commercial scheduling were also considered. Manual operation could be warranted, if commercials were sold for only specific sporting events on a single channel. Automatic operation could be justified if the commercials were sold on a regular basis for a full-time channel.

Commercial verification requirements also were discussed. A reliable method should ensure that clients are not billed for commercials not aired or commercials aired with severe technical problems. In a manual or staffed automatic operation, the operator could log when the commercials ran and note technical problems. In an automatic, unattended operation, an off-air recording could be made with the time, date and channel number inserted on the screen. The tape could then be viewed later to show what commercials aired and how they appeared. Other devices could be used to print a log of the time the commercials ran. However, most automatic electronic verification methods provide only a partial indication of certain technical problems that affect the picture or sound quality.

The videotape machine format also was discussed. Other cassette machines would work well, but ¾-inch machines were selected because of the lower equipment cost for a multiple-channel facility.

Also, traffic and logging procedures were developed to ensure a smooth flow of information from sales through traffic to operations. Commercial production capabilities were considered because many advertisers attracted to cable had never produced TV commercials. Many of these clients would need competitively priced facilities to produce their commercials.

The new facility

Photo (A) shows the commercial insertion facility in the background, viewed from the master control operating position.

The senior operator at master control switches signals and verifies the programming and technical quality on all 30 channels. The commercial insertion center is operated by another person who loads the videotape machines for movie playback. Both operators must be aware of commercial insertions, to ensure that the local commercials are aired when scheduled.

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(B) A view of the videotape area is shown above.

(C) Equipment (at left) for one channel includes video monitors for satellite, VCR and line; the status panel, with audio metering and selection switch; the automatic commercial insertion unit; and the time base correction unit.

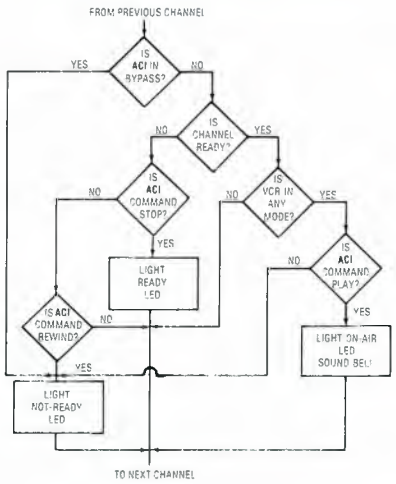

Figure 1. The flow chart for the computer program used for each channel. There are six decisions, some of which are for protection in case the operator does not follow procedures correctly. If the channel is *Ready* (tape cued) and the operator puts the videotape machine into any mode, a *Not ready* indication will result.

As shown in photo (B), the commercial insertion center is located next to the videotape machines for movie playback, so the tape operator can directly observe the status indicators A duplicate set of all the status indicators is mounted at the master control operating position, allowing the senior operator to stay abreast of the commercial insertion operation

Operational considerations

Photo (C) shows the equipment group for one channel. The black-and-white monitors show the satellite, videocassette machine and line signals. Located directly below the monitors is the status panel, which includes an audio meter and switching capability of the same signal sources as are fed to the video monitors. Below the status panel is the automatic commercial insertion (ACI) controller, which combines a tone decoder, videocassette machine controller and audio-video switcher. At the bottom is the time base corrector for the videotape machine.

Each channel has three LED indicators, at the commercial insertion center and at master control, labeled *Not ready* (red), *Ready* (yellow) and *On air* (green). A computer monitors the ACI controller and the videocassette machine to light the proper LED. Each channel is checked by the computer about every 150-millionth of a second. With this speed, even simultaneous changes are detected by the one computer that monitors five channels. (See Figure 1.) Also, a 1-second *bell* alerts the operators five seconds before a commercial airs. The computer is automatic and does not require any operator training. This status and testing equipment was designed and constructed in-house. Warner-Amex QUBE Cable is in the process of changing the computer to a dedicated microprocessor on a 3"x5" circuit board.

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Until now, color correctors have been designed for the primary purpose of correcting camera-colorimetry errors. FORTEL has changed that with the CC-1 Color Corrector,™ an incredible advancement in the art of color control.

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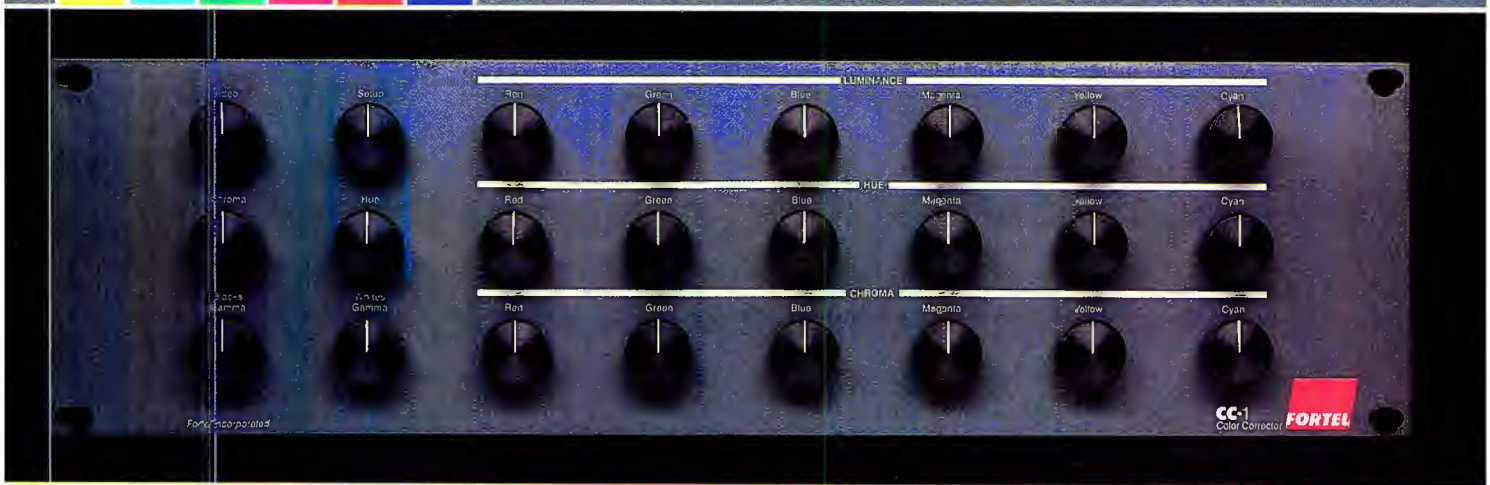

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(D) The commercial insertion area.

The 5-channel facility, shown in photo (D), includes three equipment racks and two videocassette machine racks. Figure 2 shows how the commercial insertion center connects to the rest of the master control facility. All five channels have identical video wiring. The audio wiring differs slightly for special cueing systems.

Four of the commercial insertion stations are dedicated channels. These channels are fed directly from the satellite receivers. The output of these dedicated stations feeds the routing switcher where the signal is switched on air. The fifth station is switchable to any program source appearing on the routing switcher. These program sources include other satellite programs, studios, tape playback and remotes. The switchable station also feeds the routing switcher where the signal is routed to air.

The method used to indicate where local commercials are to be inserted will determine what types of operation are possible. The most common method is the use of DTMF tones (dual tone multiple frequency). A sequence of four of these standard telephone Touch-Tone* digits is transmitted in approximately one-third of a second. One group of tones is used to roll the local commercial. The group of tones, transmitted 5-7 seconds before the local commercial is to air, allows the videotape machine time to thread and gain speed. The actual switch to the local commercial is determined by an adjustable time delay in the local equipment or by reading a tone from the commercial tape. Another set of tones is used to signal return to the satellite program.

Other methods of signaling the local breaks are possible. Aural cues can be given by the announcers on sporting events, but require manual switching.

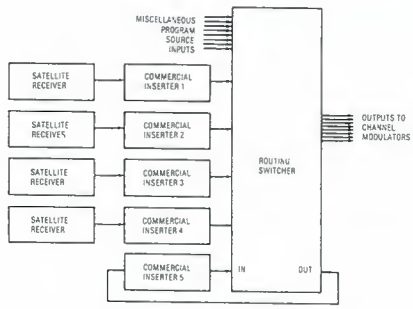

Figure 2. A block diagram of the 5-channel commercial insertion system.

Some satellite services plan to use signals encoded into the vertical interval of the video signal. These signals in video would be similar to DTMF tones, but offer advantages: no viewer distraction as with tones; possible data transmission of logs or other information; and more reliable sensing of signal presence. Another method of cueing, used for years by the major TV networks, is real time switching. This method requires accurate timing information for local operators in advance of the actual program. Inaudible audio carriers or a separate audio channel for DTMF tones are used by two services.

Commercial preparation

How the commercials are prepared and assembled for air should be considered. Possible methods include the following:

- single playback machine with an edited tape containing multiple breaks to be aired sequentially, or a single edited tape for each break; or
- multiple playback machines with separate tapes for each commercial, or long tapes with commercial files for random access use.

An unattended operation is possible using an edited tape with multiple breaks. However, unless the commercials can be sold to conform to a rigid schedule that repeats, a significant amount of editing time is needed because the commercials are assembled sequentially. Less editing time is required if a separate edited tape for each break is used, because whole breaks can be shifted without any re-editing. However, staffing to change the tape after each break is necessary.

If separate tapes are used for each commercial, more videocassette machines are needed for playback. One time base corrector could be shared by all machines to cut costs. Difficulties could occur if breaks are too close together, with insufficient time to change tapes. Errors can also occur if the tapes are supplied with more than one commercial on a single tape, especially if tones are used to cue the local tapes.

Long tapes with commercial files can be used with multiple playback machines for automatic random access. This method rarely has been used, however, because of the increased equipment cost.

The type of editing was also studied. If no signal correction is needed, videotape machines capable of RF dub can be used. Using an RF dub mode allows maximum signal quality by bypassing part of the electronic circuitry in the playback and record edit machines. It might be desirable to have signal correction capability so that individual commercial tapes can be matched during editing. This can be done using a time base corrector or a processing amplifier that does not distort an uncorrected video signal.

Engineering considerations

For ease of making equipment repairs, bypass capability was provided, so equipment could be tested or repaired without interrupting the program. The video and audio wiring diagrams show how relays are used to provide a method to quickly test the operation of any channel without interrupting the air signal.

Figure 3 shows the video wiring for one channel. Program sources (satellite receivers or routing switcher output) are fed through a patch to commercial insertion. The program signal then loops through the SAT monitor to bypass relay K1. The bypass relays are shown in the normal operating position (solid lines). When the channel is put in bypass, the signals cross over, as shown by the broken lines. In the normal mode, the program signal from bypass relay K1 loops through the TBC gen-lock connectors to allow the local tape to be locked to the program service. The

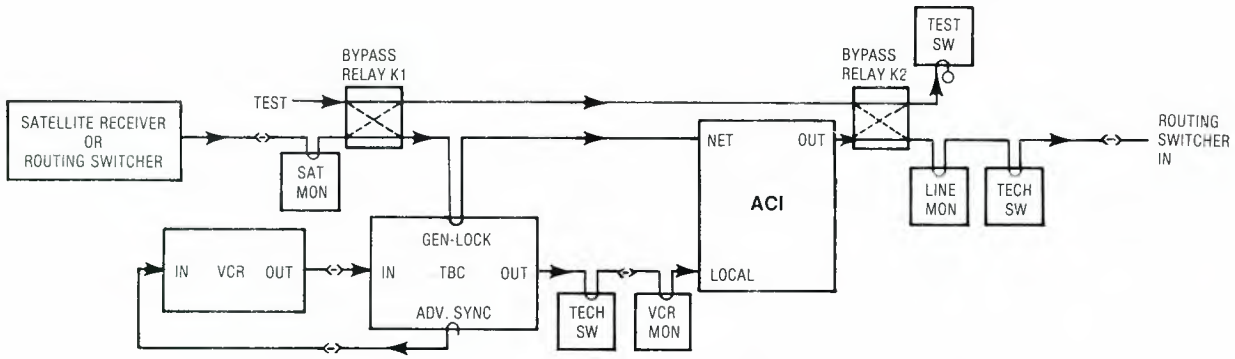

Figure 3. Video wiring for one channel of the automatic commercial insertion system.

signal then feeds the ACI controller network. The ACI controller program output enters bypass relay K2, and in the normal operating position the signal is fed through the line monitor and the tech switcher through a patch to the routing switcher.

A video DA (not shown) applies color bars into the test input of each channel. In normal operation, the channel test input is fed through the bypass relays to the test switcher. When the channel is bypassed, the program signal is fed directly through the relays to air. The test signal is fed through the TBC gen-lock to the ACI controller network and finally to the test switcher.

The videocassette recorder output goes through a patch to the TBC input. The TBC advanced sync output is fed back to the VCR input to keep the tape video vertically phased. The TBC output loops through the tech switcher, a patch and the VCR monitor, then feeds the ACI controller local input.

As Figure 4 shows, the audio is wired similar to the video with a 4-digit DTMF tone encoder as the test input. The VCR Channel 1 output feeds the ACI controller local cue input directly. The VCR monitor output feeds the tech switcher directly. The VCR Channel 2 output feeds the line amp. The output of the line amp feeds the ACI controller local input and also the meter VCR position. The VCR level control remains in preset or calibrated position. An LED illuminates when the control is not preset, to warn the operator that a non-standard condition exists.

Good signal quality control exists because all tapes used at the commercial insertion center are recorded by

"The Electro-Voice Sentry® 500 is a monitor by design."

Greg Silsby talks about the New Sentry® 500 studio monitor...

Everyone expects a studio monitor system to provide a means of quality control over audio in production.

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Only a true studio monitor speaker system can deliver an accurate indication of audio quality in . . . **audio**! After all, this is the language of the trained ear and doesn't require a complex interpretation process.

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The term "studio monitor" is often a misnomer. It's easy to tack a label on a box and call it a "studio monitor" without including the best precision engineering available, and careful attention to application design. Too often, these all-important considerations are traded-off for such marketing reasons as high cosmetic appeal, a particular type of popular sound, and low component manufacturing cost. While all of this may translate into high profit margins for the manufacturer it does nothing to produce a reliable standard for audio testing and evaluation.

Linear frequency response

The Sentry 500 follows the well-established Electro-Voice tradition of combining the most advanced engineering and manufacturing technology available. The Sentry 500 has been carefully thought-out and built to meet the specific needs of the audio professional. Like the smaller Sentry 100A, the Sentry 500 provides linear response throughout its range (40-18,000 Hz ± 3 dB). In fact, because the two systems share this linearity, program material may be mixed on one, sweetened on the other, with complete confidence in quality. Acoustic "Time Coherence" (the synchronous arrival of acoustic wave fronts from both high and low-frequency drivers) has been maintained through careful crossover design and driver positioning.

Constant Directivity

The Sentry 500 is a Constant Directivity System, benefitting from years of E-V experience in the design and application of constant directivity devices. Utilizing a unique E-V-exclusive high-frequency "Director", the Sentry 500 provides essentially uniform coverage over a 110° angle from 250 Hz on up to 10 kHz and 60° dispersion from 10 kHz clear out to 18,000 Hz! And it does this on both the vertical and horizontal axes. This means the "sweet spot", once a tightly restricted area large enough for only one set of ears, has been broadened to allow accurate monitoring by the engineer, producer, and talent—all at the same time. That's what we call Constant Directivity.

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To qualify as a truly accurate test device, a monitor speaker system must faithfully reproduce the wide dynamic range required by today's music and current digital recording techniques, and do it with low distortion. This is no problem for the Sentry 500 which combines the high efficiency of an optimally-tuned Thiele-aligned cabinet to the brute power handling of Electro-Voice Sentry components. Consider what you get with proven E-V components in the Sentry 500: the Sentry 500 will deliver 96 dB at one meter with only one watt and yet will handle 100 watts continuous program material with 6 dB of headroom. That's 400 watts on peaks! The same Super-Dome®/Director combination which maintains uniform dispersion of linear response out to 18 kHz also handles a full 25 watts of program power or 5 times the power handling capacity of most "high powered" tweeters. After all, tweeters should convert electrical energy to acoustical energy—not to smoke and fire.

The Sentry 500 is another no-nonsense Electro-Voice Sentry design with the incredible performance and credible price you've learned to expect from EV. I'd like to tell you the rest of the Sentry 500 story and send you the complete Engineering Data Sheet. Write to me: Greg Silsby, Market Development Manager/Professional Markets, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107.

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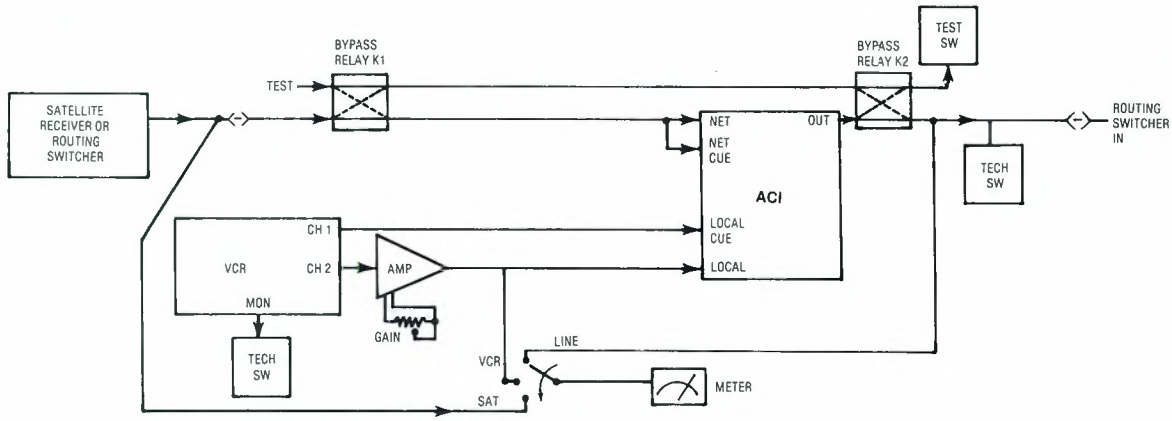


Figure 4. Audio wiring for one channel of the automatic commercial insertion system.

one videotape machine at the commercial assembly editing station. A preset audio level at the commercial insertion center and regular engineering calibration matches the audio level of the videotape machines at the commercial insertion center to the videotape machines at the commercial assembly editing station. No audio processing was used at the commercial insertion center. It is more efficient and economical to put one high quality audio processor in the commercial assembly editing station than to put a separate audio processor on each channel at the commercial insertion center.

Most VCR controllers use tones on a second audio channel of the local videotape to provide automatic or manual assist operation. If no tones are used, there exists the problem of cueing ¾-inch machines to avoid upcutting first video, because most older machines do not have reverse playback.

Three different tone controls may be used, depending on the particular equipment. The stop tone puts the VCR at its cue point, just before the commercial starts. Another tone starts the next VCR, if separate tapes are used, or causes a switchback to the satellite program. A third tone can put the machine into rewind after the last spot on the tape.

Allowances should be made for the required cue toning time. If breaks are being edited, master tapes with accurate tones can be recorded. These tapes can then be dubbed, and spots edited into the dubs, so that no cue toning time is required. A controller could use a count of control track, SMPTE and/or vertical interval time code, but these methods require increased equipment cost.

Testing a channel is simple. The channel is bypassed using the status-panel *Normal/bypass* switch. A *Not ready LED* warns the operator if the channel is bypassed. The test output of the channel is observed on the monitor. When a proper code is dialed into the DTMF tone encoder and the tone encoder is activated with a momentary switch, the tones are sent through the ACI controller, as program audio normally would be. If the channel operates properly, the videotape will play and then switch up on the test output.

The system provides for simplified break delay and timing measurements. A tape, recorded with time code appearing in the picture, includes tones that simulate a commercial. A second signal with time code in the picture is fed to the test input. The tape is played, using the tone encoder as if it were a normal break. The output of the TEST switcher is recorded and viewed in an editing machine at slow speeds or still frame, allowing the time code used to measure the exact delays and switch points.

In an unattended operation, an off-air recording can be made with the time and date inserted into the picture. The VHS format is ideal for recording such a verification tape, because it has quick lockup from record pause. On models without still-frame, no head-to-tape contact occurs during pause, so tape and head wear are minimal. The VHS machine can be wired to the ACI controller so that off-air recording begins when the network tone is received and stops when the local videotape machine stops or goes into rewind. The VHS tape could be viewed once a day to verify that commercials ran correctly or to isolate certain technical problems. This method, used during the first year at Warner-Amex QUBE Cable, is now offered as an option on some commercial insertion systems.

Summary

There are many different ways to approach the same requirements. Considerable thought on the available methods will produce favorable results. As more cable operators become involved in selling local commercials, equipment manufacturers will be encouraged to market more sophisticated commercial insertion devices to meet the specific needs of certain cable operators. This equipment will provide more options to tailor systems to particular requirements.

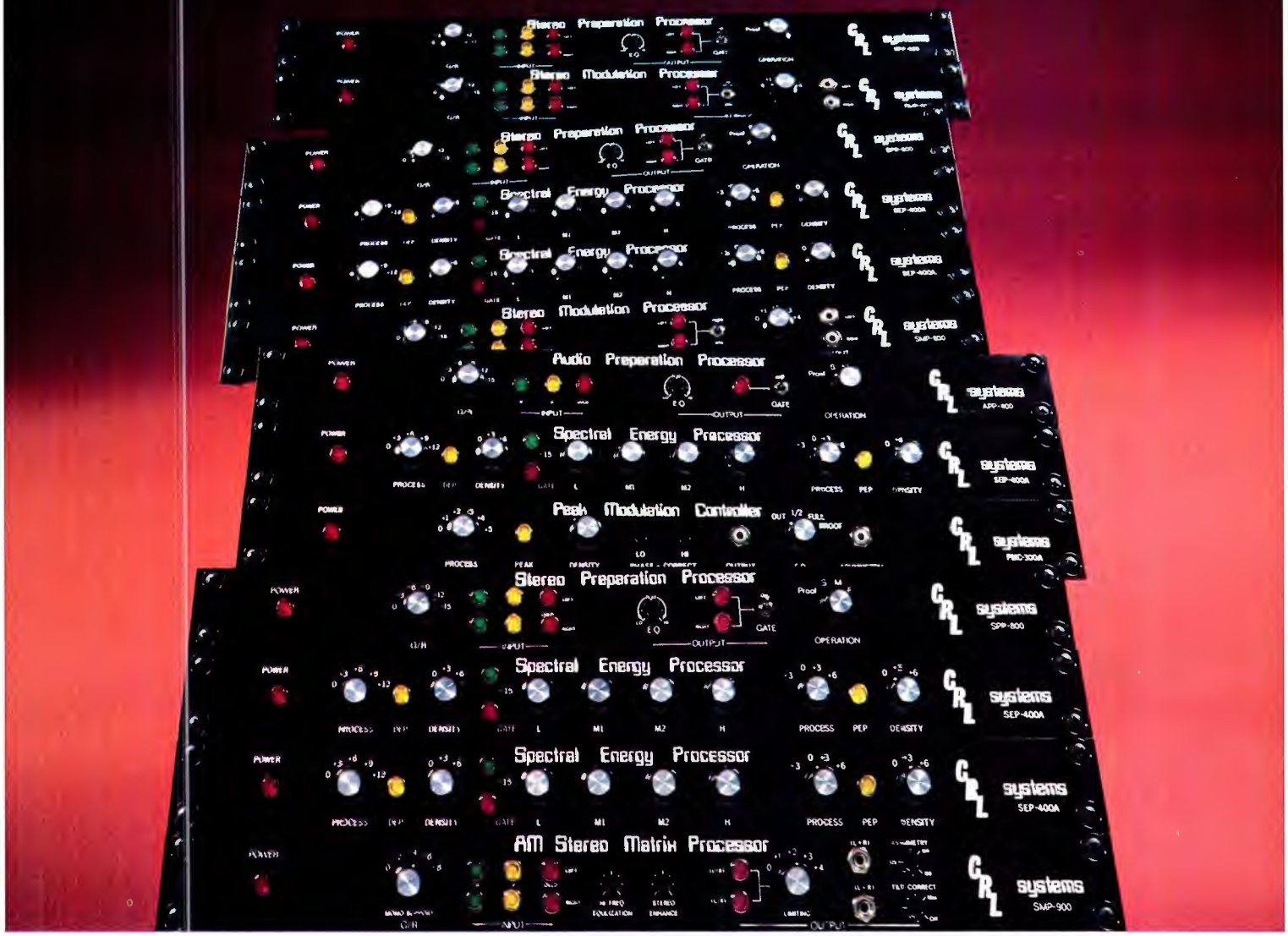
Mutual adds five satellite uplinks

At press time, the Mutual Broadcasting System announced the implementation of a plan to add five permanent, on-line satellite uplinks in major urban communications centers to its national satellite system.

The systematic enhancement program will give Mutual instant full-time uplinking capabilities in New York, Chicago, Los Angeles, San Francisco and Houston, in addition to the existing uplink at Mutual's satellite complex at Bren Mar, VA. Satellite services have begun from Houston. Technical tests and final integration plans should be completed at the other sites by the end of November.

These uplinking facilities, which have been acquired under a number of agreements with third-party organizations, will provide Mutual with the capability to originate and transmit broadcast or non-broadcast signals from six sites, at a moment's notice, for distribution via an existing system of 650 satellite earth terminals located nationwide. Mutual presently multicasts programming to 900 radio stations daily via Westar IV and provides satellite services to a variety of broadcast and non-broadcast users on a full-time and occasional basis.

SEE HOW WE STACK UP.



CRL offers much more than just another limiter for your AM or FM station.

We provide you with any combination of multiband AGC's, four channel processors, and pre-emphasizing limiter/clippers for your stereo or mono needs.

Because of this, it's no wonder we have been stacked up against the best known audio processors in the industry . . . and won!

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Corporate profile: Otari

Shown above (from left) are Masayuki Hosoda, president of Otari; Otari headquarters in Tokyo; and a VL series Beta format videocassette loader being checked for operation.

By **BE** staff

Recently, I visited the main assembly plant of Otari Electric Company, Japan, a producer of audio recording equipment. Takao Aoki, general manager of Otari's Overseas Marketing Division, escorted me to the Matsumoto plant in the Japanese Alps. On the 3-hour train ride to reach Matsumoto from Tokyo, we discussed Otari's success, methods of operation and future plans.

Japan is a tiny island country with a dense population and almost no natural resources. Because of this, Otari has had to overcome a series of problems peculiar to Japanese companies. Otari and most Japanese companies have solved many of their problems through the large-scale use of subcontractors. For example, the Otari factory at Matsumoto manufactures little. OEMs manufacture 90% of the components that go into Otari equipment. These components are shipped from all over Japan to the factory, which should more properly be called an assembly plant.

This process fulfills several needs of Japanese manufacturers. First, they can assure themselves of attentive quality control by selectively choosing quality OEMs. Second, if sales are heavy, and they need to increase production, they simply add contractors. There is no need to increase factory size or hire new people. Likewise, when times are bad, there is no factory space to lie fallow and no employees to lay off. As with everything else in Japan, compactness and maximum usage are the keys to business success. Finally, because Japan's small amount of available land is extremely expensive, this approach also enables Otari to locate its main

Mitaka factory facility (above).

Otari technical center (upper left).

Matsumoto factory facility (at left).

assembly plant away from industrial centers. Many of the OEMs are located throughout Japan, so Otari's assembly plant can be located in a remote but readily accessible and less costly area.

Historically, Japanese companies have been strongest in making improvements on Western innovations. Technological creativity has been slow in coming from Japan. Otari, similar to many other Japanese companies, is setting out to change this. Otari now has two R&D operations and is involved in creating, rather than merely improving, technology.

At Otari, no development proceeds, however, without innumerable checks at each stage. Aoki told us that some products have taken as long as two years to develop because they were not allowed to carry the Otari logo until they had been thoroughly evaluated by prospective end users and their own engineers. In fact, potential end users are querried throughout the products' development.

Otari's overseas marketing also shows involvement with end users. Otari has sales and service centers in the United Kingdom, Germany, Singapore, Japan and the United States, employing approximately 400 employees worldwide. The most

The definition of the best color camera tubes in the world.

No matter how you define your color camera needs, you will want to be certain you have chosen the best tube for the job. And no technical appraisal can be complete without EEV Leddicons.

Take lag or smearing. Because Leddicons incorporate a unique light bias arrangement, shading is minimal. So is differential lag. The result is that a football in flight will always look like a football — not a flying saucer!

As for color imagery, you simply cannot improve on Leddicons. Extended reds have a precisely-engineered response with an infra-red filter providing cut-off exactly where you want it.

Or compare the highlight image performance of Leddicons with other tubes. The difference is that the retention effect is minimised by a unique target manufacturing process — even in the very difficult extended red channel where other tubes are simply unable to cope.

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Then there's geometry. The optimised electron optical design of Leddicons ensures the best possible geometry. Registration too is equally distortion free — we can, in fact, supply computer-matched sets for all three channels.

