BROADCAST ENGINEERING®
November, 1975/75 cents

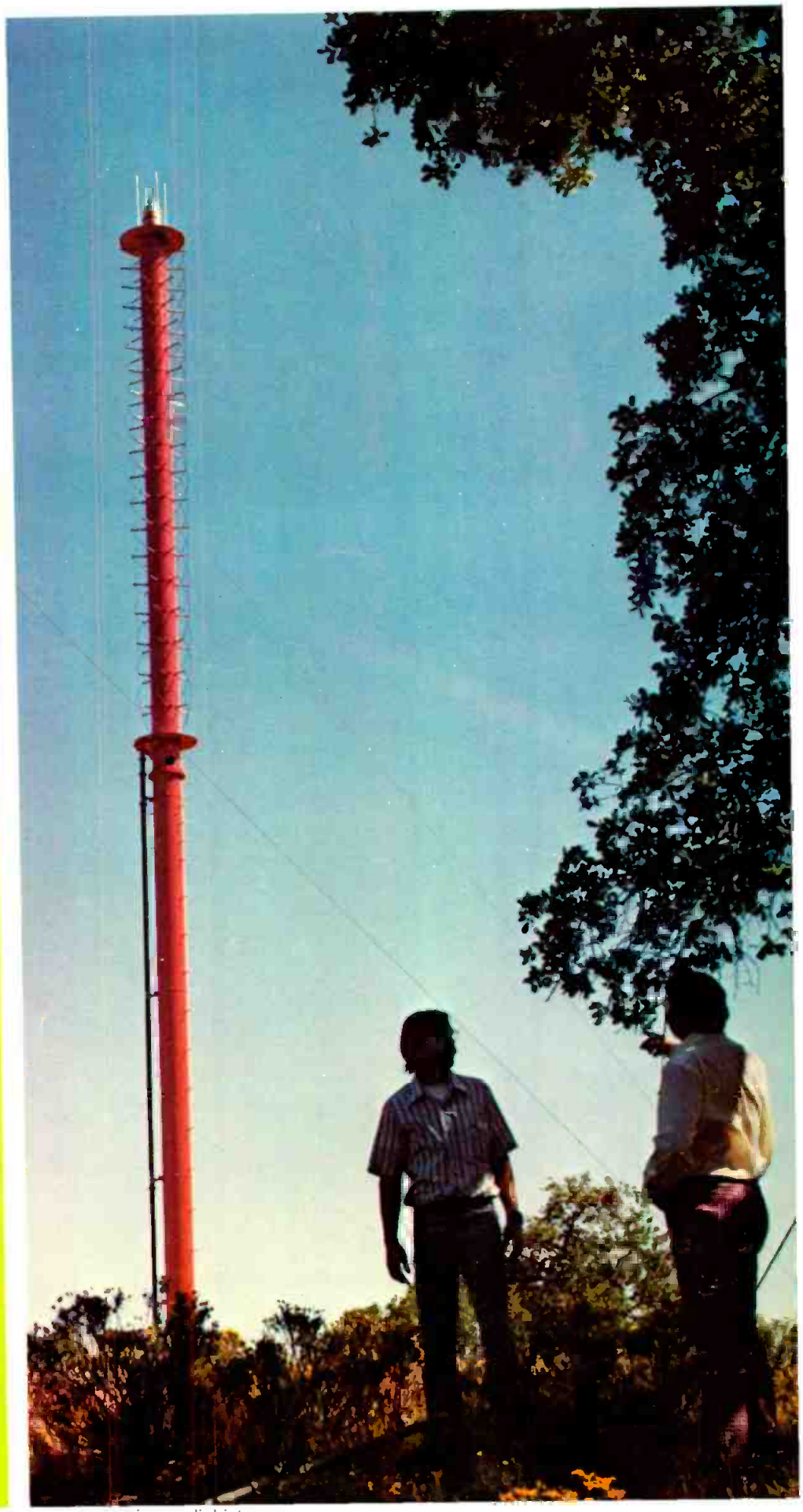
Will The FCC Approve CP Antennas?