And what about microphony? With EEV's unique anti-microphonic mesh assembly, Leddicons provide the cleanest pictures — even from cameras operating in areas of high ambient acoustic noise.

As for choice, there's simply none better than Leddicons. That's because the range covers fully-interchangeable sizes and types to suit virtually every type of studio, EFP and ENG camera used in the world today.

When you add up all the facts about Leddicons, there is only one conclusion — namely, the definition of the best tubes for your camera.

But don't leave it at that.

Next time specify Leddicons for your new equipment and as replacements and find out what that definition really means in practice.

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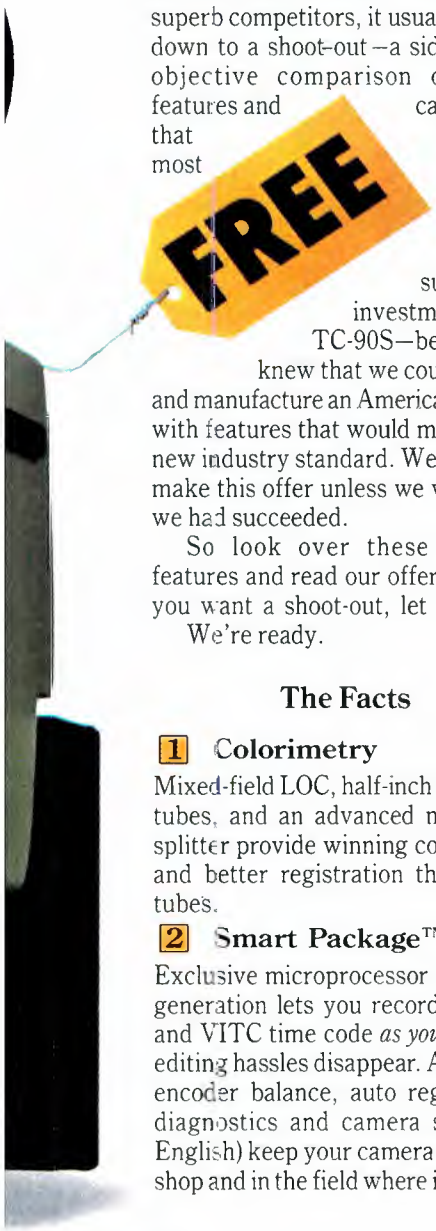
If your HL-79 beats
we'l

our TC-90S, give you the TC-90S!



Comparison. The real test. When you have to make a choice between two superb competitors, it usually comes down to a shoot-out—a side-by-side objective comparison of those features and capabilities that mean the most to you. Harris has made a substantial investment in the TC-90S—because we knew that we could design and manufacture an American camera with features that would make it the new industry standard. We wouldn't make this offer unless we were sure we had succeeded.

So look over these TC-90S features and read our offer. Then, if you want a shoot-out, let us know.

We're ready.

The Facts

1 Colorimetry

Mixed-field LOC, half-inch diode gun tubes, and an advanced new beam splitter provide winning colorimetry and better registration than larger tubes.

2 Smart Package™

Exclusive microprocessor time code generation lets you record SMPTE and VITC time code *as you shoot*, so editing hassles disappear. Automatic encoder balance, auto registration, diagnostics and camera status (in English) keep your camera out of the shop and in the field where it belongs.

3 Automatics

Auto registration
Auto beam control
Auto encoder balance
Auto iris
Auto white balance
Auto black balance
Auto scan failure protection

4 Gain Tracking

The TC-90S maintains black level under all conditions to eliminate color shift, even with changes in gain.

5 Noise

Minimal apparent noise at +18 dB gain for superb low light level performance.

6 Weight

The TC-90S, with standard lens and battery, and including the viewfinder, weighs less than the HL-79, similarly equipped. No more "sagging shoulder" feeling, and your pictures will show it.

7 Profile

You can see to the right! Even when you're shooting, you have an unobstructed view to the right over the top of the camera.

8 Price

The TC-90S, with microprocessor, tubes, batteries and a 15:1 zoom lens—a top-of-the-line camera—is list priced under $30,000!

9 24 Hour Service

Call us. 24-hours-a-day, 7 days a week. Our telephones are constantly manned by service engineers, and we're ready when you need help.

The Challenge

The details of the shoot-out are simple: We must have on file the coupon below filled out by the cameraperson at your facility, and a letter signed by your chief engineer or general manager on your organization's letterhead, requesting the shoot-out and stating that you are in the market for a new ENG camera. Then, if your current model Ikegami HL-79 (or an HL-79 you secure for the shoot-out) meets all, and exceeds one or more, of the TC-90S features given above, we'll leave without our camera—it's all yours.

There's More

To those of you who believe that time is the true test of a product, we'll make another offer: Forget about filling out coupons and writing letters—call us today and order a TC-90S. Then use it in the field for 30 days. If it doesn't live up to our specifications, we'll refund your money.

Either way, the TC-90S is a winner. In a shoot-out, or on your shoulder.

OK Harris, prove it!

Mail to: Mark Gray, Director of Marketing, Harris Corporation, Studio Division, P.O. Box 4290 Quincy, IL 62305, (217) 222-8200 TLX 404347

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Hurry, our incredible offer expires January 31, 1984. And good luck. Your HL-79's going to need it.

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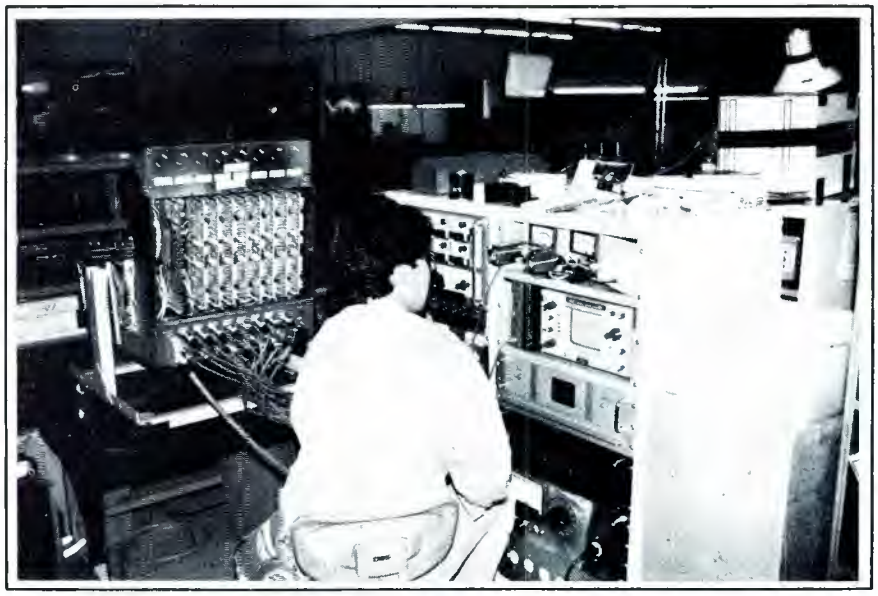
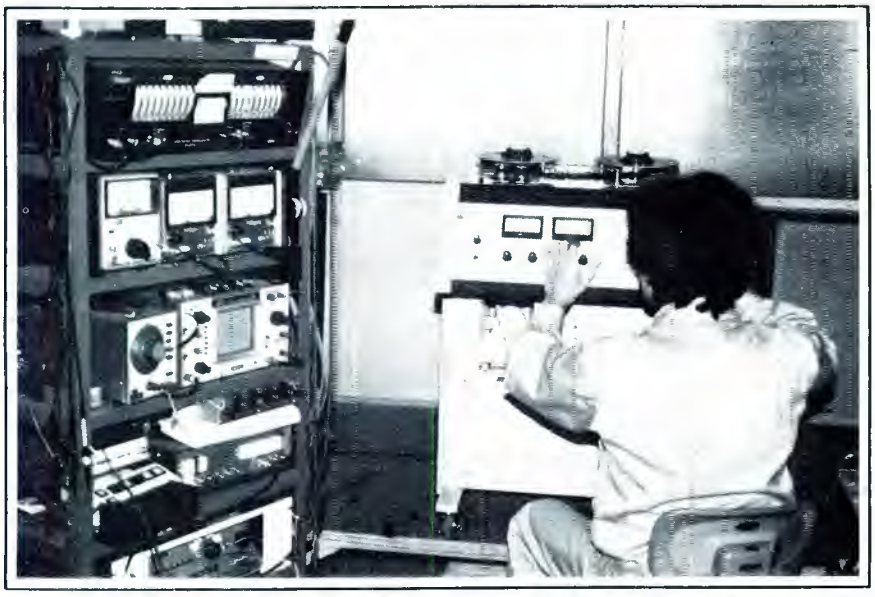
Adjustments are made to the MTR-10 mainframe.



An MX-5050B Mark III-8 set up for final amplifier performance checks.



A completed MTR-10 undergoes final inspection.

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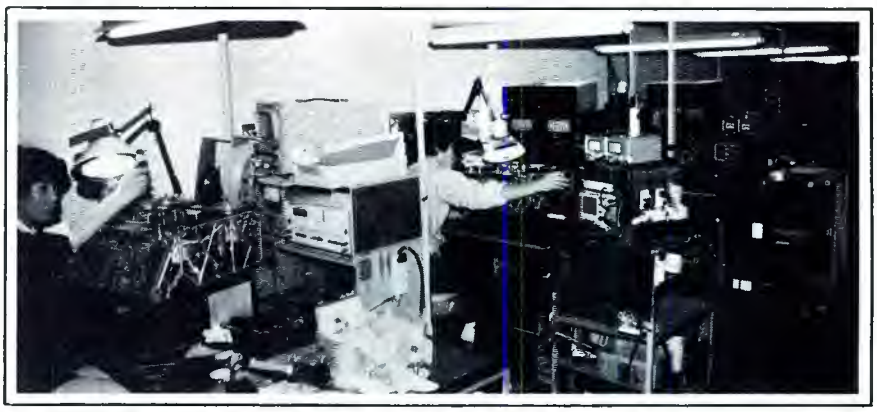
Once completely assembled and checked, an MX-5050B Mark III-8 is again tested before crating for shipment.

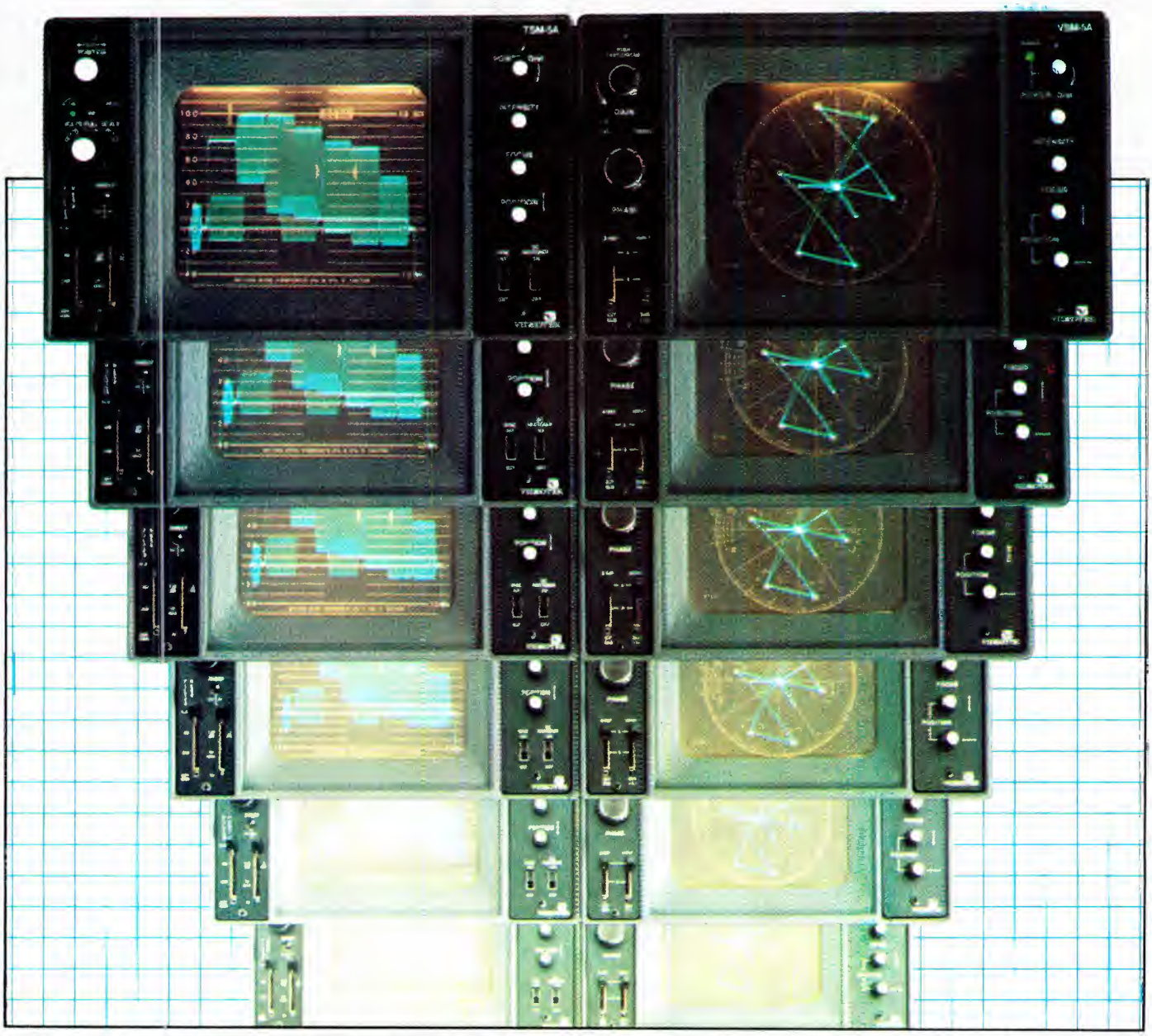


The last three stations of the MX-5050B assembly line recheck the mainframe components, adjust the heads and perform overall system checks.

An MTR-90 circuit board is adjusted before installation.

Special instrumentation is required to check the speeds of an MTR-90 capstan-drive unit. An electron microscope produces a video display to help locate the capstan encoder.

Movin' up!



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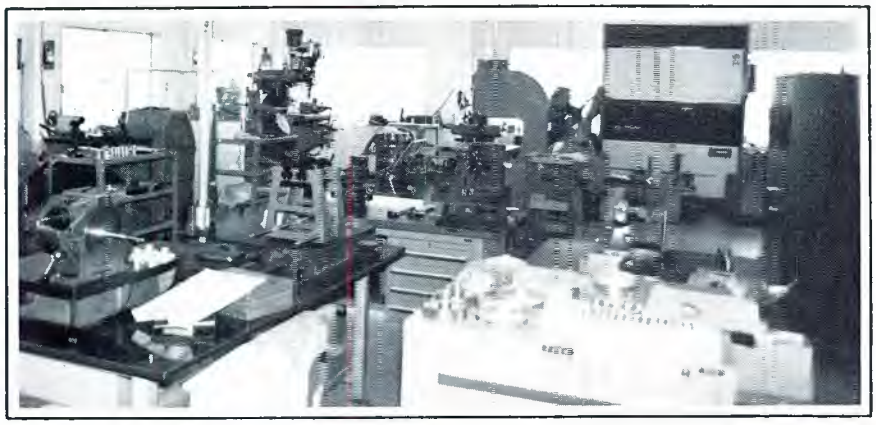
Adjustments are made to the high speed slave duplicator unit.

Kanji characters spell out the Otari motto, "For Improved Quality." Located beneath are monthly inspection records, where employees may check the results of their efforts.



In the machine shop, critical tolerance components are made by hand.

The winding room.

critical element of these operations may be the regional service center established in each area in which Otari sells products. Dealers handling Otari equipment must demonstrate technical support capability. For example, only eight dealers are allowed to handle sales of the MTR-90 in the United States, and they must have competent, factory-trained technical backup. To bring foreign distributors up to par technically, annual technical seminars are held, taught by Otari factory technicians. Any distributor who fails to attend these sessions violates his contract and may be terminated. Also, Japanese engineers and technicians are sent, on a rotating basis of approximately two years away from home base, to temporary assignment in other countries to ensure Otari that its interests and those of its end users are being served. Obviously, pride in craftsmanship does not end with the equipment being shipped from the factory. What Otari makes, it services.

One of the most fascinating features of the company's operation is its incorporation of the Japanese virtues of beauty, cleanliness and honor in even the most mundane things. A tour of the Matsumoto plant results in a bit of culture shock for the average Westerner. Upon entering and removing our shoes (even in factories, street shoes are forbidden) and replacing them with sandals, I was treated to a succession of pleasant surprises. The plant is immaculate—not only in the various test rooms in which recorders are tested at each assembly stage—but in every corner of every part of the factory. Company pride is everywhere, but is perhaps most apparent in the large quality-control charts prominently displayed and studied daily by all workers. The courtesy displayed by staff members to each other, regardless of rank, was especially impressive. All of this was even more amazing because the plant was in the process of being expanded, yet nowhere were there signs of the usual chaos accompanying such construction.

This matter of courtesy also applies to selling situations. When asked about selling techniques, or more specifically, why the Japanese thoroughly frown on aggressive one-on-one selling, Aoki said, "Engineers are a very professional group. We encourage professional people to do their own testing and then they will buy the right machine."

When asked what makes Otari so successful, Aoki attributed it to Otari's excellent sales and marketing staffs and to the dedication of their engineering personnel. Would Aoki say anything bad about any of his competitors? Certainly not. That is

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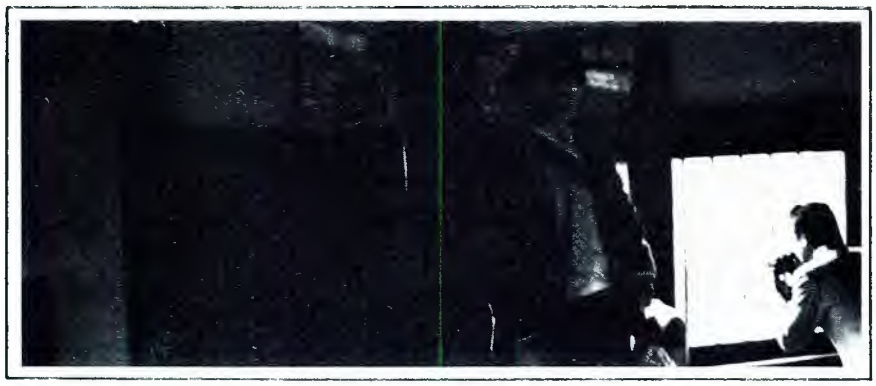

The production engineering department.

not the Japanese way.

One of the lesser known facts about Otari is that it is the largest producer of tape duplicating equipment in the world. It makes a full line of duplicating systems—open reel and cassette—as well as a full line of video and audiocassette loading equipment, including a machine to load the new microaudiocassettes now becoming popular. Interestingly, the largest purchasers of duplicating equipment are the underdeveloped countries that do not have the broadcast capability to beam programs throughout their countries and have to be content with duplicating information, video and audio, and shipping pre-taped cassettes to rural locations for local broadcast.

From the employees' point of view, there is good news and bad news in working for a Japanese company. The yen does not buy what it used to, so when workers retire (at age 60), chances are they will have to watch their pennies in retirement and even then may be hardpressed to live comfortably. Also, job opportunities for those past retirement age are few. Six-day weeks are more often the rule than the exception, especially for young workers. The "whistle blows" when the job is finished, which may be closer to 10 p.m. than to 5 p.m.

On the other hand, there are benefits such as profit sharing; good vacations; excellent, clean and pleasant physical facilities; and two bonuses each year, in summer and winter. Summer bonus generally amounts to two or three months' salary, while winter bonus is usually three or four months' salary. Perhaps the best news is the knowledge that no matter what your position with the company, as long as you are a team player and give your best for the good of the corporation, you will be accorded respect from everyone, especially the corporate hierarchy.

What about Otari's future? Aoki, like any good businessman, did not let us into the corporate vault, but clearly, R&D is a major and ever-increasing commitment. With the opening of its R&D operation in California, under the direction of Steve Krampf, that commitment is real.

Aside from that, Aoki said he thinks that multi-track equipment is becoming increasingly important to the broadcast and video post-production markets. He foresees a continuing interest on the part of TV viewers in quality audio and a continued pressure on broadcasters and producers of broadcast programming to increase sound quality for radio and television. From what I could see, as quality sound progresses in broadcasting, Otari will be right there supplying it.

Panasonic invites you to see the next generation of Video Cart Machines at the 1983 SMPTE show.

Introducing the MVP-100 Multi-Function Video Player.

It's the MVP-100 Multi-Function Video Player and it will revolutionize broadcast automation. The big story behind the MVP-100 is its computer-controlled broadcast programming capability. Commercials, station IDs, and promos can all be programmed with time code accuracy. The MVP-100 is more than a spot sequencer. It can also function as your complete program player. And because it's modular, up to 24 video cassette transports can be loaded in advance. The MVP-100 also features M-format for multi-generation picture quality that goes far beyond 3/4".

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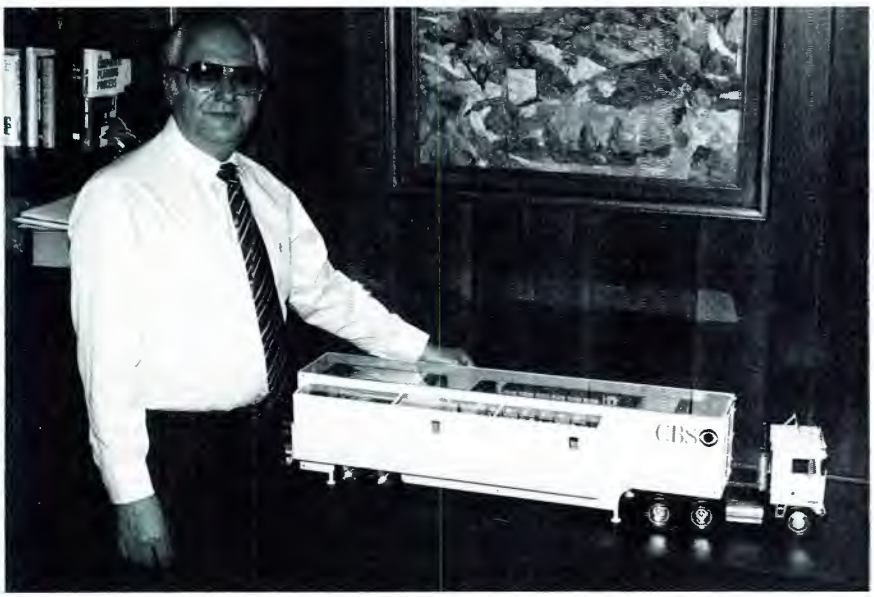
Part 2
Inside CBS Operations:
On the road

By Bebe F. McClain, president, B.F. McClain Productions, Asheville, NC

The author (at right) discusses equipment setup at the Atlanta Golf Classic with the CBS crew (from left): Bob Dailey, director; Fred Dansereau, EIC; and Marty Solomon, director, field operations.



Solomon poses with a model of the new CBS mobile unit.

In the July 1983 issue of **BE**, the author reported on the people and equipment behind CBS Operations in New York. Here, in Part 2, she reports on her travels with a CBS remote operations crew, with special emphasis on the airing of the Atlanta Golf Classic.

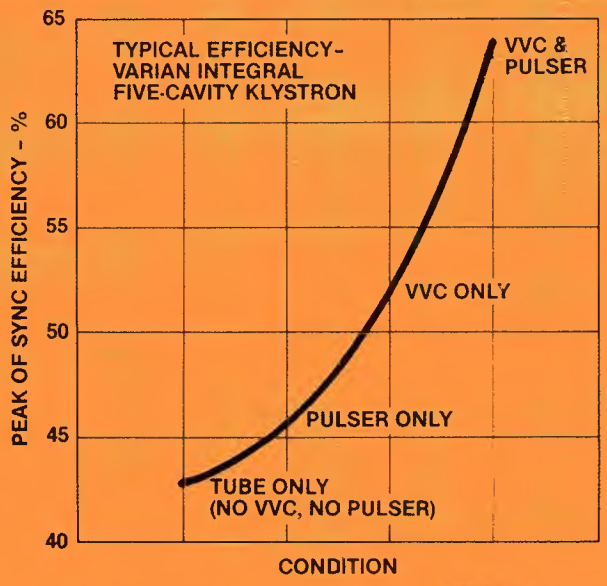
Handfuls at a time, CBS Operations people converged at the site of the Atlanta Golf Classic. This assemblage of technical titans proceeded to build a minibroadcast center from the ground up. When the hubbub ceased and the monitors faded from black to *on air*, some three dozen people began interacting with a professional unity akin to the performance of a philharmonic orchestra.

A remarkable aspect of this sports coverage was not just that it was virtually flawless, but that CBS field personnel accomplish similar feats more than 300 times a year, often at seven or more sites simultaneously. Although some might consider this coverage to be the technical achievement of electronic gadgetry, Marty Solomon, director of CBS field operations, does not.

"People make these shows," Solomon said, "not hardware. Over the last 30 years, equipment has come and gone, but the people have stayed. They represent the finest talent in the industry."

Inside CBS

During the past few months, I had the opportunity to go inside CBS Operations in New York and to visit remote production sites. To understand how CBS field operations covers more than 300 remote events a year, one must look behind the scenes, beginning with the corporate structure.



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Improved efficiency reduces operating cost.

The payback period realized over the cost of installation of a Varian variable visual coupler can be surprisingly short. Considering the rising cost of electric power, broadcasters will make a sound investment with the inclusion of variable visual couplers.

For more information on efficiency improvement, contact your original equipment manufacturer or Varian Microwave Tube Division.

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Shown (from left) at the main announce tower overlooking the 18th green at the Atlanta Golf Classic are Pat Summerall and Ken Venturi. The camera operator is George Klimcsak.

Sandy Bell, technical director, checks with Frank McSpedon, camera operator at the 17th green coverage using a Hollywood crane.

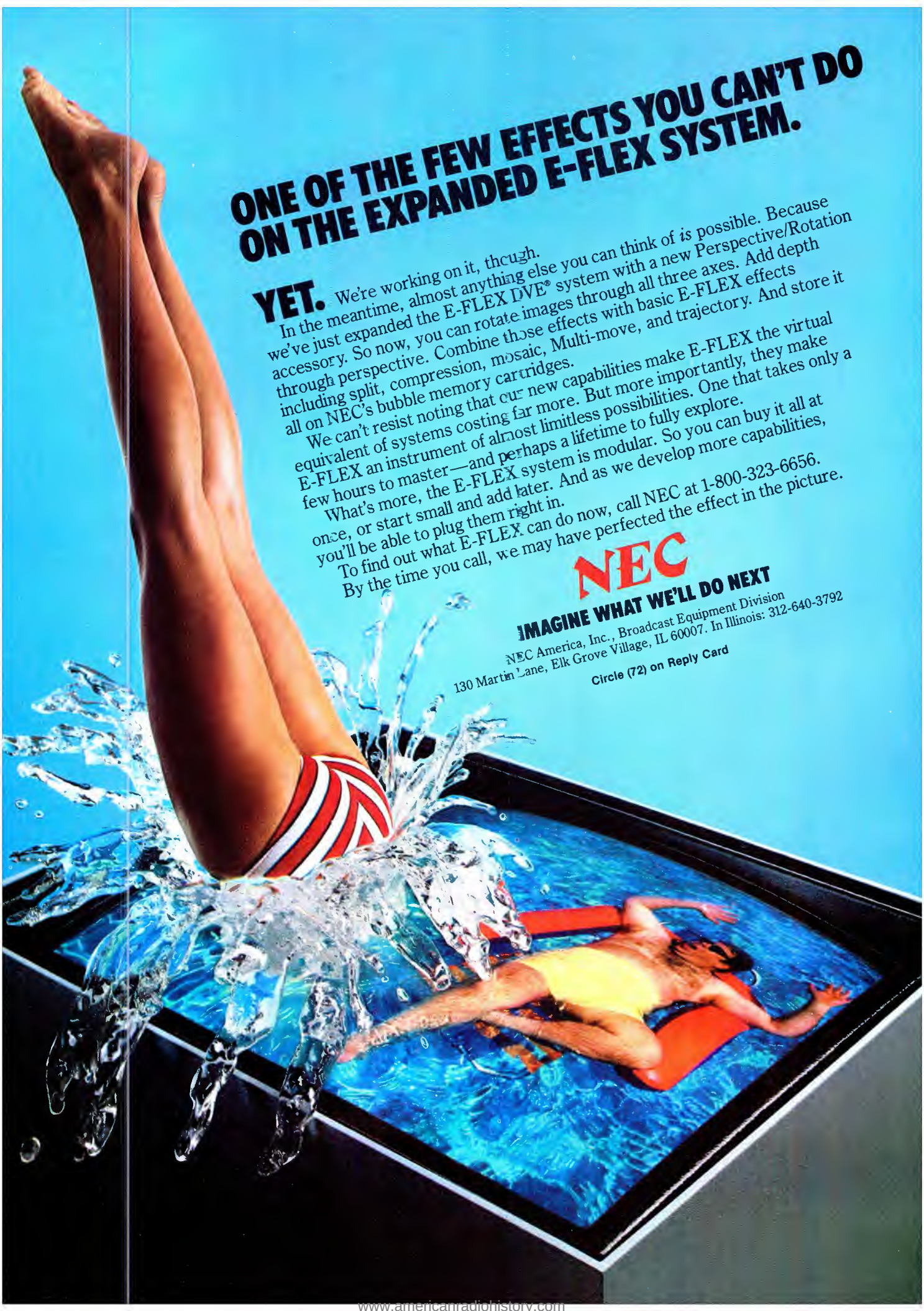
View from inside a typical camera tower.

CBS Operations is headed by Bob Hammer, who oversees the New York Broadcast Center, including the equipment and manpower used there and dispatched for remote coverage. His multifaceted responsibilities include providing technical services needed to prepare and air CBS programs. The technical services group, accountable to its director, Jack O'Donnell, is broken into six general areas: videotape, film, studio services, maintenance, central broadcast and operations, and field operations. Although these departments are interrelated, field operations is our main subject here.

Solomon, who is entrusted with the ever-growing task of managing this far-flung empire, said he thought the key to CBS's success in field endeavors lays *not* just in selecting the right kind of people and grooming them to meet the unexpected, but also in fostering a teamwork attitude that makes them unafraid to tackle unusual situations. In doing so, he puts a lot of faith in his managers and technicians.

Preparation for coverage of the Atlanta Golf Classic began months before the May 21 air date, when CBS Operations and CBS Sports (the customer) agreed upon a production budget. At this point, the two department managers reporting to Solomon became involved.

One of the department managers, Art Jensen, determines if CBS mobile equipment or rental facilities will be provided for the remote. Wall charts in Jensen's office list assignments of mobile units and field technical



CBS Operations--New York

Vinny Castrataro (left), director of central and broadcast operations, looks in on the program control area at CBS Broadcast Center in New York, where commercials are integrated into incoming programs.

On the *Dan Rather News* set (from left) are: Bob Hammer, vice president, CBS Operations; Jack O'Donnell, director, technical services; and Fred Schutz, director, maintenance.

Gil Miller, technical director, operates the new Ampex video switcher in CBS Control Room 41.

Jim Paterson (left) inspects the videotape editing activities in one of the *CBS News* editing rooms.

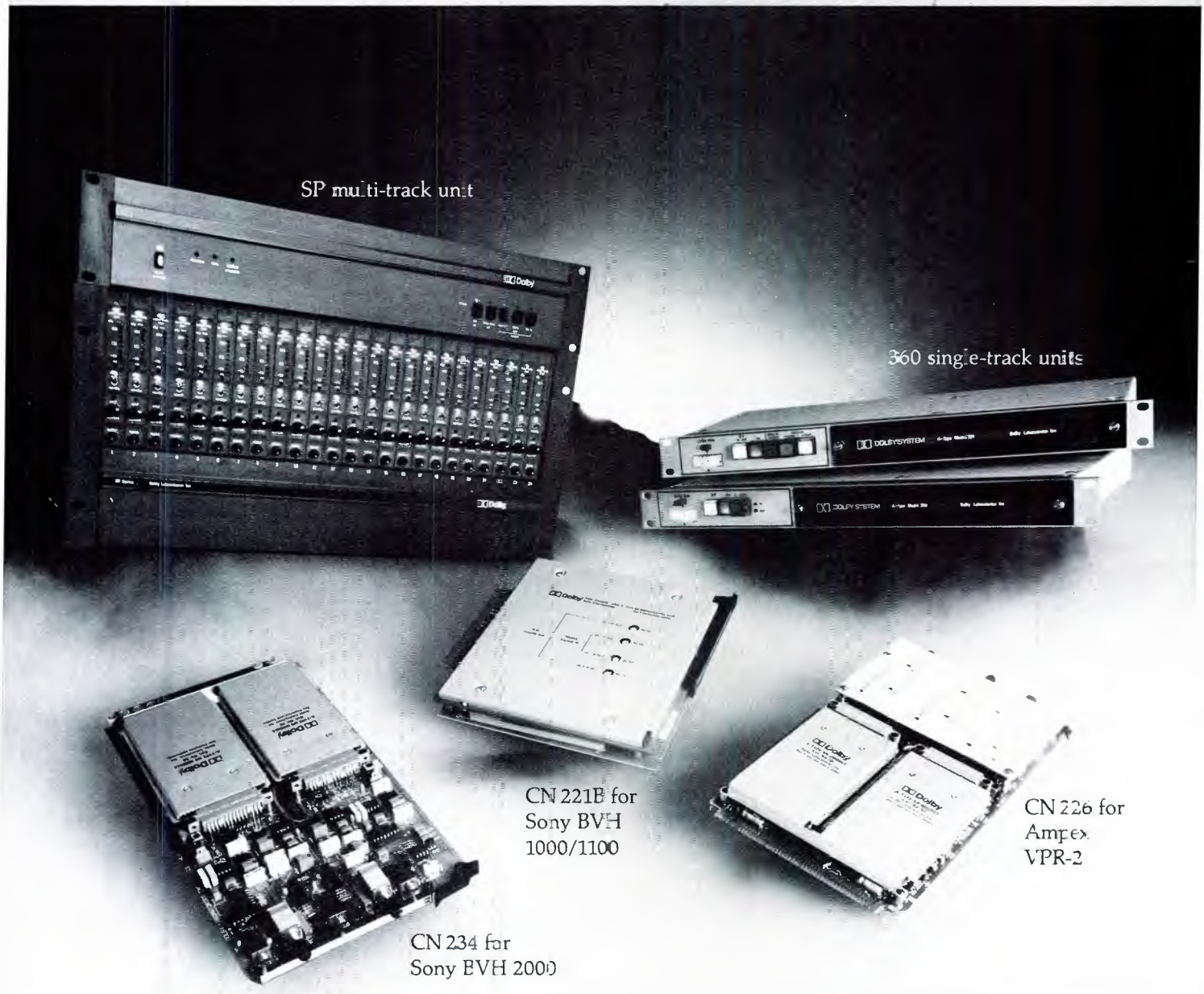
CBS Control Room 41 features the latest equipment available.

In CBS master control, O'Donnell (left) checks out systems operations.

Andy Barry, director, videotape operations, inspects 1-inch VTRs dedicated to the adjacent CMX editing room.

Shown are a few of the 350 racks of equipment in the CBS Broadcast Center, which support production and keep CBS on the air.

DOLBY® NOISE REDUCTION FOR THE 1980'S



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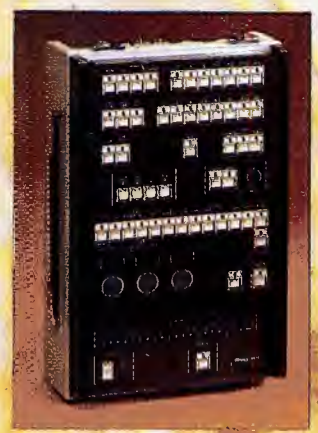

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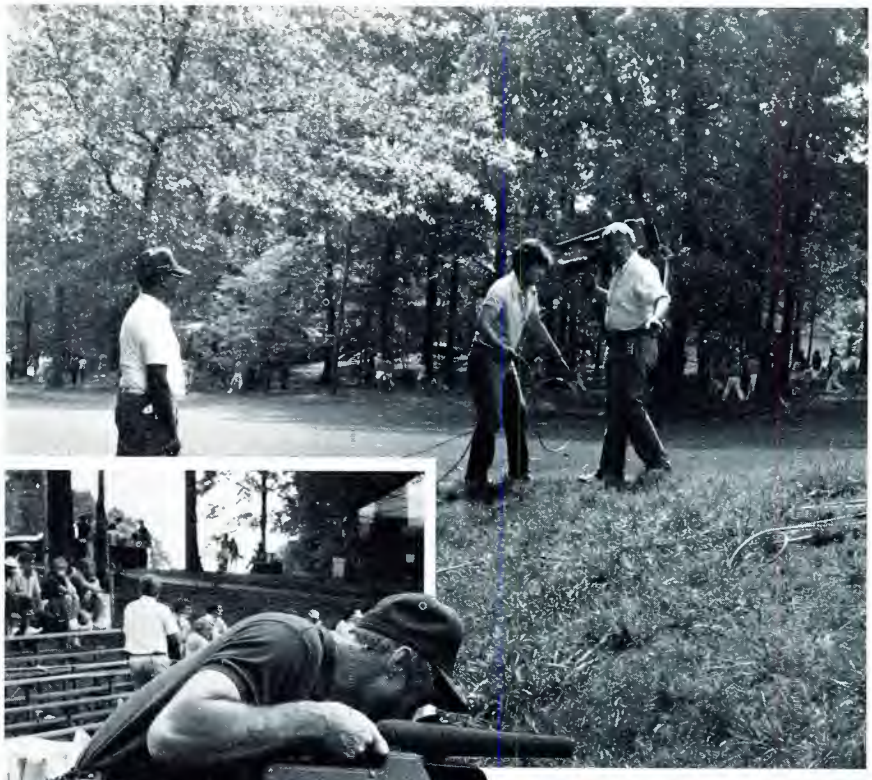
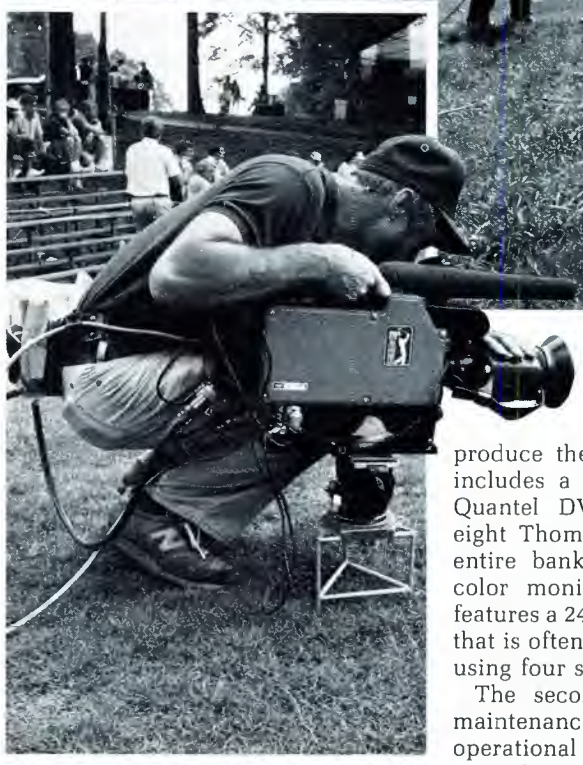


Camera operator Bob Welsh connects into camera drop along course.



Camera operator David Graham attaches his camera to his grass mount invention.

managers to CBS remotes. This 2-month advance schedule cross-references events with the support equipment to be sent, such as the hand-held cameras, Chyrons, ADDA still-stores and Hitachi portable 1-inch recorders. Not only does Jensen track the CBS staff and hardware, but he also contracts for rental units, often totaling 24 mobile units a month, and an extensive listing of single items.

The other manager, Rick von Seekham, schedules drivers and trucks and devises shipping schedules for support gear needed on the trucks, weaving them into the complex web of the season's activities.

CBS Operations owns five mobile units, each comprising two trailers that travel together. One trailer is the production trailer, in which the producer, director, technical director and audio and video technicians actually produce the show. Basic equipment includes a Grass Valley switcher, a Quantel DVE, remote controls for eight Thomson-CSF cameras and an entire bank of black-and-white and color monitors. The audio portion features a 24-input Ward-Beck console that is often expanded to 48 inputs by using four submixers.

The second trailer, equipped for maintenance, can also house support operational equipment such as still-store devices and graphic equipment. When the show is over, this trailer transports the field cameras and much of the other equipment. To this mobile unit, various support trucks are assigned to carry videotape machines, videographic equipment and minicameras. A house-type trailer, partitioned into three sections (general office, producers/directors office and technical manager/production supervisor office) is rented locally. The size of the show determines how many vehicles are sent.

Early scouting

Many weeks before the air date, a field technical manager (one of 13 managers referred to as EICs, *Engineers In Charge)* is assigned to the event. With the producer (in this case assigned from CBS Sports), the EIC surveys the site to outline placement of cameras, platforms, announce towers, Telco drops, etc. Each determines an approach for the coverage, one from an artistic viewpoint and the

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At the Michigan 400 race, production supervisor Bob Theile (seated) goes over plans with EICs (from left) Walter Pile and Fred Dansereau.

other from a technical stance.

The integration of these goals, a mutually satisfying resolution of the problems particular to this site, has reinforced respect between Operations and its customers.

"I have a tremendous respect for the Operations guys," said Frank Chirkinian, executive producer of CBS Sports, who specializes in golf and tennis events. "They do a hell of a job under adverse conditions. They're dealing with a bunch of lunatics like me—everybody wants to do the show his way and put his needs over the others'. It's a delicate balance that these Operations people have to maintain, and they do it admirably."

For the Atlanta Golf Classic, the EIC was Fred Dansereau. He began by compiling lists of the technical and production personnel assigned, equipment allocated and local contacts made on the survey trip. On large remotes such as this, he is assisted by a production supervisor, such as Al Irizarry, who coordinates the plethora of arrangements concerning hotels, caterers, trailers, portable restrooms, golf carts, tents, transportation and security. Irizarry also establishes friendly relations with all local suppliers and authorities, including the local CBS affiliate.

The planning stage is crucial to any coverage. As EICs Walter Pile and Joe Tier explain, if the planning goes well, the on-site goes well. If the job is going to go wrong, it usually won't go wrong in just one area but will come apart at the seams. That means the planning was not done properly. The key is follow up; delegate and then check.

The EIC and production supervisor arrive on-site days before the mobile units. Camera operators and video and audio technicians are dispatched from a technical pool, while Chyron operators and videotape editors are assigned from their departments. Many CBS technicians are permanently assigned to the studios, but it is usually the pool technicians who are sent to the remotes. Each mobile unit has five permanently assigned members: drivers of the two

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Karen Hymes operates a Chyron in mobile graphics trailer.

Shown is a CBS field invention, an announcer's headphone/mic, which uses a Sony headphone, a Plantronics boom and a tiny Tram mic with windscreen.

trailers, two maintenance men and a mobile unit supervisor who acts as the "wagon master." Team members have developed such a rapport that they intuitively know what each other needs.

After the two trailers arrive, support vehicles converge from different destinations to form a remote broadcast center. It is interesting to note that, years ago, CBS decided to cross-train its truck drivers in technical areas. For example, a driver who displayed an interest in camera work was taught the trade by the field camera operators and can now offer additional services after the trailer is parked.

Some of the camera operators arrive early to help the technical director lay the all-important camera cables. At the Atlanta Open, it took two 4-man crews two days to lay the 60,000 feet of cable needed. During this time, six camera platforms were erected, some of which also served as announce booths. Also, a large forklift with a platform perched on the forks and a Hollywood-type crane, using a long, extendable hydraulic boom with camera platform attached, were rented and driven to a selected site on the course.

TV coverage was set up from the 13th through the 18th holes, with cameras at each tee, each green and up to two spots along each fairway. Large tripod-mounted field cameras were in stationary positions, while portable cameras were leap-frogged around and plugged into strategically located camera drops.

Three days before air time, all the equipment was installed and in operating order. Beauty shots were recorded, along with action shots of the qualifying rounds. These were used to prepare the *billboards* that lead in and out of the aired program and commercials.

Finally, as air day arrived, everyone was on site early to make a final check of their paraphernalia. As I drove the course with Dansereau, I asked him what was running through his mind. Surprisingly enough, he said, "Teardown. I'm not worried about the show. I leave that to the crew. They're professionals, and they have done everything they can to ensure success. I'm concerned about getting everything back on the truck in working order to go on to Philadelphia."

Physical setup

At each remote site, a compound builds up around the mobile units and coffee tent similar to wagons circled for a technical assault. Among the fleet of vehicles is a tractor-trailer referred to as the "whale," a warehouse on wheels carrying 50,000 feet of cable, backup and auxiliary equipment, connectors and a million other items needed on remote productions.

Of the eight large field cameras, seven have 34:1 zoom lens. In the main announce platform studio overlooking the 18th green, the eighth has a 40:1 lens. There are also four handheld cameras. Although the total camera count comes to twelve, technical director Sandy Bell said that effective deployment of the minicams and the cameras mounted on the boom of the Hollywood crane and the forklift made it look like a 21-camera show.

O'Donnell expects the technical services people to push CBS equipment to the limit. When he visits the remote sites, as he did in Atlanta, he is impressed by the 100% usage of the equipment. He does not visit these remotes just to see how they are being handled; he also listens to requests and relates news and information, first-hand, about policies, procedures and plans being made in New York.

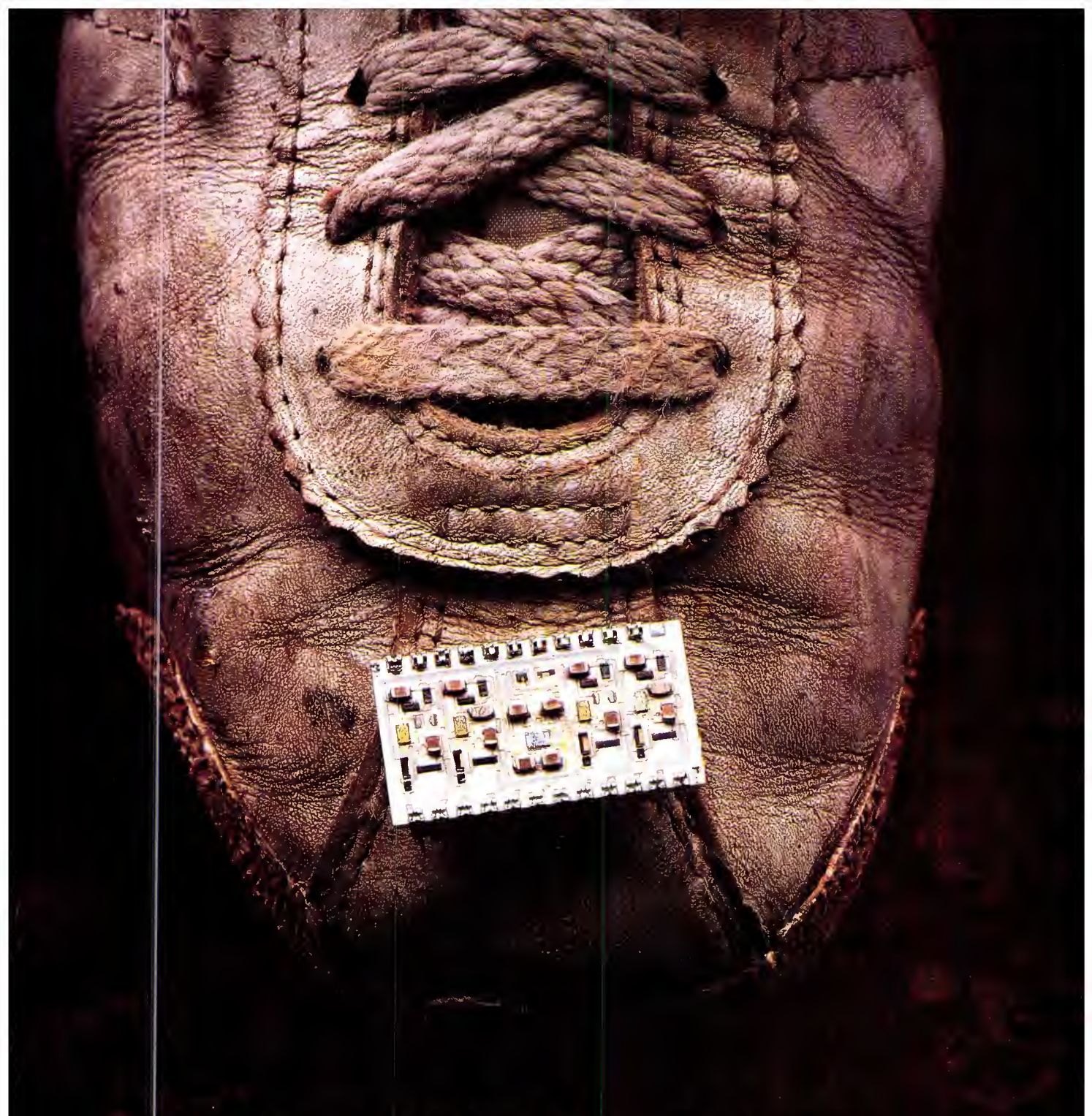
Audio is also important. For the Atlanta Open, a large number of microphones, including six shotgun types, were deployed over the six holes covered. Audio operators Steve Palecek and A.J. Gulino, knowing that audio generates excitement in TV shows, make every attempt to have sound quality that matches the gorgeous pictures. For the Atlanta Classic, this also meant special efforts to capture the sound of golf balls.

Roles of the crew

Solomon likens each of his EICs to the captain of a ship who plans the cruise, sees to supplies and crew, and then guides his ship safely to its destination. "Their job," he said, "is to translate the producer's request and to see that those needs are met from a technical viewpoint, and to make sure that the network requirements are met." Solomon has a keen appreciation for the problems in the field because he has been there—as a technical director and as an EIC.

The producer guides the overall production and interfaces with the talent, while the director gives blow-by-blow instructions to the camera operators and the technical director sitting beside him operating the switcher. An assistant director calls for the tapes to roll as they are interspersed with the live action.

Because of the tight CBS spring remote schedule, two technical direc-



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Shown (from left) are video editors Bob Hickson and Hank Weiland in mobile tape trailer.

Maintenance technicians Dan Acker (standing) and Harry Krim work inside the maintenance trailer.

tors were used on the Atlanta Classic. Bell, as one of the technical directors, arrived on site early to set up, then left for another assignment. Meanwhile, the second, Charlie D'Onofrio, handled rehearsal and operated the switcher on air. For D'Onofrio, the hardest part of his job is "not letting my mind wander even for a second during the hours the show is on the air. I can't *watch* the show for fear of missing a cue or losing what I'm trying to do." He pre-programs all the special effects, which are then ready for him to use in the show.

Many of the camera operators, such as George Klimcsak and Frank McSpedon, are 20-year-or-more veterans with CBS. Klimcsak's first remote for CBS had three cameras with one zoom lens among them. McSpedon, of course, prefers the present-day portable cameras to the 90-pound outfit he toted in 1968, consisting of color camera, power supply, backpack with RF transmitter and command receiver, and radio. At Atlanta, he stood atop the Hollywood crane, beside a studio-type Thomson-CSF camera wired with a 15-function triax cable.

On remotes, the camera operator depends upon the person at the other end of that cable, the video controller who *shades* a number of cameras at a time, remotely controlling the iris, pedestals and gains. Lou Leger and Cal Marotta, video controllers at the Atlanta remote, have been perfecting their trade for more than 30 years each. Poised with left hand on a switcher and right hand on the iris control, each constantly switches among the field cameras assigned to him. They close the iris down as the camera operator follows the ball in the air so that the small white object is not lost against the pale sky, and then smoothly open the iris as the ball descends past the speckled trees and onto the darker solid grass. This is complicated by what Leger describes as *floater clouds*, which drastically affect the overall light level as they intermittently block the sun. As the sun begins to set, the color temperature changes, forcing them to constantly match the color-rendering of the cameras.

Editing

What is not aired live is recorded by videotape editors, such as Hank Weiland and Bob Hickson, who have been closeted inside the tape trailer for days editing the *billboards*. The first step in preparing the billboard is to lay down the voice overs (sent from New York or prepared on location) on the videotape. Next, they add the recorded scenes with live sound. This video and two audios are recorded on a second tape, mixing down the two audios to one track. This mixed audio is then transferred back to the first tape in sync with the original video. Finally, music is added.

All types of special effects and graphics are incorporated into the unique CBS billboards. A Quantel DVE and two Chyrons are standard equipment at these remotes. It is often said that the sun never sets on the Chyron operator. They never get a break while on the air, because the producer is always calling for more and quicker graphic information. The faster they do it, the more is wanted. Karen Hymes, a Chyron operator for five years, said that the hardest part of her job was trying to anticipate upcoming demands. "I have to stay one step ahead and watch for a clue to see where they're going," she said. "On a show that lasts for three hours, I have to really concentrate. If I'm doing the score and I daydream for a moment, I miss a play and I don't change the score."

If a remote compound is viewed as a city, then the maintenance truck is its Times Square. This truck is a dispensary, a field hospital in a war zone manned by mechanical/electronic wizards well-versed in a multitude of realms and prepared for absolutely anything—seemingly minor to catastrophic. Always alert, the maintenance staff serves as the last line of defense.

Dansereau described these crew members. Most maintenance technicians fall into one of two categories, he said. One kind gives you a quick and dirty solution to get you on the air; the second, tenacious type insists on finding the right answer no matter how long it takes. Every now and then you find a man that can do it either

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way and knows which situation calls for which solution, he said. Harry Krim and Dan Acker, the field maintenance personnel on CBS Mobile 7 at the Atlanta Classic, are such men.

To gain a new perspective on the word *maintenance* and a realization of how unencompassing a term it is, just sit on a stool inside the remote maintenance truck and watch the world be patched up. Fred Schutz, director of maintenance for CBS Operations, said that the task of his field maintenance men is complicated by the fact that the trucks come home to New York ony a few times each year. Therefore, all technical maintenance of the equipment must be done on the road, with periodic calls to New York to coordinate schedules and supplies.

Road work: A demanding assignment

Being on the road means knowing more people at LaGuardia airport than in your own neighborhood, according to Palecek. It means spending up to 180 days away from home each year. According to Solomon, it means working in weather that ranges from 100°F to −12°F in wind, rain and snow. It means thinking on your feet. It means pitching in to do it all, even if it's not your job, and being a jack of all trades plus a master of one, Solomon said. Furthermore, he said, a field operator might be assigned to four remotes in a row and be gone for more than five weeks. Typically they arrive on a remote by Thursday, set up and rehearse Friday and Saturday, air Sunday, then tear down Monday, Solomon said.

As compared to those who work in the studios, these people are much more on their own, physically separated from backup or help. They have to make quick decisions with credit or blame resting on their shoulders. Solomon knows that, for his people, "There is no eraser on a live remote. No chance to retape. These men are not working with scripts or following the movements of actors paid to play for the cameras. They must capture unpredictable sporting events, sometimes even history as it unfolds. It is definitely a challenge and it takes a certain type of person to survive the gypsy life that keeps them so long away from home, especially on weekends and holidays. It's an upside-down life."

Few people can survive this lifestyle, much less thrive on it. CBS Operations has managed to find those who do. For instance, consider McSpedon. I watched him standing 50 feet in the air on the boom of a crane tying a tarp around his camera to protect it from the rain that was sure to follow the lightning dancing in the area. But even facing the prospect of going back to another hotel room and eating a dinner ordered from a menu like the last hundred menus, he said, "I love it on the road. I have to admit it, I do."

Back at the ranch

Although field personnel are often thousands of miles from broadcast center, they are keenly aware of being the extension of a larger group. They realize that their efforts are integrated into a structured schedule, and that they are on an excursion from the mother ship upon whom they are quite dependent.

This CBS production trailer's unique construction allows side to expand, enlarging program control room.

All remote programs are fed either by Telco or by satellite to the transmission center inside Broadcast Center in New York. Vinny Castrataro, director of central and broadcast operations, who oversees the transmission center, the equipment center and program control, is responsible for verifying the parameters of the incoming feed and transmitting it to the affiliates. Actually, he presently handles four outgoing networks on a regular basis. When the broadcast center technical update is complete, he will have additional capacity.

Before the various feeds begin, Castrataro's group must coordinate the incoming signal levels with the technical crew at the remote. In addition to the usual program video and audio sent, CBS often provides *international* feeds to broadcasters around the world. These feeds consist of video and natural sound minus the CBS announcers, allowing broadcasters in foreign countries to add commentaries.

Other sports coverage

On any given Sunday during the NFL football season, Castrataro may be simultaneously handling seven or more incoming shows destined for different markets that must be coordinated with the pre-game *NFL Today* show and with individual half-time shows.

Harold Schutzman coordinates the mammoth NFL (National Football League) season coverage. All NFL games are put into one of four categories months before the season begins to determine the scope of the coverage (equipment and manpower). As the season unfolds, many changes are made, but Schutzman manages to stay within the overall budget.

CBS TV Network has been broadcasting NFL games for 27 years. Last year, it scheduled coverage of 107 games, with the majority falling during the 16-week season. It is difficult to imagine the coordination and preplanning required for this simultaneous coverage, especially when you discover that CBS has never had a failure.

In addition to NFL games, CBS field operations covers almost 50 NCAA (National Collegiate Athletic Association) football games within a 14-week period each fall. Unlike the NFL games, which are scheduled far in advance, allowing CBS to pre-plan coverage, the NCAA TV coverage often is not scheduled until the Monday before the game. Every weekend there is simultaneous coverage of multiple games. During the weekend of Oct. 2-3 last year, CBS Operations covered four NCAA games on Saturday and four more on Sunday.

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Demands of different events

Football coverage, like every other type of remote programming, presents special challenges. Problems of white golf balls against white clouds give way to the frustrations of following a quarterback's clever hand-offs.

Each sport and special event has its professional headaches. For instance, basketball games, often held in large civic arenas that book a circus or a rock concert the night before, usually require that the field crew begin setup at 2 a.m. the day of the event.

Handling remotes outside the United States can be particularly difficult, because the mobile units usually are rented with full crews. Roxana Dunnette, an EIC for CBS who often handles international remotes such as swimming/diving and boxing events, finds it frustrating to interface with an "unknown" group as opposed to working with a CBS mobile unit and crew. It has made her appreciate the high standards maintained by CBS.

Special events like the Daytona 500 auto race and the NFL Super Bowl coverage (with its 26 vehicles and 25 cameras, amounting to one for each player on the field) are so immense in scope that planning begins a year in advance. These events become more than games or races; they are *happenings*. As one technician said: "Super Bowl is like a circus. The game appears to take a back seat to the hoopla. There are 20-30 cameras and 70 mics. We're on air for five hours and we cover parades and bars for fan reaction. The 'color' often seems more important than the game. It's our biggest show, and I'm proud when CBS selects me to help do it."

Dealing with problems

Through years of experience as an EIC, Tier has learned that no show is ever easy. "You can go back to an event four years in a row and have different problems," he said. "That's why we keep detailed notebooks." He was referring to the rows of black notebooks that line the walls of the field operations area at Broadcast Center. These CBS field history books help the EICs save time and avoid trouble when an event is repeated. Sometimes there's no history, and sometimes there's no time to plan. The toughest ones can be the small ones where there is no preparation, and they just have to go in and wing it.

Dealing with problems often means doing on-site engineering. On the Atlanta remote, I saw many examples of innovation under field conditions, some of which stemmed from manufacturers' tendency to design mainly for the studio. In one example, the field people had fabricated a small headset for the announcer to wear. This consisted of a Sony Walkman headphone, a short Plantronics boom and a tiny Tram mic. A quarter, glued to the side of the headset, helped isolate the headphone from outside sound.

Camera operator David Graham invented a quick setup device to steady his portable camera when he stoops or lies down to capture a putt. His *grass mount* is a tripod head on a mount with four long, thin spikes that push easily into the grass, but causes no damage. It is easily leveled and does a magnificant job of steadying a camera. Solomon gave approval for the field shop to construct the device, encouraging his staff in efforts to do a better job.

Such ingenuity is not confined to equipment. To mask some audio distortion behind an important interview, the field crew spent hours in the woods audiotaping birds chirping and dogs barking. When mixed with the interview, no one noticed an intermittent hum.

Even with all the planning, there can be minor and major problems. For instance, being in the tightest

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Lou Leger, video operator, *shades* three cameras assigned to him.

Charlie D'Onofrio, technical director, checks out switcher inside production trailer before air time.

telephoto setting of a 40:1 zoom lens on a camera mounted on a metal tower and having some kid climb the tower can result in a jittery televised shot. And, having five out of six cameras go down an hour before air time can be disconcerting. When this actually happened, CBS field operations did not panic, but fixed them one at a time.

The difference between success and disaster is often a simple action by one man. Once, when Schutz was working in the field, the feed to New York was lost. He spotted a severed cable and held the two ends together for the entire show. Splicing, even quickly, would mean going off the air for a minute. He preferred to hold the cable.

Worries and attitudes

The omnipresent worry on any remote is the possibility of losing power. As air time approaches, each person worries about all systems being debugged. Pile summarized it by saying, "The only thing you can't buy is time. You can spend money for equipment or manpower, but you can't buy time. So, when that clock goes straight up, I'm on the air and that's it."

Sometimes it's good to have a problem crop up so the crew thinks that it's out of the way. They tend to get nervous when everything's working. Being prepared is the name of the game. Crew members discuss new ideas during travel and off time. To them it's not just a problem of making the system work, but of providing for as much backup as is feasible. Total redundancy is the aim. Usually Telco lines back up satellite feeds, but sometimes further redundancy saves the day. Once, when a football fan turned the main power switch off outside of a rented van feeding the Telco lines, New York did not lose the feed because a second routing had been set up through the local affiliate.

Solomon said that often a separate, audio-only program Telco line with different routing than the line carrying program audio and video is leased so that, if the main line is lost, the network can carry the audio portion until video is restored. The networks have found that audiences are more likely to stay with a show if audio remains and video is lost than vice-versa. Covering all the bases, anticipating potential problems, is truly what makes these people pfoessional. It's an attitude that no one can outline in a procedure book or job description. When asked what kind of people he was seeking to put on the road, O'Donnell unhesitantly responded that he looks for *anticipatory* people. That's a key ingredient for remote operations.

There is little dividing line in the field between labor and management, technicians and supervisors, production people and operations people. The overall attitude is an outgrowth of cameraderie.

"These field people are like mountain climbers all tied together ascending a peak," Solomon said. "If one falls, all could go. They are so interdependent. Their competence, dedication and teamwork is vital to success."

This entire attitude was summed up when Schutzman said that the crew rarely even knows how many markets are receiving a remote telecast. "It doesn't matter to us," he said, "We're going to do the best we can if the whole show is being fed to only one monitor somewhere."

Rewards

People who work on the road for CBS are paid well for their services but, for most of them, it is not the money that keeps them in the field. It is not the hundreds of Emmys that they have won for unbelievable coverage such as the Super Bowl in Michigan and the Daytona 500. It is a feeling of being your own boss, a special feeling of accomplishment. It is the pride of rising to the occasion in adverse conditions and tackling the most demanding job of your career. It involves the inestimable gift of knowing you've gone the distance.

For some, it is the reward of being there when history is made, such as at Kennedy's Inauguration, John Glenn's first space flight and the landing on the moon. As Dansereau said, "There's one show I'd do again for no pay—the bicentennial celebration with the tall ships. I'll never forget the feeling as I stood on the deck of the Aircraft Carrier Nimitz in 1976 and rode into New York harbor with those tall sailing ships."

According to O'Donnell, "Each year there are more and more events for us to cover. And many of our experienced field personnel will retire in the next 5-10 years. We have many good young people, but we need more of this special breed. They have strong personalities, and this is both a virtue and a problem."

Dansereau has his toughest time dealing with *people problems*. Still, he said, "If we had robot-like men, we'd never get on the air. On any job, I try to keep two things in mind: to remain sensitive to the individual and to make the job fun. Sometimes the crew plays elaborate pranks on you. You have to know when you've been had, and laugh about it."

Wrapping up the classic

As air time approached, I wondered what was happening at the other locations where CBS field operations personnel were setting up, airing or tearing down. I tried to fathom how you manage an operation that can execute up to seven remotes simultaneously. It boils down to skilled people serving in an outstanding organization. Solomon expressed his pride in those people, proclaiming that they were the best field people in the world.

The cables were laid, all systems had been tested and internal communications checked. The crew had covered all the bases, and they were confident that everyone else down the line had done their jobs so that there was little chance of technical error.

In Atlanta, their efforts culminated in 90 minutes of coverage Saturday and two hours on Sunday without a hitch, under adverse weather conditions, and with no loss of signal.

As I left, watching the remote crew tearing down to embark on its next assignment, I realized that the crew's overall task lies in anticipating every conceivable problem and taking the fail-safe measures before the technical director fades from black to on air. I had seen this done first hand, by the professionals of CBS Operations, at home and on the road.

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Field report:

Wilmore 1409–24 Uninterruptible Power Supply

By Jerry Whitaker, chief engineer,
KRED-AM/KPDJ-FM, Eureka, CA

Courtesy of Wilmore Electronics

1409-24 UPS system

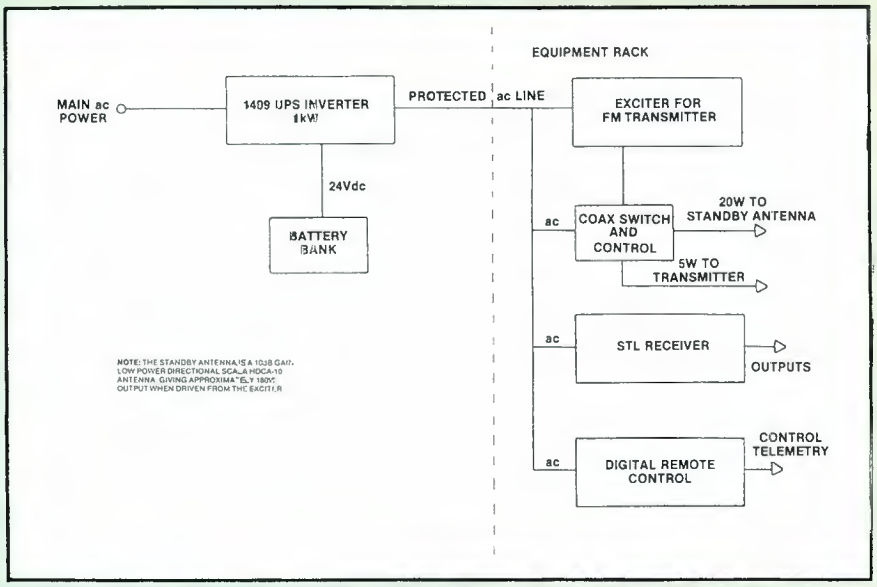

Figure 1. Typical application for the UPS inverter.

The Wilmore Electronics Company 1409-24 Uninterruptible Power System (UPS) is a versatile device that can provide continuous power to a protected load. Typical applications for the 1409-24 would be providing standby power for a translator, low power transmitter, data processing unit, test and monitoring equipment, or remote control and telemetry gear.

The application for which our stations purchased the system is shown in Figure 1. With this arrangement, we have a low power "standby transmitter" system in case of a power company failure or main transmitter problem. A future addition will be the installation of a diesel generator that will power the station building in case of lost utility service. The UPS will then be called upon to provide power to the standby system for the approximately 10 seconds the generator needs to get up to speed, and the 2-minute warmup time the transmitter is allowed following a power outage. This will result in no lost air time, regardless of the situation. The standby transmitter system shown in Figure 1 can be constructed for less than $500 (not including the backup power supply and exciter) and, in most situations, will provide acceptable coverage over the city of license.

Although the Wilmore UPS system comes in a number of power ratings, this report will focus on the 1000W model. The unit's list price is approximately $1250 at this writing. The only additional cost is for the batteries. The 1409-24 is available only for 24Vdc input. Other models are available for 12Vdc or 48Vdc inputs.

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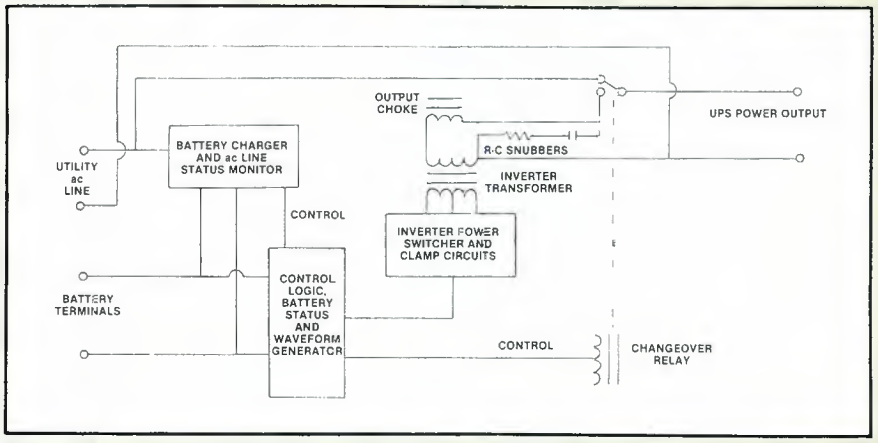

Figure 2. Block diagram of the 1409.

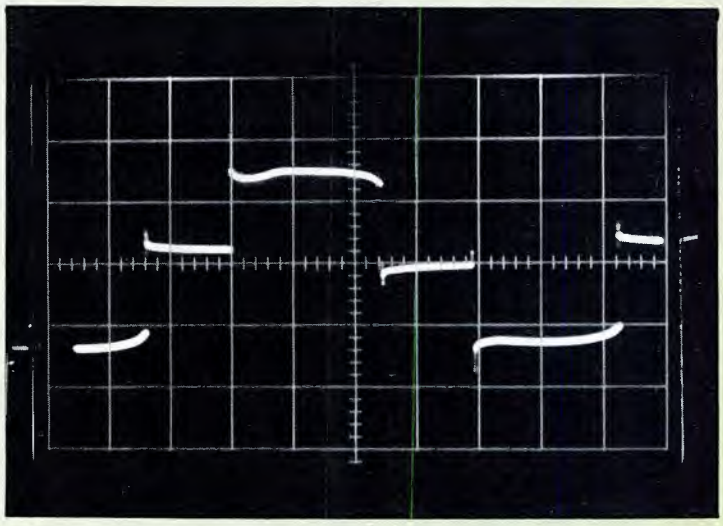

Figure 3. The stepped square-wave output of the 1409 UPS inverter.

Operation

Figure 2 shows the block diagram of the 1409-24. In the normal mode, the utility company line connects directly to the ac output terminals. If the utility line drops below a present level of 90Vac, or disappears completely, the inverter will start and feed the load from the battery supply. This transfer is accomplished in less than one cycle, so no load disturbance is experienced in most cases. When the utility feed is restored, the 1409-24 will switch back and turn off the inverter after a delay of 5-7 seconds, allowing the power company line to stabilize.

The batteries are charged during normal operation by an internal battery charger set to maintain a voltage across the dc supply of 27.3V for the 24V input version. The battery is protected against excessive discharges or faults by a front-panel circuit breaker and a circuit that switches the inverter off if the dc supply drops below 18V. Front-panel LEDs indicate the status of the inverter and the battery disconnect circuit breaker.

The 1kW unit is available with a factory-set output of 115Vac or 230Vac. The output is capable of approximately a 2:1 current surge of short duration, as would be encountered with an inductive load. The output frequency is 60Hz for the 115V unit, and 50Hz for the 230V connection. The frequency stability is ± 0.15Hz with load and line variations. The efficiency of the 1409-24 is greater than 80% from one-half to full load.

The output waveshape, as shown in Figure 3, is a 3-level step approximation to a sine wave. The ratio of peak to rms voltages of the stepped square wave is nearly that of a sine wave. The use of such a waveform results in considerable savings in the cost of the unit and improves the operating efficiency over comparable sine wave units.

The operating temperature range of the 1409-24 is -20°C to +55°C. It weighs about 58 pounds and measures 9"x12"x16".

Installation of the unit is simple, and there are no user controls to adjust. Documentation of the 1409-24 is good, however, no theory of operation or component layout sheets are included. They are available upon request, though.

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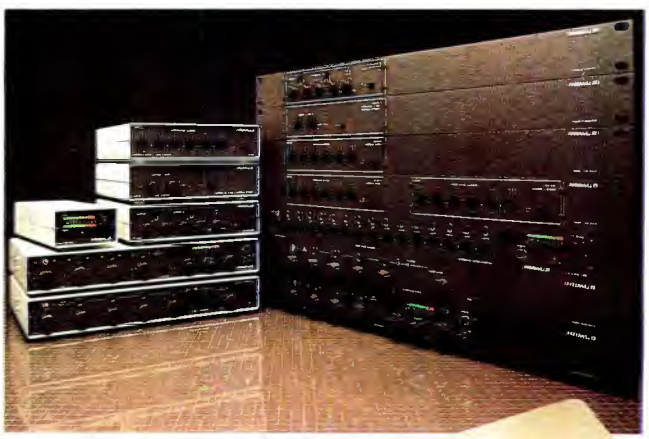

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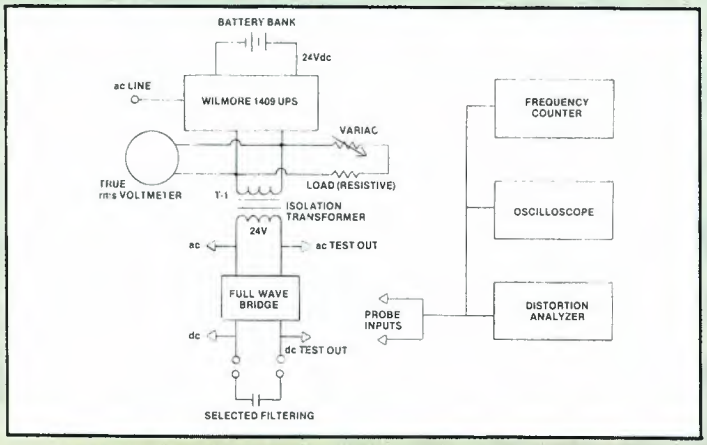

Figure 4. The test setup used to test the 1409.

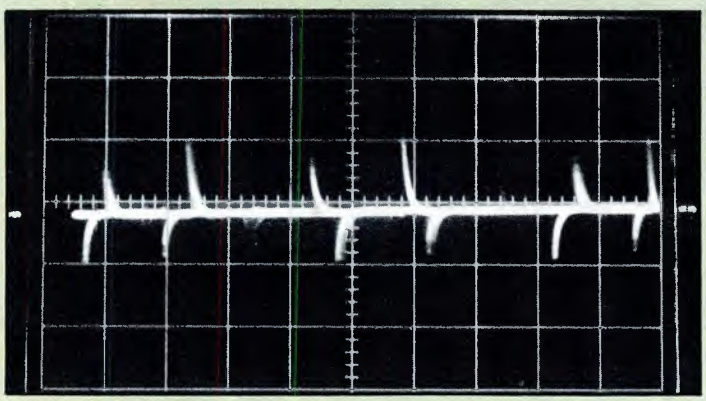

Figure 5. Rectified output of the test setup.

Manufacturer's claims: Wilmore 1409–24

The 1409 is available for an input of 24Vdc. The standard outputs are 115Vac, 60Hz and 230Vac, 50Hz. Other dc input versions are available.

•**Power rating.** 1000VA continuous with approximately 2000VA surge capacity.

•**Battery voltages.** 22-29Vdc (26Vdc nominal).

•**Output voltages.** 115Vac, 60Hz, 10. 230Vac, 50Hz, 10.

•**Output waveshape.** 3-level step approximation of a sine wave. The ratio of peak-to-rms voltages of this waveshape is approximately that of a sine wave. Third harmonic distortion of a square wave is largely eliminated.

•**Frequency stability.** +0.15Hz with load and line variation and +0.02%/°C temperature coefficient.

•**Inverter efficiency.** Greater than 80% (from one-half to full load).

•**Protection.** Circuitry is present to protect the inverter against reversal of dc-input polarity, overloads, short circuits and excessively high or low battery voltage.

•**Operating temperature.** −20°C to +55°C.

•**Size and weight.** 9"x12½"x16". Approximately 58 pounds.

•**Automatic transfer.** Under normal conditions, the 1409 passes commercial ac power directly to the user's load. Upon interruption of commercial power, the unit switches to inverter operation in 10-15ms. When commercial power is restored, the 1409 delays several seconds before switching back to normal operation to ensure that commercial power has stabilized. Upon return to normal mode, the internal battery charger begins to recharge the batteries.

•**Batteries.** Standby power for the system is provided by external batteries maintained at full charge by the built-in battery charger. Backup time is determined by the rating of the battery bank employed by the customer. The model 1409 is available for 24Vdc batteries. Batteries are not supplied with Wilmore's UPS unit.

•**Battery charger.** The battery charger is a well-filtered, current-limited charger, factory-set to charge lead-acid batteries. The charger will provide a maximum of 3A at 27.3Vdc.

Circuit description

As shown in Figure 2, power from the utility line is routed through a relay to the output terminals. This power also drives a battery charger circuit that will deliver a maximum charge of 3A at 27.3Vdc. Upon loss of commercial power, the sensing circuitry will start up the inverter and switch the output from the normal line to the UPS supply. This transfer occurs within 10-15ms. The timing circuits and output modules are shown in Figure 2. The output of the inverter is filtered by a choke and resistor-capacitor snubber network. The control circuitry includes battery undervoltage sensing, ac line condition and inverter status.

Test results

The Wilmore 1409-24 UPS unit was bench tested at KPDJ for several days, during which all results indicated that the unit meets its published specifications. The test setup used would be a typical load for this type of device. (See Figure 4.) Most of the measurements concerned the effects that the 3-level step wave would have on the equipment it typically would be used to drive, such as an exciter, STL or remote control unit.

As mentioned earlier, Figure 3 shows the output of the step-down transformer, T-1. Ringing can be seen on most transitions, but that is to be expected with this type of waveform. Loading the transformer had no effect on the transition ringing.

The output of the rectifier bridge gave the display shown in Figure 5. The 120Hz spikes are approximately equal in amplitude to the ac waveform on the secondary of the transformer, shown in Figure 3. These spikes easily are filtered out by adding as little as 0.01μf across the rectifier output. In fact, a long piece of coax to the frequency counter eliminated most of the spikes. Figure 6 shows the rectified output with a 1μf filter capacitor across the diode bridge. Noise is reduced to a level comparable to that of a circuit being fed with a sine wave, rather than a stepped square wave.

The waveform shown in Figure 7 is the output of the step-down transformer in the test setup, when the inverter also is driving a noisy, 6A inductive load (motor). The effect of the motor brushes can be seen in the inverter output at the high and low steps as modulation of the sine wave. This is not surprising, because the choke and resistor-capacitor snubber network at the output of the inverter would tend to present a high impedance (relatively speaking) to noise generated on the load side of the system. The filter is designed to prevent noise or transients from being transferred from the inverter output to the

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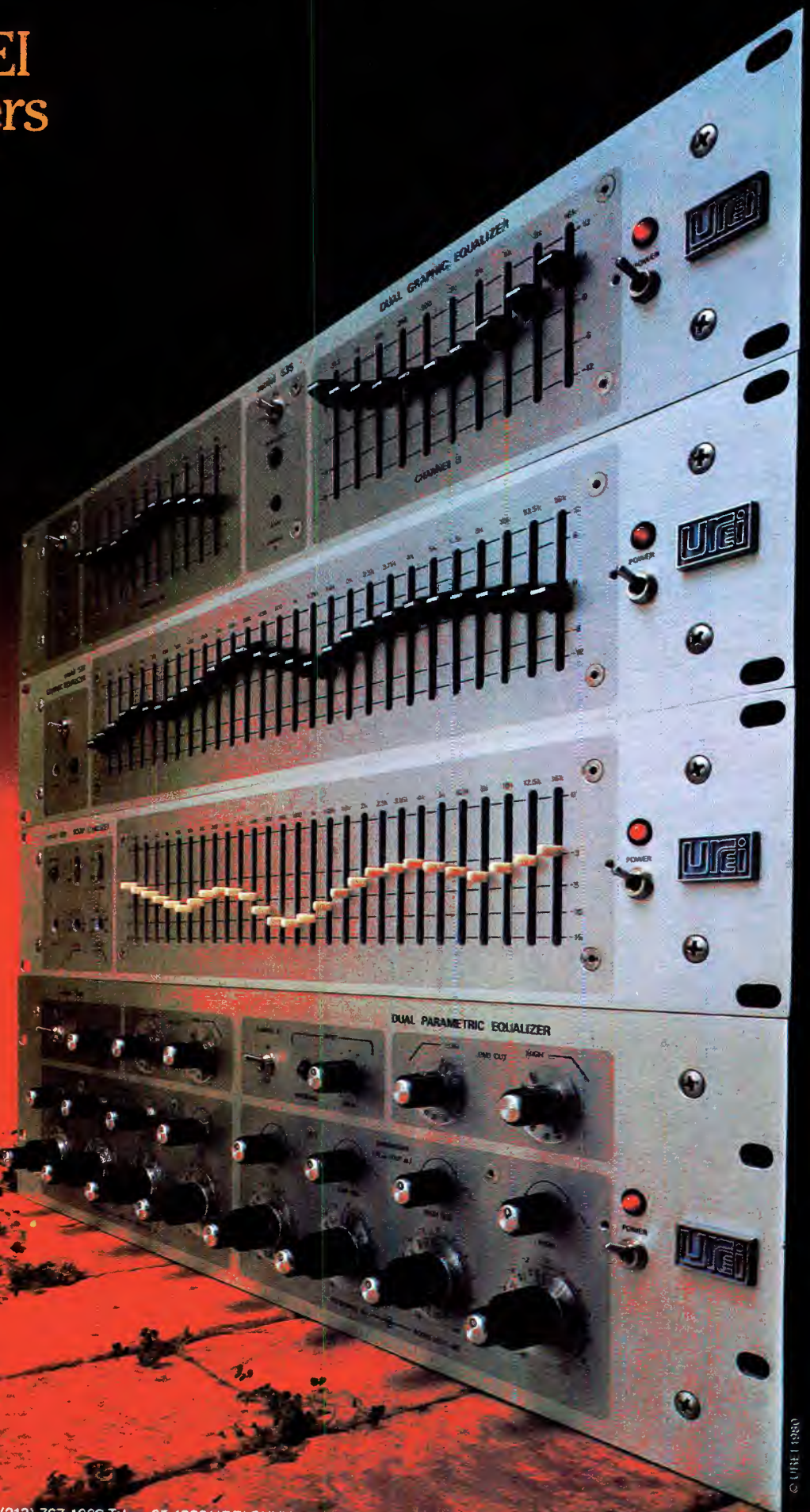

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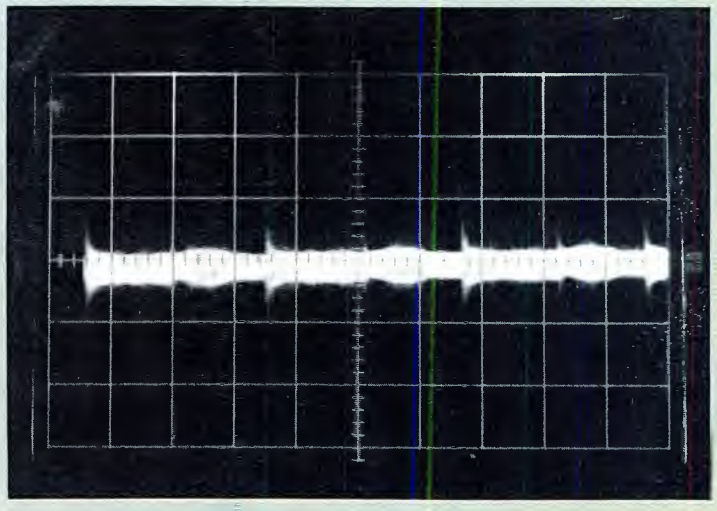


Figure 6. Rectified output of the test setup with 1μf of filtering.

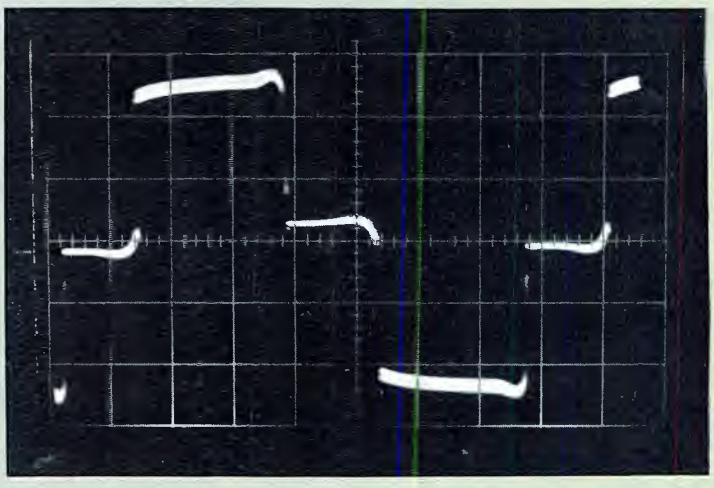


Figure 7. Ac inverter output when a noisy inductive load also is being driven.

load, not the other way around.

The 1409-24 is somewhat soft on regulation. Dumping large loads on-line will drop the output voltage as much as 15%. Recovery to a near-normal voltage occurs within a second or so. For this reason, I would not recommend the 1409-24 UPS unit for use with widely varying loads, unless such dips can be tolerated by other equipment on the line.

Measuring the output voltage of this type of a unit is not as straightforward as you might think. Because the output waveform is not a sine wave, a true-reading rms (iron vane) voltmeter is required to accurately measure the output of the inverter. The more common peak of average reading ac voltmeter will not always give a true representation of the voltage.

The total harmonic distortion reading of the inverter output is approximately 23%, as compared with the typical 3% distortion on a utility company feed. This reading, in most applications, will have no effect. In fact, measuring THD on a square wave is largely a waste of time.

In summary, we found the Wilmore UPS system to be a low cost, high performance alternative to the much more expensive and much less efficient sine wave inverter. This system can be used to power most equipment used at a broadcast installation with no difficulty.

Editor's note:

The field report is an exclusive BE feature for broadcasters. Each will be prepared by the staff of a broadcast station, production facility or consulting firm. The intent is to have the equipment tested on-site. The author is at liberty to discuss his research with industry leaders and to visit other broadcasters and/or the manufacturer to track down pertinent facts.

In each field report, the author will discuss the full applicability of the equipment to broadcasting, including personal opinions on good features and serious limitations – if any.

In essence, these field reports are prepared *by* the industry and *for* the industry. Manufacturer's support will be limited to providing loan equipment and to aiding the author if support is requested in some area.

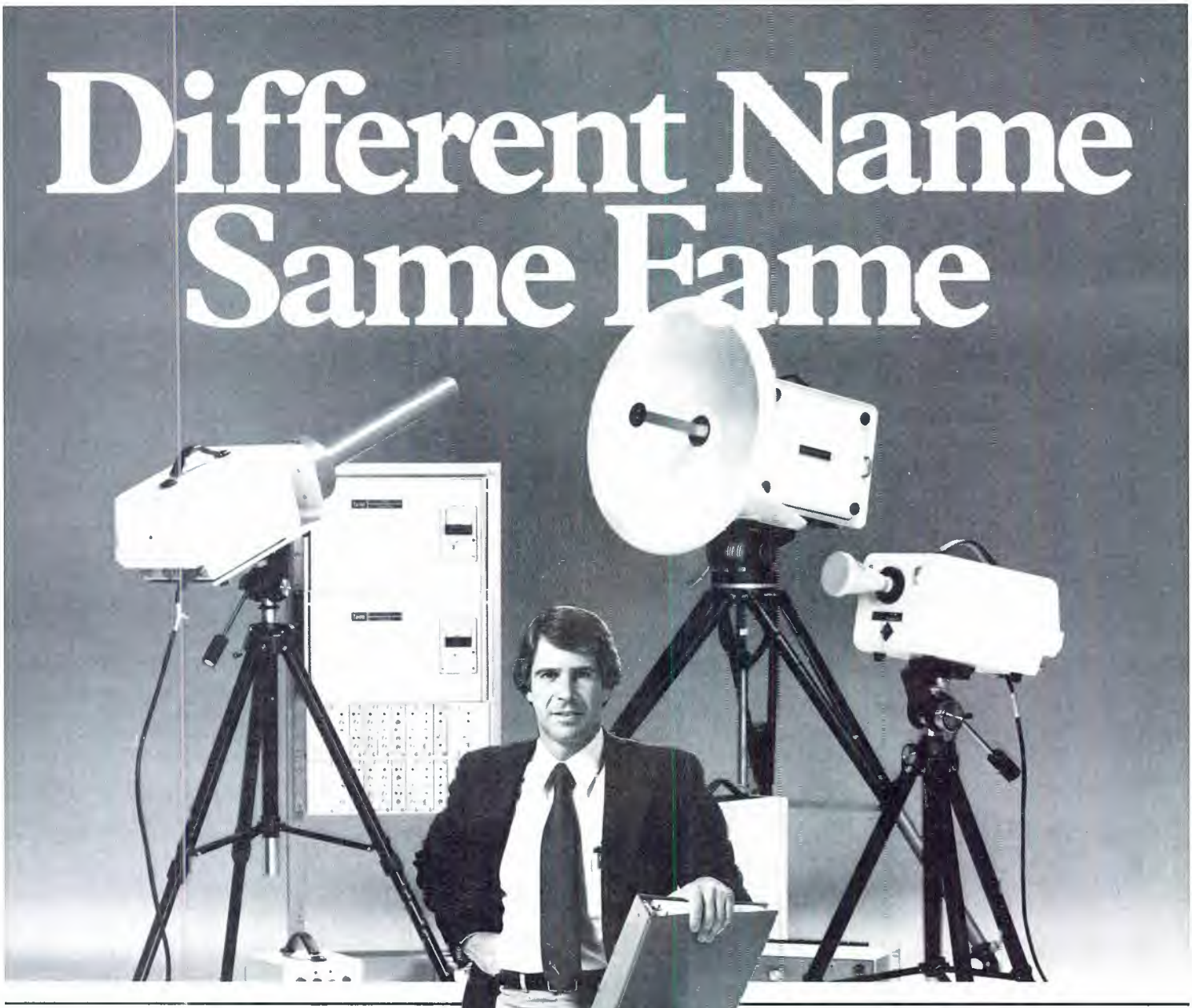
It is the responsibility of **Broadcast Engineering** to publish the results of any piece tested, whether positive or negative. No report should be considered an endorsement by **Broadcast Engineering** for or against a product.

For more information on the 1409-24, contact Wilmore Electronics, P.O. Box 1329, Hillsborough, NC 27278.

Acknowledgement

The author thanks Laurence Siegel of Wilmore Electronics Company for his assistance in preparing this article.

Different Name Same Fame



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For railroads, telephone and pipeline companies, and other common carriers, we provide highly reliable portable microwave transmission systems for emergency restoration of vital communication systems.

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Plant tour:

ADDA Corporation

By Bebe F. McClain, president, B.F. McClain Productions, Asheville, NC

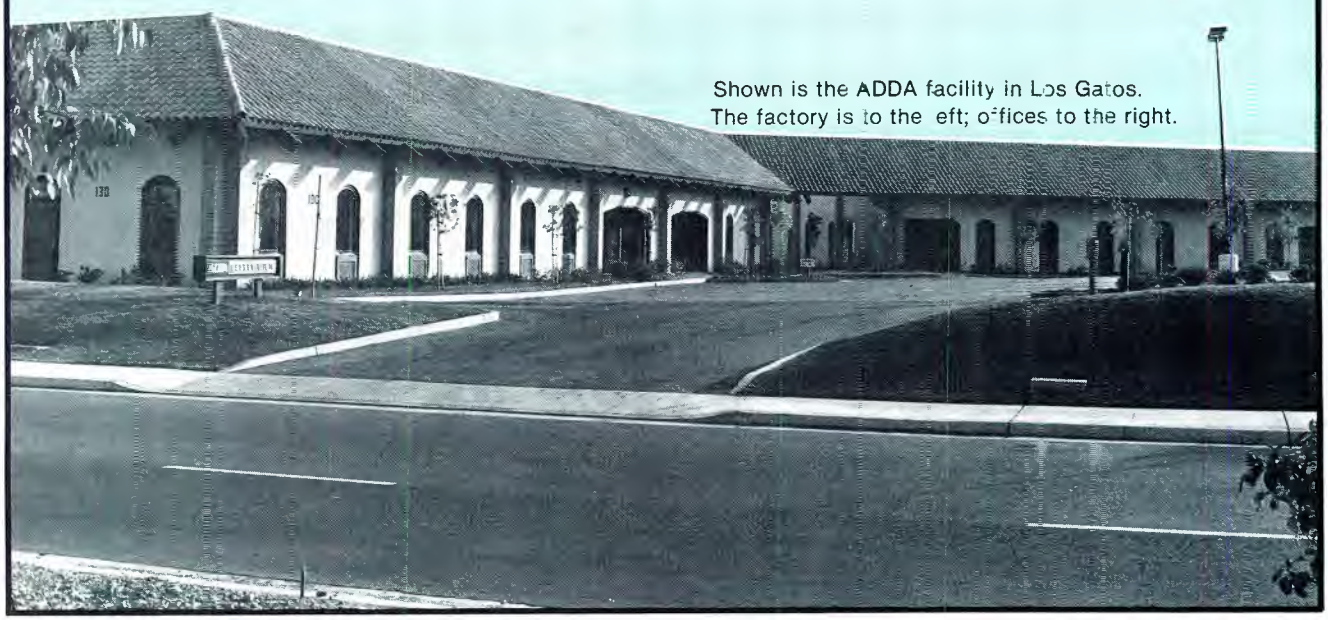
ADDA Corporation, known for its broadcast still-stores, TBCs and frame synchronizers, recently moved its corporate headquarters and manufacturing operations to new facilities in Los Gatos, CA, part of the famous Silicon Valley.

The new facilities include 14,000 square feet of office space where the president, William B. Hendershot III, and his 25-person sales, marketing and administrative staff are housed. The 29,132-square-foot manufacturing plant adjoins the offices.

ADDA's main product line consists of the following:

- ESP still-store;
- AC 20A dual-channel video processing system;
- VW-1 TBC/frame synchronizer (for ¾-inch);
- VW-2 TBC/frame synchronizer (for 1-inch);
- VIP—(Video Image Processing); and
- MAC—(Multiple Access Controller).

ADDA employs approximately 150 people to produce and market these products.



Shown is the ADDA facility in Los Gatos. The factory is to the eft; offices to the right.

FROM OUR HANDS TO YOUR HANDS

The Otari ½" Four Channel MARK III/4 & ½" Eight Channel MARK III/8

At Otari, the focus of our work is on innovation and problem solving. These values are carefully reinforced by our dedication to quality: they are inherent in every tape recorder we engineer.

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Built with the reliability and craftsmanship that have become the hallmark of our reputation with our 5050 Series two channel machines, we've once again advanced the broadcast industry's most advanced and affordable professional recorders.

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Rick Kundert, plant manager, holds an A-D conversion chip in the factory component inventory area.

The manufacturing process involved in producing the highly technical, computer-based line of ADDA equipment is a mixture of automated and manual procedures. Almost half of the floor space in the plant is devoted to testing, inspecting and quality control.

ADDA buys component parts from many different US suppliers. The basic microchips involved in the analog-to-digital and digital-to-analog conversion are supplied by TRW Corporation. Working closely with this semiconductor manufacturer, ADDA helped develop the chips essential to its equipment.

The basic disc drives, such as that incorporated into the ESP still-store, are purchased from outside venders, and the sheet-metal frames are fabricated by suppliers. Other than that, ADDA builds everything from components and circuit boards.

To keep production on schedule, ADDA maintains a large stock of all component parts for the equipment it builds. After the manufacturing

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In 1967, the introduction of the first professional quality compact monitor created a small revolution in the recording and broadcast industries. Combining high power capacity, accuracy, and extended bandwidth, the loudspeaker was ideal for close monitoring, yet flexible enough to provide a practical alternative to full size monitors. That speaker was to evolve into the JBL 4311. And since its introduction, it has literally set the standard for compact monitors.

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Our new 4312, for example, represents the next step in the evolution of the 4311. Improvements include a new high resolution dividing network for better transient response and a mirror-imaged design that provides enhanced stereo imaging. These refinements significantly improve the loudspeaker's performance, yet maintain the unique sound character that made it an industry standard. And best of all, the 4312 is still priced to fit comfortably in even modest budgets.

For those that require a more flexible or compact monitor, we've created the 4411 and 4401. These loudspeakers incorporate our most advanced component and design technologies. Both the 4401 and 4411 utilize newly developed transducers arranged in a tight cluster to provide outstanding coherency of sound for close monitoring. This design also minimizes off-axis variations in the far field. Additionally, the 4411s are mirror imaged for improved stereo perspective.

For maximum flexibility, the continuously variable levels controls on the 4411 are calibrated for both a flat direct-field response and a rising axial response that produces a flatter power response. And for ease of adjustment, each of the monitors' level controls are baffle mounted. Finally, the low frequency loading has been optimized for flat response when the speakers are placed away from room surfaces. Because of this, the 4401 and 4411 may be console mounted without the loss of low frequency response typical of other designs.

For additional technical data and a complete demonstration of the 4312, 4401, or 4411, contact your local JBL Professional Products dealer. And discover the next generation of compact monitors. From the refined to the redefined.

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PC board oven removes moisture.

At right, parts are inserted into sets of PC boards.

Shown below is an automatic solder wave machine with a washing machine in the background.

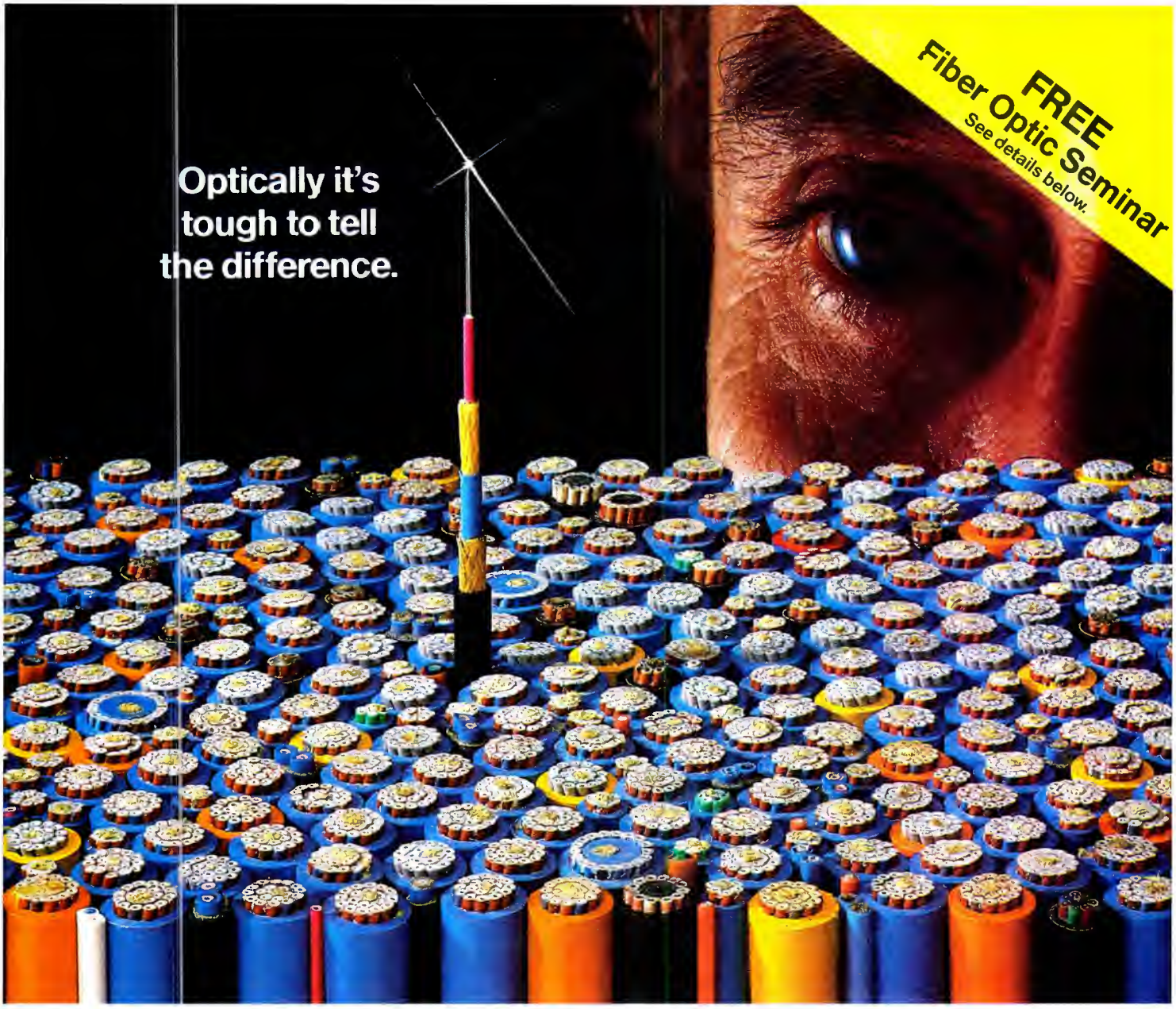
schedule has been determined, the plant personnel pull from stock the parts needed to manufacture units targeted for production. At any given time, the factory will be engaged in producing a mix of different models, depending on the market forecast.

Manufacturing steps

The first step in the manufacturing process is placing the printed circuit boards into a special oven. The baking process dries up any moisture-laden contaminants that might be in the plated-through holes. If this were not done, and moisture were in the holes as the PC boards passed through the solder machine at 500°F, the steam produced would cause outgassing, which results in a poor solder joint. Baking the boards before assembly yields improved solder joints and, therefore, higher quality PC boards.

A receiving inspection, performed on PC boards, components and fabricated metal work, is the first step in the creative process—the foundation. The production staff knows that one damaged capacitor could possibly defeat a $50,000 product. This embryo stage is not a procedure to be rushed.

During production, each component is inserted into sets of PC boards that comprise the electronic heart of ADDA's signal-processing equipment. Once the set of boards has received all its parts, the set is taken to the automatic wave solder machine. Here the boards are carried along a track that ultimately brings the bottom sides into contact with molten solder, making hundreds of clean, even solder joints simultaneously. (A special coating is used over the areas on the underside



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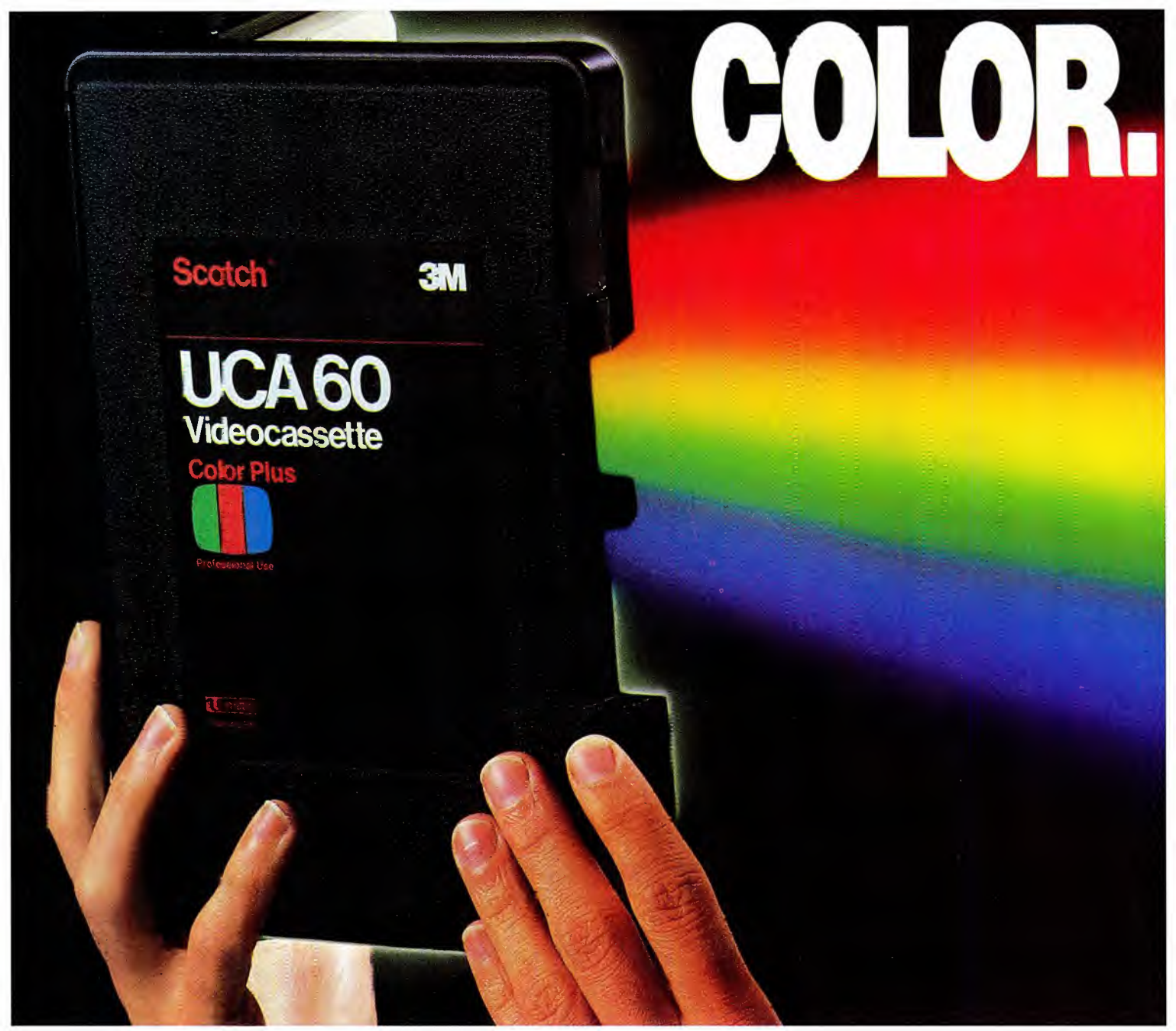

The difference between standard videocassettes and Scotch® Color Plus ¾" Videocassettes will be obvious to you right from the start.

Scotch Color Plus delivers exactly what its name implies. Bright, brilliant color for your ¾" mastering or editing needs.

Behind this dramatic color improvement is our unique Scotch Color Plus oxide that exceeds industry standards for color and video signal-to-noise. So you get a crisp, colorful picture, with significantly fewer dropouts.

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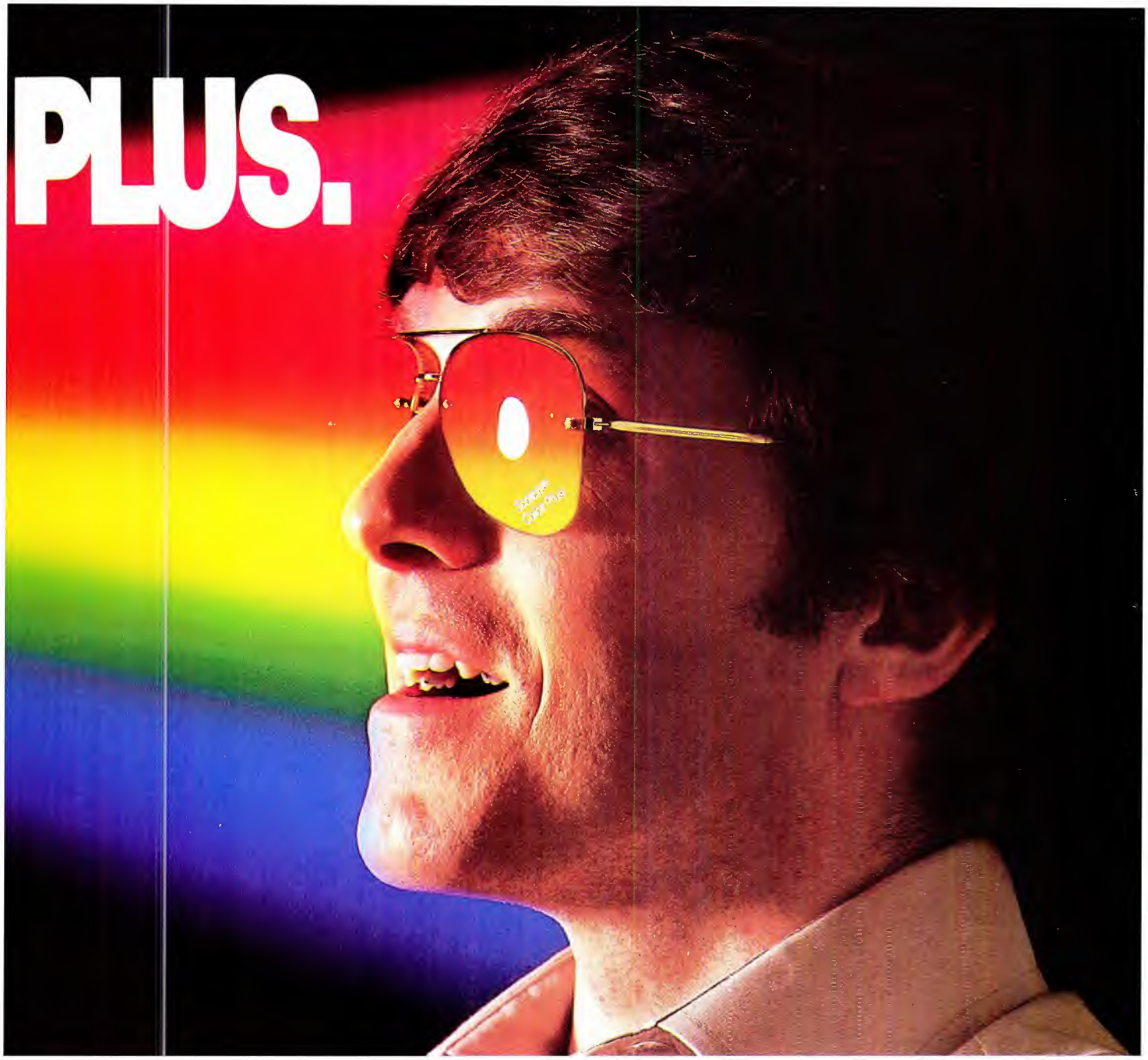

designed for the new generation of U-matic recorders reduces headwear to the lowest in the industry.

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of the PC boards, where no solder is desired.) Then the boards are removed and put through a hot wash to remove any residue from the chemicals used in the soldering process.

Parts that are heat-sensitive, chemical-sensitive, too large or otherwise unsuitable for the auto-soldering process are then inserted by hand into the subassemblies. These parts are also inspected, and any damaged components discarded. Not only are the assembled subassemblies inspected with the naked eye, but all the subassemblies are taken to a special inspection area where they are meticulously examined under magnification.

Imperfect subassemblies are removed from the manufacturing flow, while those passing this quality control inspection are put through in-circuit subassembly tests. The initial electronic testing to identify and replace electronically defective components is done at this time. The subassemblies are inspected again before being placed in the subassembly storage area where pre-assembled parts are stored until needed. The mainframe is born when all important electronic subassemblies are joined with the more mechanical portions of the unit. At the same time the subassemblies are being completed, the fabricated sheet metal frames are being assembled elsewhere in the plant. Wiring, power supplies, fans, etc., are then installed into the metal chassis, making them ready to receive the PC

After soldering, certain parts must be hand-inserted.

All boards are thoroughly inspected.

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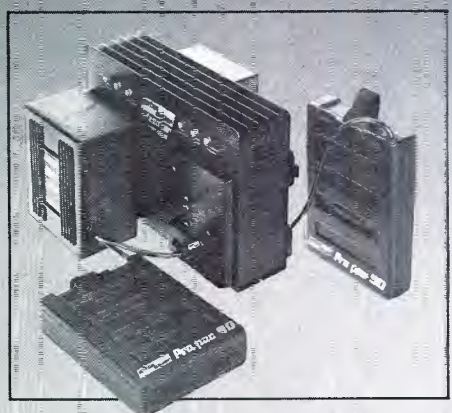

Lifesaver 8 Hour Quad, LSQ4, can charge any combination of up to 4 Pro Pac 90 VTR batteries or Snap-On™ batteries. The Pro Pac 90 can also be safely charged in one hour with the Lifesaver Fast Charger, LSFC. The Lifesaver chargers prolong battery life and keep batteries fully topped indefinitely.

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Boards are married to wired chassis in the subassembly area.

Infant mortality is induced in boards placed in the burn-in room.

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Manufacturer's suggested list price $2095.00. Contact dealer for further pricing information.

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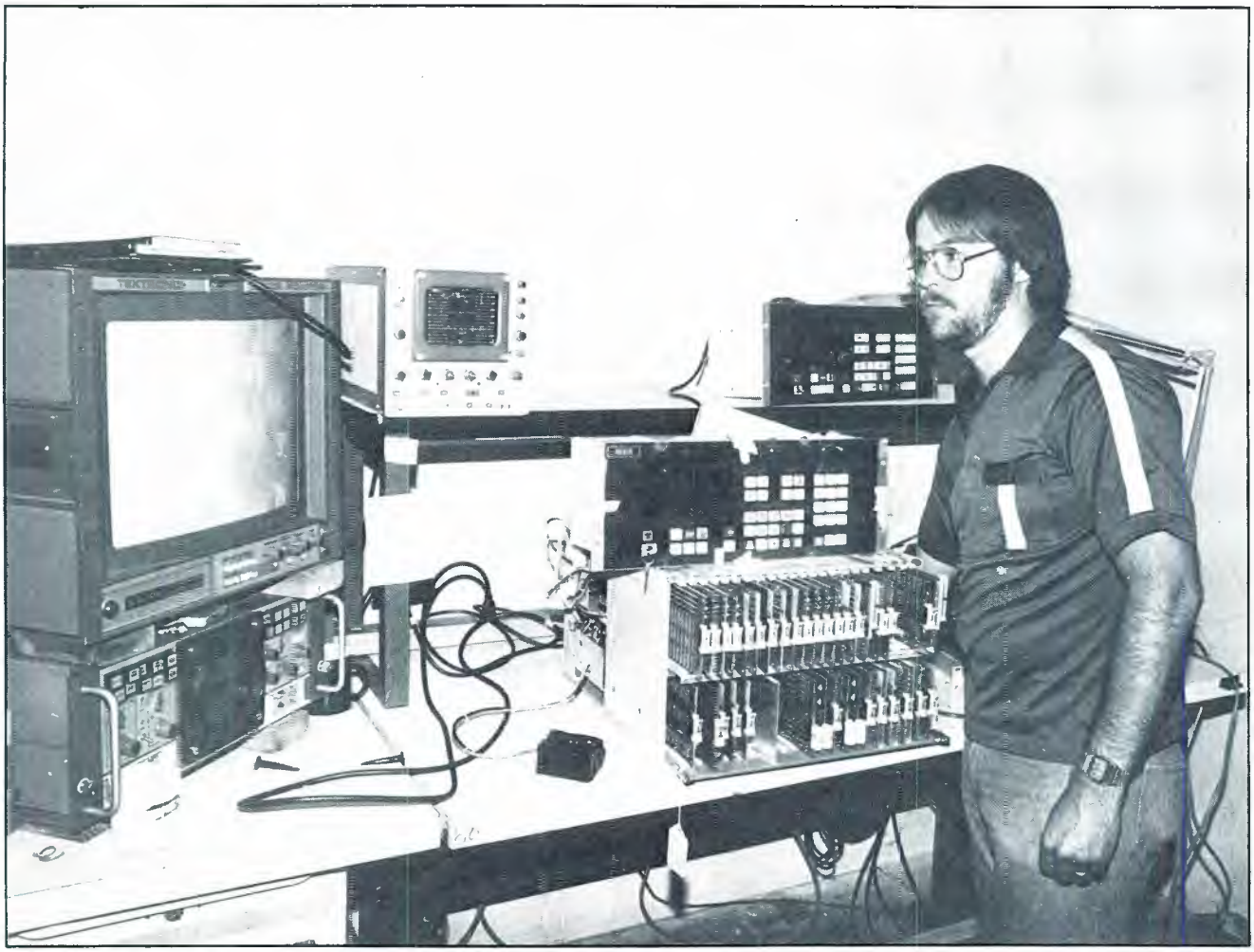

All assembled units go through extensive quality-control tests to verify all specifications.

All ADDA products go through customer acceptance.

boards. When the mechanical assembly, the point-to-point wiring and board insertion is finished, the assembly stage is over.

But, this still is not the end of the manufacturing process. Completed systems pass through in-process *quality control* and then go on to *systems test*, where the units are aligned and debugged, for the first time, as a complete system. Next, they are taken to the burn-in room, where they are kept, at an elevated temperature, for at least 48 hours. This procedure brings on any *infant* mortality that might cause initial failure of the finished product. Any problem that might develop because of faulty parts will more than likely be uncovered here. The system is tested completely once more to make sure it meets published specifications and performs all functions it was designed to do.

After final systems test, the product goes through another visual inspection before proceeding to *customer ac-*

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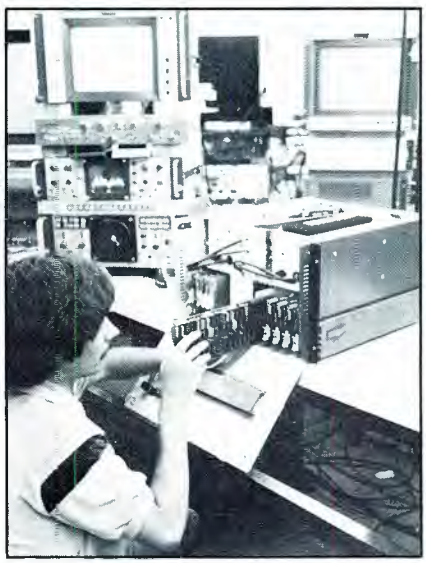
ceptance, where all products are tested for their capability to meet published specifications before being boxed for shipment and/or finished goods storage. This procedure is analogous to equipment startup at the customer's site.

If any problems are found by manufacturing or quality control, the unit is taken to a special repair station where parts are exchanged and resoldered, if necessary. Any unit that undergoes this repair step will then re-enter the manufacturing stream at a point before its failure and go through all verifications again.

Example of testing

To more fully understand the functions tested, let's take, for example, the ADDA customer acceptance routine for the Multiple Access Controller (MAC), used to remotely control a number of ESP still-stores.

Problems detected during quality-control check are repaired, then completely retested.



Multiple Access Controller (MAC) is completely tested by itself.

First, the controller would be visually inspected. Each board would be removed, then checked for current revision level and workmanship standards. Next, the following tests would be made: all output parameters checked; general signal quality evaluated; and functional testing of the unit done.

Because the main function of this unit is to control two or more ESP still-stores, the testing would not be complete if it were not hooked up to

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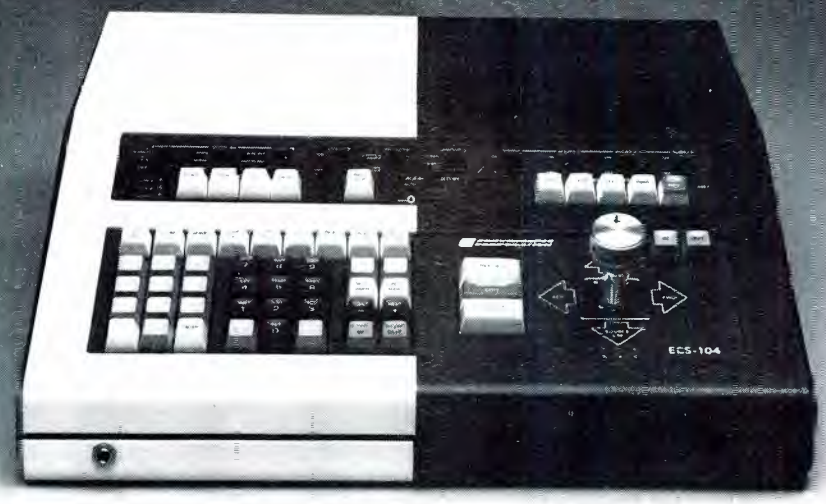

Upgradeability has been the promise of the 100 Series controllers ever since they were introduced in 1978. You took us at our word, buying over 2500 systems — more than any other editing manufacturer. Now our word is as good as gold. For $11,000 we will take back any functioning 103 (also 101 or 102) no matter how old, and give you a brand new 104. This extraordinary offer gives you the chance to have 800 lines of edit memory, Smart-Start synchronization, Comments and Advanced List Management at prices 40-50% below normal. Add it up, then call your local Convergence dealer or sales office. Offer ends January 1, 1984.

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two ESP units. One at a time, numerous commands are given to activate the two still-stores, and the results are monitored.

Once the quality control technician is convinced that the piece of equipment measures up to all specifications, the unit is taken to the shipping department, where it is crated and shipped to a customer or stored to await an order. Typically, ADDA products are manufactured and warehoused for forecasted sales rather than for specific orders.

Although one could deem the process at ADDA as an assembly line operation, it more closely resembles a custom-manufacturing procedure. Depending on what variety of models are scheduled to be manufactured, the factory typically produces between 75-90 units a month.

MAC is tested by using it with two ESP still-stores.

Technician in customer service area repairs returned unit.

Service

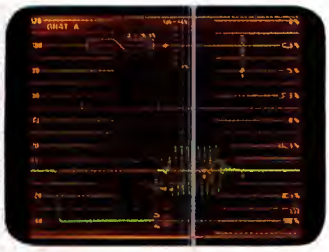
At the ADDA factory in Los Gatos, an area has been set aside for customer repairs. Returning equipment to the factory is the last resort for customers encountering trouble, because ADDA field service technicians repair many large installations on site. Also, there is a board replacement procedure. Usually, the customer, often with telephone assistance from ADDA service personnel, can determine which board is malfunctioning. A new board is then air expressed to the customer, who returns the old board for repair.

Because of the high degree of sophistication of ADDA's digital processing equipment, sometimes it is necessary to return units to the company. Most of its customers are in the broadcast making it imperative for repairs to be performed as speedily and thoroughly as possible. The customer repair area is set up to do that.

Offices for engineering personnel are adjacent to the factory's production area. These employees work on improving the existing product line and developing new equipment involving A-to-D and D-to-A conversion.

Founded in 1976, ADDA has experienced steady growth in serving broadcasters. The present facility was designed to meet the present market demand and to allow for future growth.

JVC engineers another breakthrough in video cameras.



JVC, a world leader in miniaturization of electronic components, brings you a new option at the highest level of production quality cameras.

ProCam™ Video Cameras!

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Getting started in broadcast videotape editing

By Arthur Schneider, A.C.E., post-production consultant, Agoura, CA

"How do I become a videotape editor?" A film and videotape editor with more than 600 screen credits answers some often asked questions and gives practical advice.

With any job, you get out only what you put in. The more effort you apply, the sooner you can expect to see results. Although many people think that videotape editing is filled with glamour (especially in Hollywood), if there is any glamour, it is rare and you might only get involved in such a situation if you happen to be in the right place at the right time.

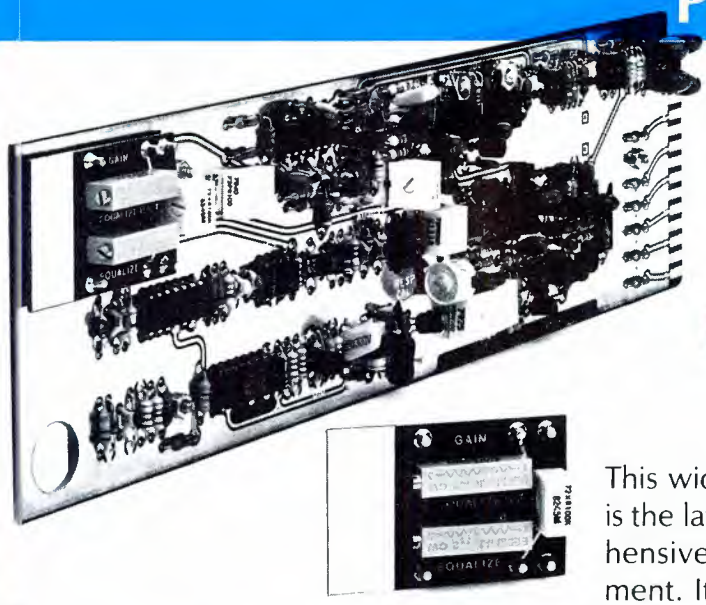
Once established as a videotape editor in the industry, with accumulated credits, your name and talent will get around the industry quickly. Producers and directors might ask for you, based on programs they have seen with your screen credits. They may also have learned about you in talking with producers and directors that have worked with you.

My start

During my early days of editing film, I thought that I was a great editor and, in my mind, I asked myself why the industry was not recognizing my talents. But success does not come overnight. You must pay your *dues*.

I began my professional editing career at NBC in Hollywood. I had attended a technical meeting on broadcasting one evening. At that meeting, a friend of mine told me that someone from NBC was looking for a part-time film editor. The man in charge was in-

HIGH PERFORMANCE



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Return loss	> 54 dB to 5 MHz > 46 dB to 10 MHz
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Outputs

Return loss	> 40 dB to 5 MHz > 36 dB to 10 MHz
Output isolation	
Signal (3.58 MHz)	> 48 dB
Load	< 0.05 dB/load at 10 MHz < 0.15°/load at 3.58 MHz
Output DC	< ±25 mV at back porch

Timing

Delay	25.4 ns (32.7° at 3.58 MHz)
Adjustment range	typically 6° at 3.58 MHz

Power Requirements

Total power dissipation	< 2 W

Performance

Frequency response	< ±0.02 dB to 5 MHz < ±0.1 dB to 10 MHz +0 -0.2 dB at 15 MHz typically -0.6 dB at 20 MHz
Differential phase	< 0.1° 10% to 90% APL
Differential gain	< 0.2% 10% to 90% APL
H tilt	< 0.25%
V tilt	< 0.25%
S/N ratio	> 70 dB to 20 MHz (rms noise/0.714 V) unweighted

Equalization

Range	0 - 300 m (0 - 1000 ft) Belden 8281, Northern Electric 728, or equivalent
Response	< ±0.05 dB to 5 MHz < ±0.15 dB to 10 MHz typically -0.2 dB at 15 MHz typically -1.0 dB at 20 MHz

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terested that I was currently a cinema major at USC in Los Angeles. He asked me to come in for an interview the next day.

The interviewer told me, in effect, "Don't call us, we'll call you." So I thought little of it until I received a call from NBC asking me to come to work the following Monday. As it turned out, what was to be a *temporary* position lasted more than 17 years. Several of those years passed before I was recognized for my talent as an editor.

Today the TV industry is expanding so rapidly that the demand for editors and other skilled help may soon outstrip the supply. Getting the opportunity to enter the field of your choice will be even greater if you make every effort to get involved in activities that will introduce you to people. One good way is to attend lectures, seminars and technical meetings in which people in the TV industry congregate. Attending conventions is another way to meet many people. Being a member of organizations such as the SMPTE will give you many opportunities to meet people and ask questions. If you are in school, many organizations offer a student membership at a reduced rate.

Get involved with the TV Academy or the Motion Picture Academy or other groups that have developed internship programs and student activities. These may give you your first opportunity to meet and work with people that can teach you skills you need.

If you are out of school, try for a full- or part-time job with a local TV station or production facility. Take any job that will get your foot in the door, even as a *gopher* or mail room worker. Many successful people in our industry started that way. Be dedicated and determined, if you expect to land the job. The pay may not be great, but the opportunity to meet people is. The job is your chance to show your willingness to work, your ability to get along with other people, and your ability to give and take instructions and to carry them out. The tasks you perform are all part of paying your dues.

Some equipment manufacturers offer intensive training in the use of computer-assisted editing systems. The cost of these schools is often relatively high, anywhere from $500-$900 per week. Some colleges offer courses in tape editing, but you must take into account the time required to complete the courses and other expenses, especially if they are located far from home.

If you get the opportunity to see format training in film or tape editing and can afford it, by all means do it. My training as a film editor made it relatively easy to move into videotape, because most skills I learned in film were easily applied to videotape. When you edit film, you use one kind of editing tool. For tape, you use a different kind of tool, but the aesthetic skills of film editing work just as effectively in tape work. Many times editing film transferred to tape is considerably faster and more efficient than editing the same material directly in film.

The media compared

I recently completed a test for a major film studio in Hollywood that compared the efficiency of editing film transferred to tape against editing the same film with conventional film editing tools. Of special interest was the creative end results, the time taken to edit both versions and the amount of money saved. For the parallel test against a skilled film editor familiar with the show on film, I was given the same script and film materials as the film editor. The film *dailies* were transferred to ¾-inch videocassettes. The result would be an episode of a weekly series.

When the project was complete, the show's film editing hours for the episode totaled more than 260 hours from the first cut to the last. My videotape editing time from first to final cut was 105 hours, which included five revisions. My version was approved by the producers to conform to the show format and could have gone on the air. I had not compromised the aesthetics of the show.

No two editors edit the same, no matter what medium is used. Although the final versions of each were different, both were acceptable to the producer. This proves that once you acquire the aesthetic skills of editing, the tools may change and your ability to edit may be enhanced by more efficient tools.

Pointers to a first job

Even skills acquired by editing home movies on film or tape give you some understanding of the relationships of scenes and what makes a pleasant edit and what does not. Formal training hones these skills so that you can extract the most from the tools with which you work. For beginners, though, they are not required.

When I am considering hiring someone, there are three requirements upon which I insist. The first is that the applicant have at least a high school education. Professional people (who have paid their dues) demand that the people with which they deal be able to communicate and understand instructions. Tape editing is a highly skilled profession and, for success, requires the ability to talk intelligently with people and to express yourself without hesitation.

The second requirement involves the person's ability to handle the job. If the job is an entry-level position, the person must be capable of learning the fundamentals of the work in order to progress. People, thinking they can do a job, sometimes bite off more than they can chew. So in preliminary interviews, don't tell the interviewer you are capable of performing a certain task if you have never done it. I would rather a person be honest with me, than to get hired and soon fired for not being able to perform as he said he could. Technical skills in the TV industry are hard to fake.

The third requirement is the ability to interface with co-workers. The individual must be capable of accepting constructive criticism and being a self-starter. Don't act too pushy, because that is the fastest way to alienate co-workers. Feel your way slowly in the new job, keep your eyes and ears open to learn from those who will readily give you information for the asking.

Some expectations

Videotape editing can be a high pressure job, because tight schedules and air dates must be met. For whatever reason, people think that all their production problems will be solved when they get into editing. Whether or not the editor can solve their problems involves editing skill and the tools available. The often heard, "Don't worry, we'll fix it in editing," are famous last words. When at times you must edit for 20-30 hours at a stretch, you soon find out what pressure is, especially when your clients do not know what they want and there is not enough coverage to make an edit work.

You must have the physical and mental stamina to work extended shifts when called upon to do so. Although these crazy hours do not happen every day, be aware that the better you become at your job, the more people demand of you. People insist on the best they can get, with on-line editing rates at $400 per hour or more.

To be a good video editor, you must have special qualities. Being an editor puts you in the spotlight. You must be fast, efficient and knowledgeable. You are, in a sense, captain of the ship, who is responsible for the technical quality of the resulting edited video-

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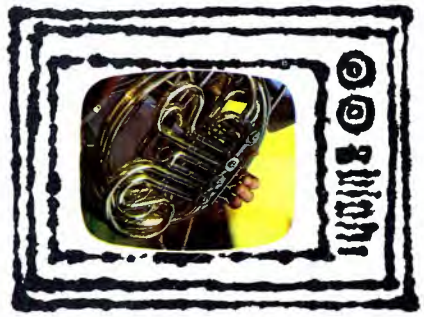

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tape. Also, you are responsible for the people working with you and their abilities to carry out your instructions. You also must be able to deal with your clients effectively.

Depending on the client, if you feel you can contribute to the session, offer suggestions. If an edit does not work the way the client wants, you may be able to improve it. Most clients are well-prepared and generally know what they want. If the opportunity presents itself to aid the client, by all means make your suggestions, but don't force them on the client. After several helpful ideas, the client may ask for your advice. If the advice helps the show, you may be asked back again for another show or series.

As the editor, you must be professional and confident in everything you do. When problems arise, you must assure the client that everything possible is being done to fix the problem. Depending on the client, a joke or two may help break the tension.

When a problem arises, screaming for maintenance only upsets the client. Excuse yourself, find the maintenance engineer and explain as quickly and accurately as possible the difficulties. Don't tell them how to solve the trouble. That is their job.

If the problem is minor, let the client know. Have them break for coffee or make phone calls they previously did not have time to make. If the trouble is extensive, even more diplomacy will be required. The client will always ask, "How long will it take to fix?", which is difficult to answer. A problem must be located before it can be solved. Then the maintenance engineer will be able to give you and the client a better idea of the expected delay.

Most clients will complain how their time is being wasted, even though they are not being charged during downtime. If repairs run into hours, not only is the client's schedule upset, but a domino effect may occur within the facility, with the client's schedule or with other clients waiting to get in. Preventive and routine maintenance schedules help reduce downtime and keep the facility profitable.

When a major problem occurs, your ability to deal with the client can put your diplomatic skill to the test. Some clients will threaten to pull the work and move to another facility. Most, however, are somewhat understanding, having been through it all at one time or another.

Off-line/on-line

There are two types of videotape editing. The first, known as *off-line*, is where most of the creative work is done. Technical skills required for this job are less extensive than those of the second category, *on-line* editing.

An off-line editor must be creative, have a good imagination, be able to visualize edits before making them and know only basic technical skills. This person must understand the use of time code and how it relates to editing. Also, if you expect to be proficient, you should thoroughly understand edit list management. (This is not difficult to learn, but requires time.) Off-line may require that you work on your own. Although you must be a self-starter and produce results on time, I think this is the most productive way to edit.

Off-line systems usually use ¾-inch or ½-inch VCRs. Learning to use them usually involves little more than loading/inserting the cassette and adjusting a tracking control. The real skill in off-line editing is in your creative ability. Most off-line systems are capable of reading time code, which is the only way the editor gets

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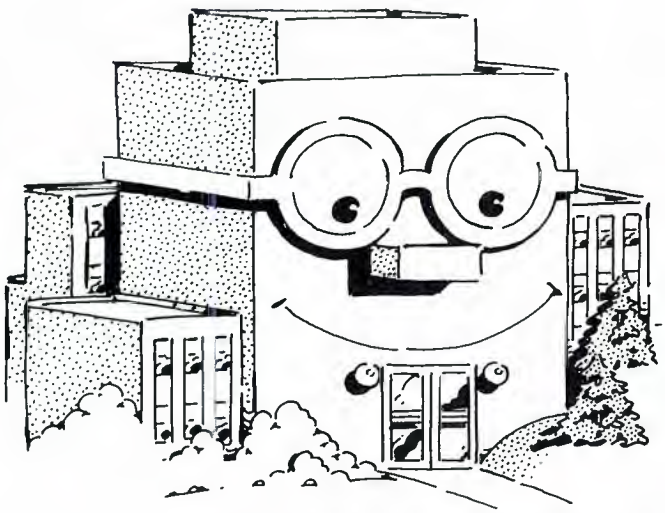

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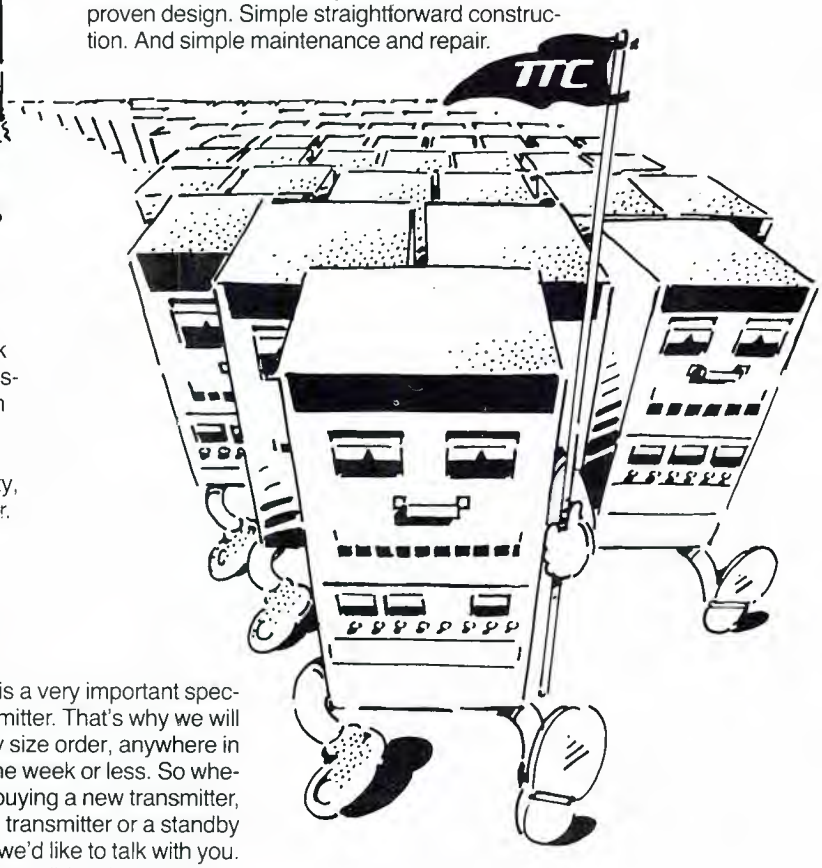

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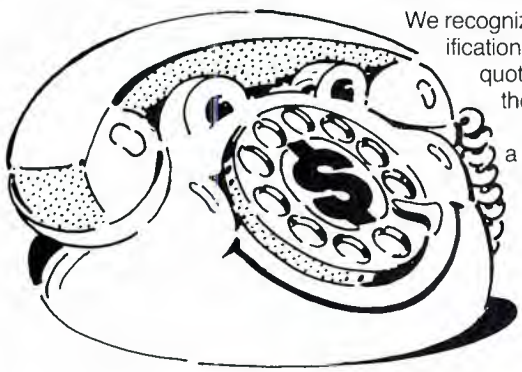

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repeatability and frame accuracy. Knowing how to use waveform monitors and vectorscopes, if available, would be to your benefit.

An on-line editor, however, must have a greater knowledge of broadcast equipment. Such an individual usually begins by learning how to record and play back videotapes on a variety of broadcast-capable VTRs, as well as how to make copies, dupes or dubs. Other duties may include preparing an *edit black* tape, which is the master tape used to build the on-line master tape. Familiarity with character generators for titling and graphics, with color camera setup and with equipment *patching* are important.

The next step after learning tape operations is becoming an assistant editor. The assistant helps tape operations by loading tapes for an automatic assembly session. During the assembly, the assistant must think ahead to anticipate the next reel change and to keep the assembly moving swiftly. After all, the longer it takes to assemble a program, the more the assembly project costs the client.

Other duties for the assistant editor involve keeping a sharp eye on all VTRs in the assembly system. Each machine must be adjusted for peak efficiency. As the assistant, you may be asked to adjust audio and video levels from time to time, while keeping an eye on the recording VTR. You must tell the editor if you notice any unusual glitches, flash frames or other video defects. It is much easier and less expensive to catch defects and problems as they happen, rather than go back later and correct them.

As you perform as an assistant, you can learn skills from the editors you serve. If you prove yourself during your training as assistant editor, most editors will show you their skills and teach you basic editing system operations. In on-line editing sessions, you will learn the use of sophisticated video switchers, digital video effects devices that manipulate video with amazing dexterity, character generators and tools not normally found in off-line facilities because of their relatively high cost.

Although the off-line room is more creative than technical, the on-line room emphasizes technical orientation. In addition to being creative, you must also know how to use high technology equipment. For that reason, on-line editors generally earn larger salaries.

Of the many computer-assisted editing systems, some are designed to be either off-line or on-line systems. Generally an off-line editing system is used to generate a work print quality videotape usually containing time code numbers visibly imprinted into each TV field and frame. The time code data obtained during the work print editing process will be used later to conform the original unedited tape into a quality master for broadcast or distribution. The new master may be on any tape format, because format does not determine the end use.

What *does* determine the acceptability of the finished product are factors such as picture resolution or sharpness, color quality, signal stability and whether or not the signal on the tape meets FCC technical specifications. The new ½-inch formats and the ¾-inch U-matic format are used heavily in news coverage with some use in other production as well.

Other considerations

Salaries need to be considered. Free-lance editors usually get higher hourly rates than those on staff. Hourly rates range from about $15, at the low end, to about $40 for the free-lance scale. From this free-lance salary, you must pay all fringe benefits that a staff job would give, such as health and dental insurance.

Staff editing positions may start at about $400 per week and may go as high as your skill and ambition will allow. These figures vary for various parts of the country. As your reputation grows, and you decide to work for an independent post-production facility, a company-leased car may be a consideration in lieu of a larger salary.

Benefits, such as screen credits, help to spread your name around the industry, gain the respect of your peers, put your name in trade publications and even carry the potential of an Emmy Award for outstanding videotape editing. It's a great feeling to sit at home watching your screen credit appear, as the TV program you edited is broadcast to millions to homes.

Let's face it. Most people are in editing for one of two reasons. One is the money; the second is recognition through screen credits. Creative fulfillment and personal satisfaction are generally only secondary reasons for becoming an editor.

Summary

What I have outlined here applies generally to broadcast, educational and industrial editing positions. Obviously, things such as Emmy Awards apply strictly to the commercial broadcast business. If your interest lies in the editing field, it will take much effort on your part to succeed, but with determination there are plenty of opportunities.

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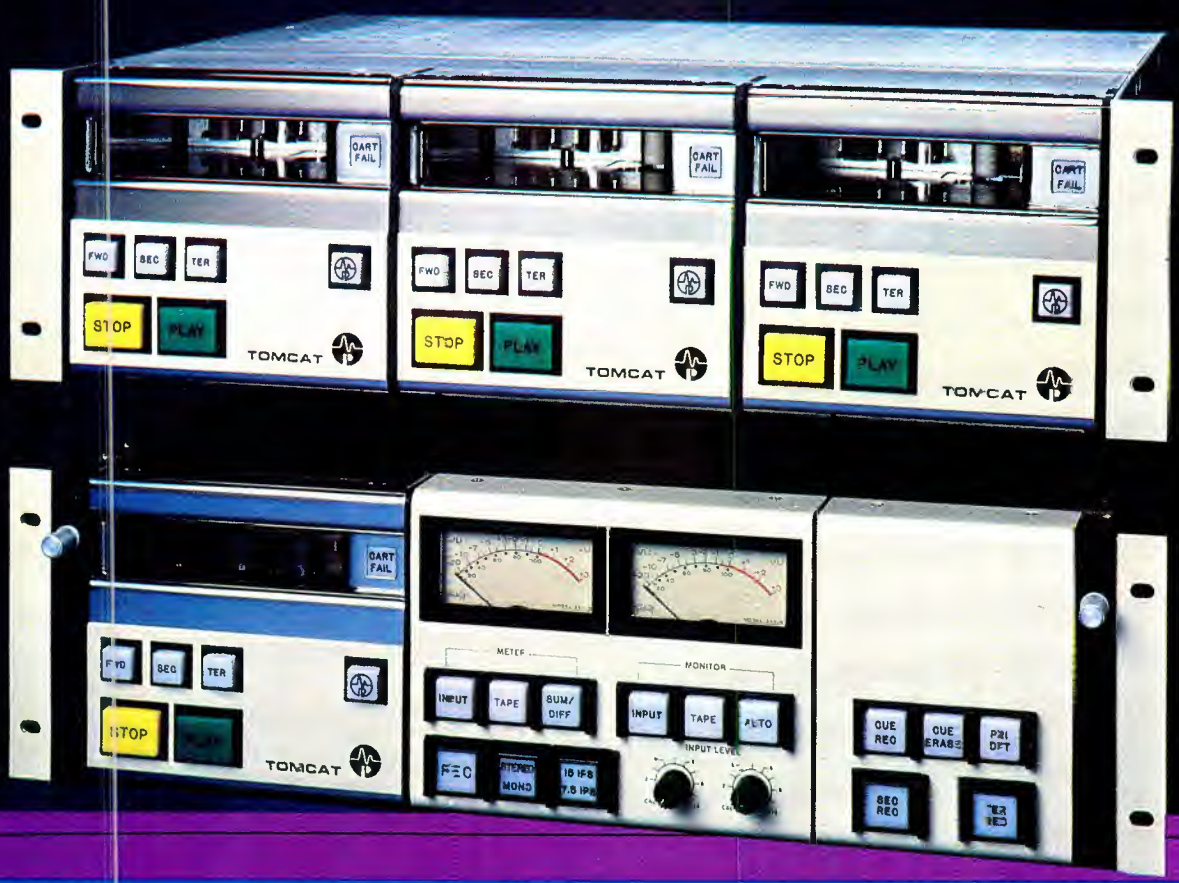

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EQUIPMENT SALES

Orders for the Aurora 100 videographic system, valued at more than $700,000 have been received by **Aurora Systems.** Orders have been placed by WJZ-TV, a Group W ABC affiliate in Baltimore; KSL, a CBS affiliate in Salt Lake City; Universal Images, a Detroit production house; and NAMCO, a Japanese electronic game manufacturer. A major system update also is under way at KRON-TV in San Francisco.

Microdyne's first Ku-Band mobile satellite TV uplink system has been delivered to VideoStar Connections of Atlanta. Named the VideoStar Express, the 30-foot, self-contained system is one of two that will be leased by VideoStar for nationwide broadcasting and teleconferencing use.

The largest single order of **TFT** aural STL equipment and accessories was recently shipped to Taiwan, Republic of China. An equal order was placed concurrent with the shipment. Recent business for TFT includes sales exceeding $400,000 of STL systems to Colombia, South America.

The United States Government Armed Forces Radio and Television Service Bureau has installed the **Antenna Technology** Simulsat-7, providing complete arc coverage of all domestic video and audio satellites simultaneously. Some TV stations currently using the Simulsat-7 include WLUK, Post Corporation, Green Bay, WI; WTVH, Meredith Broadcasting, Syracuse, NY; WOKR, Rochester, NY; WCGC, Raleigh, NC; KXKX, Dallas, TX; WPWR, Aurora, IL; WKRG, Mobile, AL; KOHA, Hilo, HI; and KTVA, Anchorage, AK. Cable companies using the Simulsat-7 include Tribune, Viacom, United, Falcon, New House Broadcasting, Televents, Gill Cable, Media General, Valley Cable, Telecable and Continental Cable.

Seven Network, Australia, has expanded its studio operations in Los Angeles with the purchase of additional **Sony Broadcast** gear, including several BVH-2000 1-inch Type C videotape recorders. Seven Network purchased Sony equipment for its Los Angeles facility, as well as production studios in Australia and London.

Vital Industries has shipped multiple-channel SECAM SqueeZoom units to Saudi Arabia and to Thomson-CSF.

WKPT-TV, Kingsport, TN, is on the air with its first **Precision Echo** Squeezer picture compressor/positioner.

Scientific-Atlanta has installed earth stations for ABC in Los Angeles. Two 11m antennas with redundant video

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transmit/receive electronics and auto protection switching will receive programming from New York and retransmit to the ABC Pacific time zone affiliates. The C-Band systems use the SAbus control system for remote monitor and control of all transmit/receive functions.

Brazil's newest TV network, TV Manchete, is using audio consoles from **Soundcraft Electronics.** The total order, delivered in May, included six series 2400 28/24 systems with bargraph metering and seven series 800B 24/8 units.

MCI/Quantel has announced recent deliveries of nine DPE 5000/Plus multichannel digital production effects systems, most including *Autoflex* special video shapes or *Dimension* perspective effects. Installations include TAV, Hollywood, which also is enjoying a recently installed Mirage effects system; CBS, New York; and ABC, New York. ABC also is using a new Paint Box system with *Font Factory* in its news operation, complementing the **Quantel** graphics system already being used by ABC Sports. Five other Paint Box graphics units recently were installed.

NEW ADDRESSES, DIVISIONS

Aphex Systems Ltd. has moved to 13340 Saticoy St., North Hollywood, CA 91605; 1-213-765-2212.

HEDCO (Hughes Electronic Devices Corporation) has announced its relocation to a larger manufacturing complex. However, its mailing address and phone number remain the same: HEDCO, P.O. Box 1985, Grass Valley, CA 95945; 1-916-273-9524.

Altec Lansing's corporate headquarters has moved to 1250 Red Gum Ave., Anaheim, CA 92806.

Thomson-CSF Communications has formed a new division, **Thomson-LGT.** The Stamford, CT, division will handle introduction and North American distribution of a line of low power TV transmitters.

Soundcraft Electronics' US sales office has moved to 1517 20th St., Santa Monica, CA 90404.

Film/Video Equipment Service Company, Denver, has expanded its professional optical department to provide expert lens service and repair for professional cine, ENG/EFP and studio broadcast lenses, such as Angenieux, Canon, Zeiss, Cooke, Schneider, Fujinon and Tamron.

CORPORATE DATA

Mitsubishi Electric America has acquired **Digital Entertainment Corporation (DEC)** in return for providing a financial package to DEC. Digital Entertainment Corporation will assume all marketing and sales responsibilities of the Mitsubishi Electric pro audio products, which primarily consist of a range of digital audio recorders for studio and broadcast use.

After reorganization early in 1983, **AEG-Telefunken** has been renamed A N T Nachrichtentechnik GmbH, with headquarters in Backnang, West Germany. Under ownership of Allianz Versicherungs-AG, Munich; Robert Bosch GmbH, Stuttgart; and Mannesmann AG, Duesseldorf, the company will continue manufacturing equipment for audio and radio communications systems including radio links, telecommunications and space communications.

Taft Broadcasting Company and **Zenith Radio Corporation** initiated teletext transmissions to the WKRC-TV audience in Cincinnati in June. The 100-page electronic magazine, *Electra,* will be available to viewers who purchase decoders from area Zenith dealers.

Allen and Heath Brenell USA Ltd. has appointed **Secom Systems** of Chamblee, GA, to represent all Allen and Heath and MBI Products in the states of Tennessee, North Carolina, Mississippi, Alabama, Georgia and South Carolina.

EECO has announced that its Intelligent Video Editing System (IVES) is now in full production, and delivery has begun. The editing systems are available locally throughout the United States and Canada through the company's distributor network.

Andrew Corporation, Orland Park, IL, has tentatively agreed to acquire the assets of **Grasis Corporation,** manufacturers of microwave towers and equipment shelters, located in Kansas City, MO.

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calendar

Oct. 30-Nov. 4

The Los Angeles Convention Center will be the site of the *125th SMPTE Technical Conference and Equipment Exhibit.* Five days of technical sessions will be held, focusing on the theme, "Future Sights and Sounds." The equipment exhibit will occupy more than 70,000 square feet, and will house 609 booths. For registration information, contact SMPTE registration, 862 Scarsdale Ave., Scarsdale, NY 10583.

November-January 1984

Synergistic Audio Concepts (Syn-Aud-Con) will hold 2-day audio engineering seminars on these dates, at these locations: Nov. 7-8, Orlando, FL; Nov. 15-16, Dallas; Nov. 29-30, Houston; Dec. 13-14, Las Vegas, NV; and Jan. 18-19, 1984, Anaheim, CA. For more information, contact Synergistic Audio Concepts, P.O. Box 669, San Juan Capistrano, CA 92693; 1-714-496-9599.

Nov. 1-4, Dec. 6-9

The Harley Hotel in Atlanta will be the site of the first series of seminars presented by North American Television Institute (NATI). The Hyatt at Los Angeles Airport in Los Angeles will host the second series. Seminar topics will include interactive video, computer graphics and animation for video, post-production techniques, audio field production, audio post-production, and more. For registration information, contact NATI, Knowledge Industry Publications, 701 Westchester Ave., White Plains, NY 10604; 1-800-431-1880, except in New York where it is 1-914-328-9157.

Nov. 7-9

The Hyatt Regency-Atlanta Hotel in Atlanta will be the site of the *Ninth Annual Satellite Communications Symposium,* sponsored by Scientific-Atlanta. Panel discussions will focus on topics including programming via satellite, high speed digital transmission, earth station design, teleconferencing and future industry developments. For more information, contact Betsy Crawley, symposium coordinator, 3845 Pleasantdale Road, Atlanta, GA 30340; 1-404-449-2274.

Nov. 7-10

A continuing engineering education course, *TDMA Satellite System Engineering and Practice,* will be held at the George Washington University in Washington, DC. It provides comprehensive coverage of basic methods in satellite digital communications and the application of these principles to specific projects. For more information, contact George Harrison at 1-202-676-6106 or 1-800-424-9773.

Nov. 10-13

The *14th Annual Loyola Radio Conference* will be held at the Hotel Continental in Chicago. The keynote speaker will be Dick Biondi, Chicago radio personality. For more information, contact Paula Lee at 1-312-670-3116.

Nov. 15

The third series of international panels on *New Trends in Integrated Circuits* will be held in Paris. For more information, contact Secrétariat Général, 11, rue Hamelin, 75783 Paris Cedex 16, France.

National Association of Broadcasters
1771 N Street, NW
Washington, DC 20036
1-202-293-3570

NAB urges FCC to reject Telocator petition

In what it considers to be a "naked plea for protectionism and a blatant attempt to insulate Radio Common Carriers (RCCs) from free marketplace competition, regardless of the resulting cost to the public," the NAB has urged the FCC to reject Telocator of America's July 25 petition seeking reversal of the FCC's First Report and Order, which eliminated restrictions on FM subcarrier usage. The restrictions that Telocator wants the FCC to impose, NAB said, are counter to the basic philosophy and purpose of the original commission proceeding, which ensures a substantial public service and maximizes spectrum use.

The NAB characterized Telocator's argument that FM subcarriers will have an unfair technical advantage over RCC paging companies as speculative and based on insufficient data. Telocator's reasoning, according to NAB, fails to consider things such as the duopoly rule, which prohibits FM licensees from operating multi-transmitter networks similar to those operated by RCCs and ignores the fact that RCCs are free to increase range and building penetration by adding transmitters to the paging systems, while FM licensees are restricted to a single transmitter site.

NAB asks FCC to implement anti-stripping rule

The NAB has told the FCC that CATV operators have failed to demonstrate that they should be permitted to strip broadcast-originated teletext. In reply comments, NAB reiterated its position that such a move would deprive the public of benefits the service would provide and asked the agency to implement an anti-stripping rule.

The association dismissed the argument that networks would have a competitive advantage over non-broadcast service because they have guaranteed access to TV households. It said that they are limited by commission rules to ownership of seven stations and will have to compete with independent producers and stations.

Most listeners consider radio "very important"

A new survey shows that radio plays a major role in the lives of most listeners, and almost 75% of the 1300 respondents agree that "something very important would be missing from life" if they did not have radio.

The study was commissioned by the NAB. Conducted by Reymer and Gersin Associates of Detroit, the study compares the psychology of fans of major formats. Among the findings are the following items:

- Fans of beautiful music radio do not just want background music. In fact, they are emotionally involved with their favorite stations and are extremely loyal to them.
- Although many people believe Album Oriented Rock (AOR) fans are non-conformists, they actually follow the lead of their friends more than any

other group when choosing a radio station. And, they are most likely to listen with their friends.

•AOR fans think of themselves as music experts who know more about music than most people. They like traditional hard rock far more than new wave music.

•Similar to AOR fans, contemporary hit radio fans want an unpredictable, trendy-sounding station, but have less ego-involvement. Their listening is more personal and more one-on-one.

•Adult contemporary fans want a station that does not demand too much of their attention—a cheerful companion that avoids obtrusiveness of any kind.

•Country fans are unique because they want a more traditional, folksy station. Also, it would "take a lot" to switch them from their favorite.

•Nostalgic fans think similar to AOR fans. They are the older-generation music experts, quite unlike their peers who prefer beautiful music.

•To news/talk fans, radio is the authority. They want someone serious they can "look up to." They are the medium's most unique listeners. They do not listen to be cheered up, unwind or take their minds off problems. They listen to engage their minds.

•Full-service fans seek the same intellectual stimulation that news/talk fans do—practical information, community involvement, self-esteem and things about which to think. However, they do not feel quite as strongly about these things as do the news/talk fans.

•There is no one kind of listener for any format. In fact, there are four groups of country fans, three groups of news/talk fans, six groups of AOR fans and so on. Each group or segment is reached with different programming and promotional campaigns.

The study also debunked some long-standing conceptions of radio listeners. It found groups of nostalgic fans that are not nostalgic for the "good old days"; trendy, sophisticated country fans; intellectual, information-oriented AOR fans and beautiful music fans who like personalities, jingles and contests.

FCC asked to repeal 100-mile rule

The NAB has asked the FCC to issue a Notice of Proposed Rulemaking to repeal its regional concentration of control rule. The provision prohibits ownership of three broadcast stations when any two are within 100 miles of the third and any two have primary service contour overlap.

The rule evolved from a commission order in 1938, which NAB termed "the Stone Age of telecommunications," and was modified in 1977 from a case-by-case approach to the present flat prohibition. Since then, NAB said, there has been dramatic increase in the number and diversity of media voices competing in the telecommunications marketplace, spurred by the growth of broadcasting and cable and the advent of low power television, multipoint distribution systems, direct broadcast satellites and other recent FCC actions. Of all the competitors, only broadcasters are shackled by the 100-mile and other multiple-ownership restraints.

Reconsideration requested on Docket 80-90 downgrading

The NAB has filed a Petition for Reconsideration of the FCC's Docket 80-90 decision to increase FM broadcast allocations through arbitrary downgrading of Class B and Class C stations. The commission said that those FM stations whose facilities were not at certain minimum standards three years after the adoption of 80-90 would be downgraded. The FCC has decided to impose 25kW and 100kW power minimums for Class B and Class C stations, respectively.

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In its petition, NAB argued that arbitrary reclassification and downgrading of these existing stations would "violate the principles of fundamental fairness and would be contrary to sound communications policy." NAB urged the commission to abandon the concept of downgrading, citing a number of factors such as other existing FCC rules, Federal Aviation Administration height restrictions, and local zoning and reconstruction costs, which inhibit or even preclude efforts of broadcasters to upgrade facilities.

The association also urged the commission to act expeditiously in granting FM preferences to daytime-only AM licensees and other existing broadcasters, such as Class IV AM and Class A FM stations, which might try to take advantage of the new FM allocations opportunities presented in Docket 80-90.

Teletext should not be hampered with program content restrictions, NAB says

The NAB has asked the FCC to reject petitions to apply the fairness doctrine, reasonable access and equal time provisions to broadcast teletext transmissions. Media Access Project and Henry Geller have asked the commission to reconsider its decision not to impose the rules.

NAB said the agency's action is "procedurally correct, good law and sound policy." The decision, NAB said, will not foreclose the presentation of controversial issues, nor will it preclude the balanced presentation of those issues. What it means, the association said, is that each broadcaster "will continue to be accorded the flexibility to satisfy its fairness doctrine obligations on its main-channel programming without being required to undertake the additional burdensome monitoring of teletext transmissions that application of the fairness doctrine would entail."

FM quadraphonic sound opens broadcast options

Edward O. Fritts, NAB president, said recently that he hoped broadcasters would take advantage of subcarrier frequencies for FM quadraphonic sound now that the FCC has authorized the service. The commission terminated an FM quadraphonic broadcasting proceeding recently, saying the decision to open SCA usage to broadcasters eliminated the need for any further action.

"NAB had urged the FCC to adopt a uniform technical standard for FM quadraphonic sound, rather than rely on the marketplace approach chosen for AM stereo and teletext," Fritts said. "The commission action does,

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however, present broadcasters with another avenue of opportunity. We will ask our members to take a look at the quadraphonic option as they consider subcarrier usage."

Coast Guard-shared frequencies questionable

The NAB has said the US Coast Guard proposal to share frequencies with broadcast stations "creates serious incompatibility problems between two services with public service and public safety obligations." The Coast Guard wants to use 161.7MHz and 161.75MHz to communicate with vessels at sea and along inland waterways. These frequencies now are used by stations for remote pickups in the Emergency Broadcast Service.

In its filing with the FCC, NAB said that there are now 1136 licensed broadcast remote pickup stations, which would increase with the proposed licensing of at least 600 new FM stations, the extension of the hours of AM daytime-only licensees and FCC action on several hundred other pending applications.

The association said that neither the commission nor the Coast Guard has offered any evidence that alternative means of providing reliable communication for the government unit have been explored and were determined unfeasible. It said that until these have been fully explored any decision would be premature.

It said that if the commission allows sharing, it must require the Coast Guard to abide by the same frequency coordination procedures now routinely undertaken by broadcasters, including advanced coordination before each specific use of the Coast Guard's portable field transmitters.

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SMPTE conference proceedings now available

The proceedings of the 17th Annual SMPTE TV Conference held last February are now available. Included are 28 papers covering high definition TV, TV graphics and special effects, the future of videotape formats and microcomputers in television, with special emphasis on software.

Copies of this 295-page book, titled *Video Pictures of the Future*, may be ordered directly from the SMPTE. Cost is $35 for non-members and $28 for members. If payment accompanies the order, SMPTE does not charge postage or handling fees.

NRBA

National Radio Broadcasters' Association
1705 De Sales Street, NW
Washington, DC 20036
1-202-466-2030

NRBA members support call for radio-only legislation

Reaction to NRBA's recent proposal for separate radio-only deregulation legislation was prompt and enthusiastic on the part of NRBA members. Many letters and telephone calls have been received at NRBA's Washington office supporting the NRBA request for radio-only legislation, which had been sent to Congressional committee leaders.

Identical letters reiterating NRBA's proposal for radio-only deregulation legislation were sent to the chairman of the House Commerce Committee, John Dingell (D-MI), and to the chairman of the House Telecommunications Subcommittee, Timothy Wirth (D-CO).

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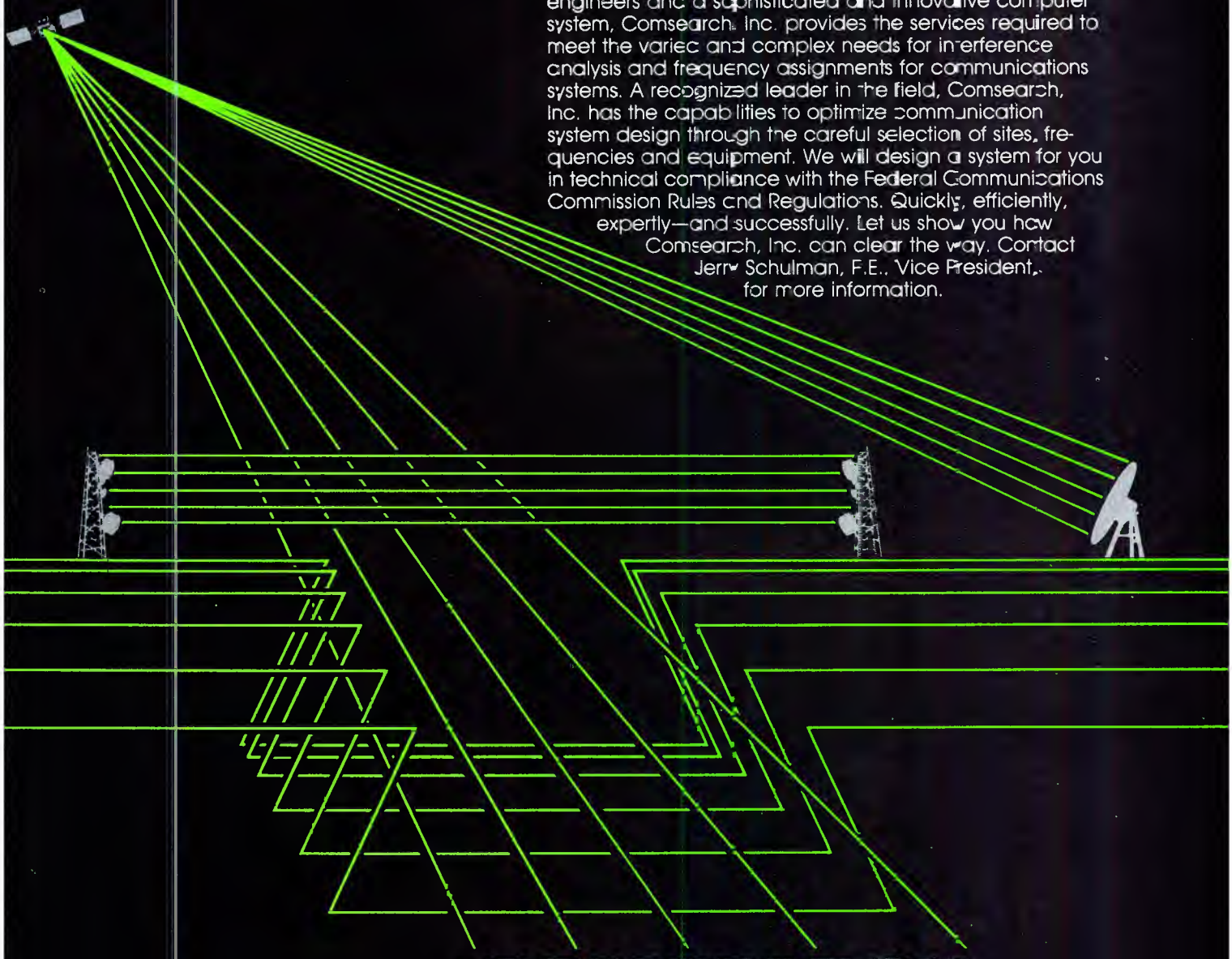

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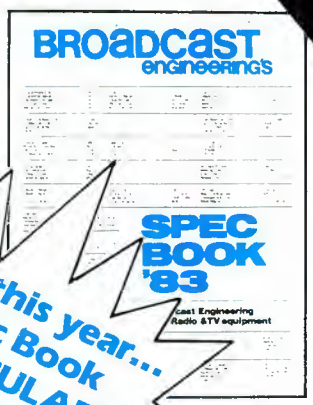

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NBC Radio Talknet program receives NRBA award

NBC Radio's Talknet program was the August recipient of the NRBA Certificate of Merit Award for outstanding public service. Talknet is a daily line-up of self-help, call in programming currently reaching a network of 137 radio stations across the country. NBC Radio is the first network to receive the NRBA award.

Fast action by Talknet staffers saved a Michigan woman's life on June 23. Talknet host Sally Raphael received a late-night phone call from the woman, who obviously was emotionally distraught. At the time, there was no initial indication that she was on the verge of suicide, but she soon revealed that she had already emptied the medicine cabinet.

The woman told Raphael that she no longer wanted to live, so Raphael attempted to focus the conversation on reasons why she should go on. Eventually the woman agreed to receive help, but by that time, she was virtually incoherent. Talknet staffer Nancy Visser was able to get assistance to the woman on time; she had swallowed about 38 pills. Only 20 minutes had elapsed between the time the woman placed the call to Talknet and when she was rushed to a hospital. The woman was released from the hospital June 27 and has agreed to seek psychiatric assistance to cope with her problem.

Talknet will be included in an engraved honor roll of certificate winners that will be presented to the chairman of the FCC and the chairmen of the House and Senate Communications Subcommittees as evidence of radio's outstanding performance in the public interest.

NRBA asks the FCC to look again at Docket 80-90

The NRBA has asked the FCC to reconsider part of its decision in Docket 80-90—FM drop-ins. That decision, adopted May 26, 1983, but not yet in effect, calls for a new FM table of assignments containing hundreds of additional FM allocations, as well as a new classification system that will require existing stations to meet certain minimum tower height and power standards or face downgrading. NRBA has asked the FCC to grandfather existing Class C facilities. In the petition, NRBA said that downgrading a Class C station, "because it is not possible (or economically feasible) for the station to meet the new... standards within three years, would deprive in the long run a significant portion of the station's listeners of an established and reliable service." In case the FCC rejects grandfathering, NRBA urged that case-by-case considerations be given to provide additional time to stations that face zoning or Federal Aviation Administration considerations. Also, NRBA asked for a buffer zone to be factored in around existing stations when the FCC assigns the new frequencies.

SBE

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Broadcast engineers to hold convention in Seattle

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Upgrade to 60 second record and display of full size video sequences

* Options, Monitor and Terminal are not included. Prices are subject to change without notice
** Upgrade to less than full size record and display can be obtained at lower cost.
† UNIX is a trademark of Bell Laboratories.

OPTIONS

-Video sequence rates: 24, 25, 30, 48, 50 and 60 frames/second
-Picture element resolution: input 9, 10, 11 bits; output 10, 12 bits
-Up to 8 minutes of full size image sequences at any of listed frame rates
-Up to 4 workstations each with independent computer and RAM memory
-Up to 4 bit overlay
-Joystick and/or tablet
-Image processing software
-Graphics software

Circle (136) on Reply Card

Write or Call:

Picture Element Limited
635 Waverley St.
Palo Alto, CA 94301
(415) 322-2141

Several related organizations hold their own meetings at the convention, including the Audio Engineering Society, the Independent Television Association and the Society for Motion Picture and Television Engineers.

Association for Broadcast Engineering Standards
2000 M St., NW
Suite 600
Washington, DC 20036
1-202-331-0606

Daytime-only decision supported

Wallace E. Johnson, president and executive director of ABES, has praised the FCC for what he termed a historic decision on extended operating hours for daytime-only AM broadcast stations.

Johnson said that the FCC has reached a decision that carefully balances the public interest considerations involved by providing an opportunity for a substantial number of daytime-only stations to extend their operations during pre-sunrise and post-sunset periods, while still protecting unlimited time stations from destructive interference to their service areas during these periods. ABES has supported the major points in the FCC's proposal.

The decision (BC Docket No. 82-538) will permit daytime-only AM stations to operate from 6 a.m. local time to two hours after the hour of local sunset with 500W or such low power as required to protect the licensed nighttime services of other classes of AM stations.

Radio Television News Directors Association
1735 De Sales St., NW
Washington, DC 20036
1-202-737-8657

FCC urged to repeal personal attack/political editorial rules

In joint comments filed this week with four other news organizations, the Radio-Televison News Directors Association urged the FCC to repeal the personal attack and political editorial rules, because they impede robust debate and foster self-censorship.

The Evening News Association, Gannett Company, Gaylord Broadcasting Company and Lee Enterprises, joined RTNDA in the response to the FCC's Notice of Proposed Rulemaking issued in June.

new literature

Compucon
—Brochure: "Guarantee Your Satellite Terminal Investment," (6 pages).
Circle (436) on Reply Card

AEG-Telefunken
—Selection guide: "VHF-UHF Semiconductors and ICs," (8 pages).
Circle (441) on Reply Card

Siemens Components/Litronix Div.
—Brochure: "Display Selector Guide," (6 pages).
Circle (440) on Reply Card

PrismaGraphics
—Presentation folders: various styles.
Circle (454) on Reply Card

Compucon
—Brochure: "Frequency Protection with Interference Alert Service from Compucon," (6 pages).
Circle (439) on Reply Card

Comsearch Applied Technology
—Brochure: "The CAT Services Brochure."
Circle (438) on Reply Card

Nesco Battery Systems

National Electro-Sales Corporation
—Brochure: "Nesco Battery Systems," (4 pages).
Circle (455) on Reply Card

A.W. Sperry
—Catalog MC-499 Issue A: "AWS Test Equipment."
Circle (442) on Reply Card

Sorensen Power Supplies
—Catalog: "40th Anniversary Issue," (128 pages).
Circle (437) on Reply Card

RCA American Communications
—Booklet: "RCA Americom's Digital Audio Transmission Service for Radio Networking via Satellite," (4 pages).
Circle (452) on Reply Card

The first 8-days-a-week logger.

The Dictaphone Veritrac SL.

Whether charting the hits or checking the spots, Dictaphone's new Veritrac SL voice communications recording system is practically indispensable. Here, in a package you can lease for as little as $99 a month, is recorded testimony to what you've aired. Uninterrupted by tape changes. 24 hours a day.

What's more, the Veritrac SL is modular. It can be configured to meet your station's specific needs. Providing recording time of up to 8 days. And it has something else going for it. Dictaphone reliability and service.

Dictaphone
A Pitney Bowes Company

Circle (163) on Reply Card

For more information on the Dictaphone Veritrac SL system, fill in the coupon or call toll-free:

800-431-1708

Except in Hawaii and Alaska
(in New York call 914-967-2249)

Name_____

Title _____ Phone _____

Station_____

Address _____

City_____ State_____ Zip_____

Mail to: Dictaphone Corporation
120 Old Post Road
Rye, New York 10580

Dictaphone and Veritrac
are trademarks of Dictaphone Corp., Rye, N.Y.

PBE-103

Compucon
–Brochure: "Microwave Communications with Terrestrial Planning Services from Compucon," (6 pages).
Circle (443) on Reply Card

ADC Magnetic Controls
–Booklet: "Broadcast Products," (30 pages).
Circle (444) on Reply Card

Mercury Wire Products
–Technical monograph: "Shielding Considerations for Cables and Interconnect Systems."
Circle (435) on Reply Card

Bardwell & McAlister
–Layout packages: "Studio Layout Package Lists and Diagrams," (correspond on letterhead).
Circle (449) on Reply Card

Whitmor Waveguides
–Technical note 83.11: "Rodent Resistance of Fiber-Optic Cable Products."
Circle (450) on Reply Card

Compucon
–Brochure: "Clear Channel LPTV from Compucon," (6 pages).
Circle (451) on Reply Card

Series 626
Universal Disturbance Analyzer

An expandable system designed for full power line and environmental analysis
- Twelve compatible plug-in modules handle up to 40 input functions
- Voltage surges, sags impulses, brownouts
- Temperature, humidity and events
- Self-contained printer and full remote operation

Dranetz Technologies
–Brochure: "Series 626 Monitoring Products," (16 pages).
Circle (445) on Reply Card

Vector Electronic Company
–Catalog: "Packaging," (68 pages).
Circle (446) on Reply Card

Whitmor Waveguides
–Technical note 83.12: "Crush Resistance of Fiber-Optic Cable Products."
Circle (447) on Reply Card

EECO
–Brochure: "IVES," (8 pages).
Circle (448) on Reply Card

Of special interest

In his book, *Colour Science in Television and Display Systems*, W.N. Sproson uses his many years of experience with the BBC Research Department to discuss the various ways in which NTSC, PAL and SECAM systems deal with the transmission of color information, detailing strengths and weaknesses of those systems. The book covers basic colorimetry, the chromaticity diagram and the color CRT. It analyzes the color camera and its optical components, such as filters and prism-splitter blocks.

Some math background is advised for complete understanding, but the material is of interest and value to anyone wanting to obtain a better understanding of color.

The book, published by Adam Hilger Ltd., Bristol, United Kingdom, is distributed in the United States by Heyden & Son, 247 S. 41 St., Philadelphia, PA 19104. Price is listed at $36 for the 221-page hard-bound volume.

Circle (453) on Reply Card

TV test equipment from the inventors of the Plumbicon® tube.

At long last a new, reliable source of TV test equipment. One that offers fast, predictable delivery. One with a name all the world trusts—Philips. Four quick examples:

PM5565 Waveform Monitor

Enjoy the luxury of examining one line and one field at a time. On top of this, there's a convenient front probe input so you can use the monitor as a troubleshooting oscilloscope.

PM5567 Vectorscope

If you want more accurate decoding and the ability to have an external reference from composite video signals, choose our vectorscope.

Both waveform monitor and vectorscope mount side by side, fit all existing hardware and use less power than the competition.

PM5539 Color Analyzer

Take it on a quick trip through your studio or control room and adjust all monitors to the same color temperature in a matter of minutes.

With four different memories, there's no problem in quickly calibrating four different phosphors.

Variable full-scale, from less than set up to more than reference white, allows measurement of color tracking as a function of APL.

PM5534 Color Pattern Generator

Our universal pattern contains all the signals needed to verify overall system operation—directly from the picture. No wonder virtually every set manufacturer uses our pattern for their TV set alignment.

Of course our TV test equipment line doesn't end here. Today Philips offers a wide range of equipment including sync and pattern generators, VITS generators and analyzers, and TV modulators and demodulators.

For nationwide sales and service information call 800-631-7172, except in Hawaii, Alaska and New Jersey. In New Jersey call collect (201) 529-3800, or contact Philips Test and Measuring Instruments, Inc., 85 McKee Drive, Mahwah, New Jersey 07430.

Philips, of course.

PHILIPS Test & Measuring Instruments

PHILIPS

Circle (165) on Reply Card

new products

Stereo console

The ESA-10 from *Audio Metrics* features 10 channels, linear faders and total dc control.

Circle (400) on Reply Card

Picture reducer

The *Stock Electronic Europe* Videoplex takes up to 16 separate signals and combines them into one split screen containing pictures either 2"x2", 3"x3", or 4"x4".

Circle (401) on Reply Card

Subtitling system

VG Electronics and *Oracle Teletext Ltd.* have released the Newfor subtitle preparation system. Developed in cooperation with the Independent Broadcasting Authority, the system reduces preparation time of subtitles/captions by about 50% and allows real time captions for news and sports. It combines with the VGE TTS4 teletext system for cost-effective captioning for the hearing impaired.

Circle (406) on Reply Card

Audio cabling

Star-Quad audio cable from *Canare Cable* is a 4-conductor material consisting of two twisted pairs with a high-density braided shield. Tests for noise immunity indicate a 10X improvement over standard balanced mic cabling.

Circle (407) on Reply Card

Noise reduction system

The *Symetrix* 511 stereo noise reduction system does not rely on an encode-decode process to accomplish noise reduction. Therefore, it may be used to remove existing noise from pre-recorded tapes or other sources, including noisy mixing boards and processing devices. It is packaged in a single-space rack chassis.

Circle (410) on Reply Card

We Made The First.

And We Still Make The Best.

THE 1710A WAS SPECIFICALLY DESIGNED FOR THE BROADCAST INDUSTRY!

The Sound Technology 1710A Distortion Measurement System has the only *true* balanced and floating oscillator that will provide you with a clean low distortion signal throughout the *widest output level range available in the industry:* -90 to +26 dBm. This performance is delivered right where you need it . . . at the transmitter (the 1710A has an RF rejection ratio of 10 volts/meter).

WHAT'S SO UNIQUE ABOUT OUR LOW DISTORTION OSCILLATOR?

The 1710A balanced oscillator, its power supplies and control circuits, are a totally floating and shielded entity. The 1710A oscillator is located within a double electrostatically shielded assembly, with shielding extending not only around the oscillator itself, but also around its power supply and down into the transformer windings. The oscillator's attenuator, also electrostatically shielded, is on the output of the oscillator, and as a result gives you very clean low level signals.

HOW DOES THAT BENEFIT THE ENGINEER?

What all this means is that the 1710A can drive *any* kind of load — balanced, unbalanced, off ground, or whatever, with no loss of level and no ground loops. Configuring the output attenuators as we do, allows you to cleanly measure down to and *below microphone line levels* (clean signals even at 24.8 μV!). Having the 1710A is like having the ultimate insurance policy at a very reasonable price. It is virtually impossible to obtain erroneous readings under any condition.

OUR SPECIFICATIONS ARE CONSERVATIVE

The published specification for the residual distortion of the 1710A is less than .002% THD below 10 kHz. This we guarantee. However, the *actual* residual of a typical 1710A varies between .001% and .0005% over each of the three lowest frequency bands.

CALL SOUND TECHNOLOGY TODAY!

We'll show you why we have the best distortion analyzer on the market today.

SOUND TECHNOLOGY 1710A

I WOULD LIKE TO KNOW MORE ABOUT THE 1710A

NAME COMPANY

ADDRESS

PHONE ( )

SOUND TECHNOLOGY

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CAMPBELL CALIFORNIA 95008
Telephone: (408) 373-6540
Telex: 357445

Circle (168) on Reply Card

If you're ready to move up to a specialized mixer, you're ready for Ramsa.

The Sound Reinforcement Specialist: Ramsa WR-8716

When your sound says you're professional but your mixer doesn't. When you're wasting your subtlety and style on "make-do" boards. When you're creating compromises instead of clear-cut distinctions. Then you're ready for Ramsa—the mixers that are specialized so you won't have to compromise.

The WR-8716 is a fully modular sound reinforcement console with 16 input modules, 4 group modules, and 2 masters. It features 16 input pre-fader solo buttons, 4 group modules with pre-fader insertion patch points, and lockable post-fader solo buttons. There are 6 illuminated VU meters with peak LED's for easy outdoor reading and a separate stereo variable frequency EQ for monitor sends. Pan pot controls allow panning to the left or right masters while level controls permit 16 x 6 board operation. The left and right direct channel assign function lets you bypass the group modules for individual sources. Portable operation is a snap with easy access connectors.

And the WR-8716 features plastic conductive faders for greater reliability and smooth, low-noise operation; external power supply for light weight, and switchable 48V DC phantom power for condenser mics.

RAMSA

The Recording Specialist: Ramsa WR-8816

The WR-8316 recording console includes the same modular construction, input modules, power supplies and faders as the WR-8716 plus many important recording advantages. Like direct outputs for 4, 8, or 16 track recording and peak-reading LED meters that let you monitor any 4 out of 24 signals with clear, quick response.

You'll command a variable frequency EQ section with 3 frequency settings for the high and low frequencies plus continuously variable midrange. Stereo echo send replaces the separate mono controls you'll find on competitive boards. And you get two independent stereo monitor controls—one for musician's headphones, one for control room monitors—a special feature for any mixer in this class. And there are other important features like low noise electronically balanced mic inputs with high-speed IC's, 16 switchable post-fader solo controls and XLR-type mic connectors.

Ramsa offers a full line of specialty mixers including the more compact WR-8210 recording mixer and WR-130 sound reinforcement mixer. So don't hold down your professional sound, call (201) 348-7470 because you're ready for Ramsa.

Panasonic®
PROFESSIONAL AUDIO DIVISION

Circle (169) on Fep y Card

Oscilloscope

The *Sony/Tektronix* 336 portable digital oscilloscope includes a measurement memory length of eight bits by 1024 words, using a 50MHz equivalent bandwidth. The microprocessor simplifies manipulation of Channel 1 and Channel 2 signals to calculate rms, peak-to-peak and average of any waveform. The 11-pound package includes a menu system and alphanumeric CRT readout with analog output signals for XY chart recorders. A GPIB interface option is available for IEEE-488 applications.

Circle (402) on Reply Card

Module

The VSM-1 speed search module from *AVR Engineering* works with a Sony RM-440 editing controller and the VO2860, VO2860A or VO2260 U-matic VCRs. If applied to series 5000 recorders, minor modifications will be needed. The module provides five bi-directional search speeds up to 3X normal.

Circle (403) on Reply Card

Lenses

Angenieux used the Montreux exhibition to introduce several new lenses, including the high performance 15x13HP and 15x17HP for 1-inch and 1¼-inch cameras and a 12X high resolution system with a 1.5X range extender for HDTV. Other products included 15x9 and 25x10 zooms for ⅔-inch cameras and an improved 42X continuous zoom scheduled for use at the COPAN Olympic Games in Caracas, Venezuela.

Circle (404) on Reply Card

Editing systems

Various capabilities and savings result from *JVC* editing packages designated by the VE-90AT series and the VE-92 series. The VE-90AT uses CR-825OU editing recorders with CP-5550U or CR-6650U U-matic equipment. The VE-92 system adds a time code generator, dual-channel readers, edit decision lister, fade module and time code character generator.

Circle (405) on Reply Card

Video switcher

Two versions of the *Ross Video Ltd.* RVS 517 offer 12 or 20 video inputs and two independent Multi-Level Effects units. Each MLE can manipulate up to four video sources. It interfaces for editors; digital effects systems; border, spin and wipe generators; and the Ross scene store memory. The Ultra Key RGB chroma-keyer is available as an option.

Circle (409) on Reply Card

$6990

AFFORDABLE FIELD/FRAME SYNCHRONIZATION FROM THE LEADER

$6,990
Synchronizer

$12,990
Dual Synchronizers

$8,400
TBC

$15,100
Dual TBC's

$14,200
TBC Synchronizer

And with ADDA's AC 20A you can put two channels in a single system for $12,990.

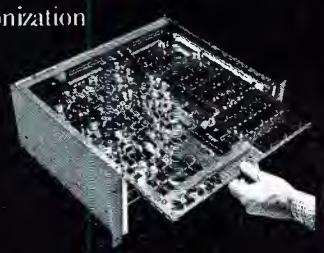
Never have broadcasters and CATV system operators been faced with signals and feeds from so many sources—satellite, microwave, news and sports remotes. What can you do to handle the problem of switching between all those sources?

ADDA, the quality and performance leader in video signal processing, has some innovative news for you.

Not only can we deliver unusually low cost field/frame synchronization with our *AC 20A*, but we can provide dual channel capability. You get a full bandwidth, high quality field or frame synchronizer in a modular one or two channel configuration in a single unit. It's priced at $6,990 for one channel of field synchronization and $12,990 for two. Frame synchronization is $1,000 more per channel.

But that's only the beginning. The *AC 20A* is a modular video signal processing system that also offers one or two channel time base correction, plus a versatile digital effects switching option.

Broadcasters and CATV people have already discovered what ADDA's remarkable *AC 20A* can do for them. Now, the new *AC 20A* with field/frame synchronization makes it even more remarkable.



Affordable Excellence

ADDA CORPORATION

Call the ADDA 1500 number: Corporate Offices, 180 Knowles Drive, Los Gatos, California 95030 (408) 378-1500; **California,** Los Angeles, 213/489-1500; **Connecticut,** Hartford, 203/647-1500; **Florida,** Miami, 305/759-1500; **Georgia,** Atlanta, 404/953-1500; **Kansas,** Kansas City, 913/631-1500; **Maryland,** Baltimore, 301/974-1500; **Michigan,** Detroit, 313/332-1500; **New York,** New York City, 212/398-1500; **Texas,** Dallas 214/373-1500; **Washington, D.C.,** 301/263-1500; **Wisconsin,** Wausau, 715/362-1500

Circle (171) on Reply Card

CCD color camera

The SP-3 3-chip camera from *NEC America's Broadcast Equipment Division* is suited for ENG and other field applications. It has a universal tape interface. The camera is resistant to vibration and shock, and weighs only 7.3 pounds.

Circle (411) on Reply Card

Video typewriter

The VTW-210 from *For-A Corporation of America* features a 16x20 dot matrix format. In addition to normal display modes, the compact, self-contained typewriter provides roll and crawl display with speed adjustable on the front panel.

Circle (412) on Reply Card

Standards conversion system

The ImageConverter from *Image Transform* uses 4-field, full-bandwidth RGB processing and a versatile temporal filtering system programmed to accommodate all existing standards, as well as future HDTV systems as standards come into service.

Circle (413) on Reply Card

Studio ribbon microphone

Audio Engineering Associates has introduced the Coles 4038 microphone. Its ribbon material is a selected pure aluminum foil, corrugated and precisely tensioned between high permeability pole pieces.

Circle (414) on Reply Card

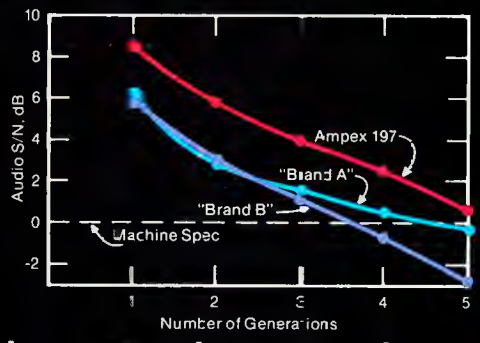
4-track cassette recorder

The X-15 multi-tracker from *Fostex Corporation of America* can record on up to two tracks at a time with individual tone and level controls. A 4x2 mixer is used for monitoring during recording and for setting pan and gain for each track during remix.

Circle (416) on Reply Card

Ampex 197: designed especially for broadcast.

AUDIO MULTIPLE GENERATIONS
Even after five generations, Ampex 197's audio signal-to-noise ratio exceeds the BVU series machine specifications.



Broadcast-quality sound.

Ampex 197 offers superior signal-to-noise and low distortion characteristics. This means crisper, cleaner audio performance under heavy editing conditions and multiple generation dubbing. Plus excellent stereo fidelity when used for music recording.

Broadcast-quality color and sharpness.

The Ampex 197 ¾" videocassette was developed with nothing less than perfection as the goal.

With superb chrominance and luminance performance it is ideal for ENG, EFP and on-line editing.

Ampex 197 has been especially formulated to optimize the performance of Sony BVU recorders.

STILL FRAME DURABILITY
Laboratory tests proved that Ampex 197 held up for three full hours with no RF loss.

Broadcast-quality reliability.

In blind field testing, Ampex 197 got the highest marks from broadcast professionals for picture quality, stability, and durability.

Find out more about why Ampex 197 is quality worth broadcasting. Call your Ampex Regional Office or write to: Ampex Corporation, 401 Broadway, Redwood City, CA 94063 (415) 367-3809

AMPEX

Ampex Corporation · One of The Signal Companies

Quality worth broadcasting.

Time code reader

Audio + Design's TCR 1 portable SMPTE/EBU time code reader and regenerator operates for up to 2000 hours from one set of internal batteries. It will read time code from serial time code outputs. The unit also will display user bit code.

Circle (415) on Reply Card

Broadcast console

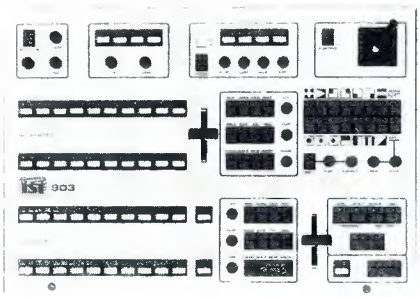
Pacific Recorders & Engineering has introduced the ABX, which features multiple stereo outputs, interactive machine control, all-format suitability and multi-track capability. The ABX is available in three mainframe sizes to accommodate 18-, 26- or 34-input modules.

Circle (417) on Reply Card

Digital TV set

Matsushita Electric Industrial Company Ltd. has developed a digital TV set that offers crisper images and expanded capabilities, as a result of its digital video circuitry. It can accommodate a tuner and adapter for videotex and teletext, and will hook up directly with home computers, stereos, VCRs and other forms of component television.

Circle (418) on Reply Card



Video production switcher

The 903 from *Industrial Sciences Inc. (ISI)* is fully computer-controlled. The pattern generator has 14 standard wipes. Options for the 903 include: PROM that allows external RS232 connection of an editor or computer with E-MEM standard protocol; RGB or encoded chroma-keyer; downstream key edger; quad split with color border; and an audio-follow-video package.

Circle (420) on Reply Card

Mixer

Sescom's MB-1 Newsbridge/mixer eliminates the need for multiple microphones in front of a speaker at a conference. It features three inputs, two of which are balanced microphone inputs. The third is a balanced bridging line-level input.

Circle (419) on Reply Card

Subcarrier demodulator

The SCB-2 from *Microdyne Corporation* recovers audio from FM subcarriers transmitted along with wideband satellite TV signals. Demodulators may be ordered with one, two, three or four subcarrier frequencies between 4.5-7.5MHz, to meet individual requirements.

Circle (421) on Reply Card

Wide-angle adapter

Century Precision Optics' wide-angle adapter for video zoom lenses and motion picture applications features a series of lens ring adapters that allow mounting on zoom lenses that have a 72mm, 77mm, 80mm or 86mm front thread. It offers 0.7X magnification.

Circle (422) on Reply Card

people

Joseph M. Swiderski II has retired as president and chief executive officer of Swiderski Electronics. **Joe Swiderski III** has been elected to succeed him. The elder Swiderski will retain his position as chairman of the board of Swiderski Electronics.

Lou Pfeiffer has been appointed director of sales and marketing for Jefferson-Pilot Data Systems of Charlotte, NC. Pfeiffer is responsible for the national sales effort for the entire JDS product line, which includes systems for electronic news processing, sales/traffic, general accounting and program management operations.

Roger Miller has been appointed Western regional sales manager of Ampex Corporation's Audio-Video Systems Division. Miller will direct the sales and service activities for the division's complete line of professional audio and videotape recorders, broadcast cameras, switching systems and computerized editing and video storage systems in a 3-state area. He will be headquartered in Glendale, CA.

Art Shifrin has been named Northeast regional sales manager for Abekas Video Systems. Most recently, he was regional sales manager for Thomson-CSF Broadcast. Before that, he was with Ampex.

Robert J. Cleve has been appointed director of engineering for the Mutual Broadcasting System. Cleve will be responsible for professional engineering activities supporting network origination and distribution. He will provide technical direction and administrative management for new technologies development and engineering support for new business ventures.

Shellie Yaseen has been promoted from her previous position as West Coast director for Audio Plus Video International to the newly created position of director of marketing for Video Services Corporation, the parent company. Yaseen will develop new sales opportunities for each of the several VSC companies.

COMSAT World Systems Division has made three appointments. **Edward J. Martin** has been named vice president, international operations. Martin will be responsible for the operation and planning of COMSAT's international satellite communications system and the direction of COMSAT's 17 earth stations, which operate with the INTELSAT system. He also will assume the role of US governor on the INTELSAT board of governors. **David E. Gourley** has been appointed vice president, business development, with responsibility for establishment of business plans, new communications services and market development for COMSAT's international communication services. **George J. Tellmann** will be vice president, maritime services. He is responsible for managing COMSAT's maritime satellite communications business and will serve as the principal US representative on the INMARSAT Council.

William H. Butler has resigned as president of Fernseh. Butler, who had been acting as a consultant to Fernseh three years ago when he was named president, will return to his consultancy role for Fernseh and pursue other business interests. Until a new president is named, the company will be run by a management committee consisting of **Dietmar Zieger,** marketing vice president; **Erich Zipse,** operations vice president; and **Donald K.**

McCauley, financial vice president. In another announcement, **Alan Sheffield** has been appointed South Central regional sales manager for the company. Sheffield comes to Bosch-Fernseh from Panavision Electronics, where he was national sales manager for CEI/Panavision broadcast TV cameras.

3M's Magnetic Audio/Video Products Division has announced that **Joseph L. Leon** has been appointed marketing director for professional markets and **Joseph A. Giordano** has been appointed product planning and development director. Before this appointment, Leon had been the division's sales director. Giordano will be responsible for advanced products and new business opportunities on a worldwide basis.

Gary Youngs, former Sony Broadcast product manager and CMX marketing specialist, has been named "chief market wrangler" at Merlin Engineering Works.

Sony Professional Audio Products has named **Jeff Evans** and **Ernie De Los Santos** as sales managers for the Western and Central regions, respectively. Each will have responsibility for MCI/Sony professional recording equipment, Sony wireless microphone systems and other Sony professional audio products.

Tucker Electronics Company, Garland, TX, has announced five appointments. **Dick McDonald,** formerly general manager, has been appointed vice president, operations; **Clay Aclin,** formerly sales engineer, is now

sales manager; and **Duanne Harvey** moves from sales engineer to purchasing manager. **Don Stabeno** has been appointed vice president, marketing; and **Mike Zelsmann** joins the company as advertising manager. Stabeno was formerly with Hewlett-Packard; Zelsmann with US Steel's OILWELL Division.

KEYCOM has made two appointments. **Vernon W. Cain** has assumed the new position of vice president, operations, and **Robert S. Taller** has joined the company as vice president, sales.

Frank Washington has been appointed vice president and general manager for Videotex America. Washington joined the company shortly after its formation in January 1982 as vice president/director, business development.

Allen Kasiewicz has been appointed operations manager in charge of marketing, sales, production and development of optical communication cable and components for PHALO/Optical Systems Division.

Quad/Eight Electronics has announced the appointment of **Joe Urbanovitch** as chief engineer, manufactured systems. Urbanovitch will head a team of engineers and designers creating new consoles to expand the line of Quad/Eight quality mixing systems for recording, broadcast and film.

Georgine Hoch has been named deputy director, sales, for Plastic Reel Corporation of America (PRCA). In her new position, Hoch will be responsible for customer service support for PRCA's priority film and video industry customers.

Bradley Broadcast Sales, Rockville, MD, has appointed **Art Reed** general manager, broadcast sales. Reed brings more than a decade of broadcast experience to the general manager's position.

Comsearch has announced that **Kevin B. McWhinney** has joined the company as director of sales. In this new position, McWhinney will be responsible for sales and marketing functions and business development. He also will provide assistance with advertising.

George Treneer has been named marketing manager, video products, a new position in EECO's marketing organization. Treneer is responsible for developing and supporting EECO's video distributor and OEM accounts and for managing the business relationship with these accounts.

Ted Feurey has been named managing director of BASYS International Ltd. of Great Britain. Feurey takes over the year-old, London-based operation from **Joe McGoldrick,** who will return to the United States to serve as the company's manager of customer services.

Roy Hanshe has been appointed product marketing manager, and **David Mandala,** product engineering manager, for Comprehensive Video Supply Corporation. Hanshe, most recently the national video product manager for Minolta Corporation, brings an extensive background in product management to the job. Mandala was a national service administrative engineer and regional technical supervisor for Sony Corporation of America before joining Comprehensive.

Comsearch Applied Technology has appointed **James J. Crenca** as vice president. Crenca will be responsible for business development.

professional services

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ENGINEER/TECHNICIAN. A midwest ABC affiliate is seeking an engineer/technician to maintain studio, transmitter, and ENG equipment. If interested, send a resume and salary requirements to: Broadcast Engineering, P.O. Box 12901, Dept. 596, Overland Park, KS 66212. 10-83-1t

TELEVISION MAINTENANCE ENGINEER. Repair and maintain studio & transmitter equipment. Experience in UHF transmitter repairs & digital troubleshooting required. General radiotelephone operator license. Resume to: Personnel, WMFE-TV, 11510 E. Colonial Drive, Orlando, FL 32817. EOE. 10-83-1t

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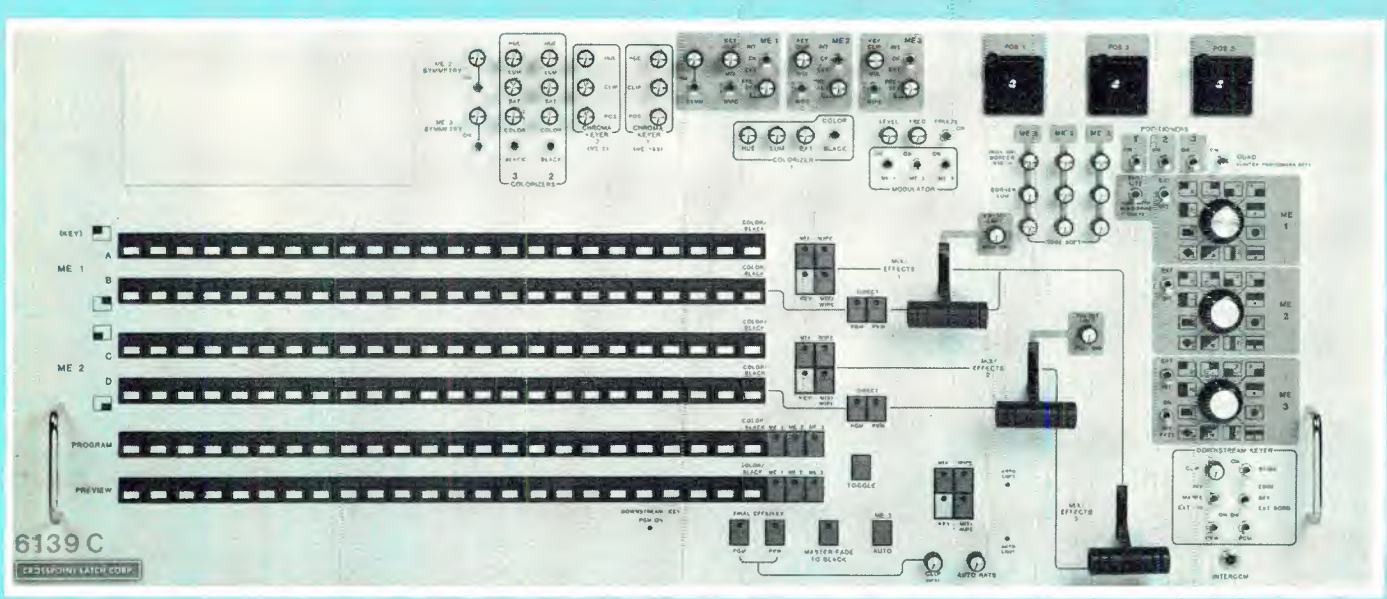

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*Patent applied

More information on the new GEN II KPA for the 80's is available from Varian Microwave Components and Subsystems Division. Or the nearest Electron Device Group sales office. Call or write today.

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Microwave Components and Subsystems Division
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