Page 24

Effective Tall Towers

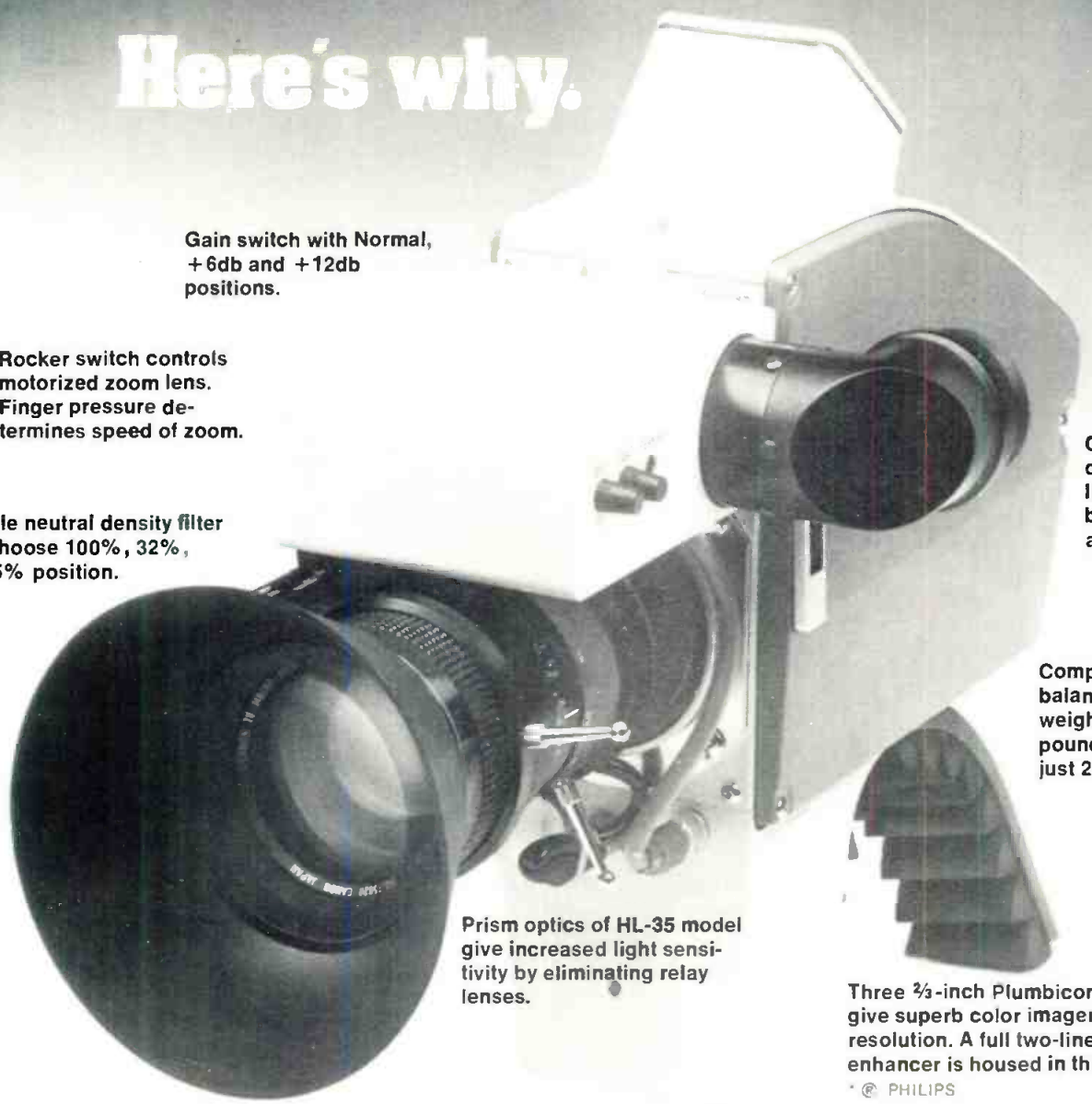
Surviving The Winter

A Super Live Special



Every major television network has chosen Ikegami ENG.

Here's why.



Gain switch with Normal, +6db and +12db positions.

Rocker switch controls motorized zoom lens. Finger pressure determines speed of zoom.

Adjustable neutral density filter wheel. Choose 100%, 32%, 10% or 5% position.

Studio use too.

Cast aluminum camera housing is lightweight, yet built for strength and rugged service.

Compact, well-balanced camera weighs just 13 pounds. Backpack just 22 pounds.

Prism optics of HL-35 model give increased light sensitivity by eliminating relay lenses.

Three ⅔-inch Plumbicon* tubes give superb color imagery, crisp resolution. A full two-line image-enhancer is housed in the backpack.

* ® PHILIPS

Uncompromising engineering has made Ikegami portable color camera equipment the choice of every major U.S. television network. And of fine stations in market after market.

It's the engineering that gives your Ikegami color pictures matchless clarity, brilliance and detail. For Electronic News Gathering. Documentary and on-site commercial production. And, with optional 4-inch viewfinder, for general studio production.

It's the engineering that's established Ikegami's reputation for dependability. Your Ikegami thrives on heavy use, stays on the job, performing beautifully, day in and day out.

Ikegami portable color camera systems: Rugged. Dependable. Stable. Lightweight. Superb picture quality.

Call or write for a demonstration.

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Depend on it

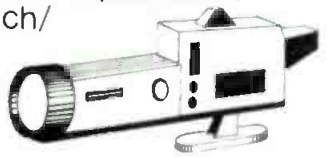
For More Details Circle (1) on Reply Card

Ikegami Electronics (USA) Inc., 29-19 39th Avenue, Long Island City, New York 11101 (212) 932-2577

HOW TO GET A SECOND CAMERA WITHOUT PAYING FOR IT.

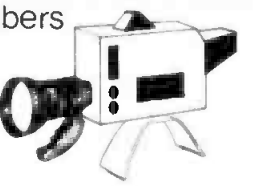
Economic realities being what they are, improving your camera setup often boils down to a battle of program quality versus pocketbook: For some assignments, you want the mobility and compactness of a hand-held camera. For others, the long focal length and high zoom ratio of a first-rate mobile. And sometimes, of course, the virtues of both. But what can you do on a one-camera budget?

Logical question. For which we have a logical—and economical—answer: Canon Versatility Packages. A family of two-lens systems which give you both capabilities, plus a quick, positive attach/detach system that's the closest thing to two cameras for the price of one.



Take our Plumbicon* Package, for instance. When you need compactness and high mobility, there's the PV10x12B—the world's most popular electronic news gathering lens. Featuring an 18" minimum object distance and a 55.4° wide angle, it's the lightest professional 10:1 around. One of the smallest of its type, the PV10x12B features remote CCU iris control with manual override, and fully-motorized variable-speed zoom.

Where applications require a longer focal length, there's the other half of the Package: our PV34x24B-DZ for 25mm and the P34x32 for 30mm. A mouthful of numbers which add up to the most versatile remote lenses available today. The basic lens is a 24-400mm automatic iris f/1.8 with built-in double zoom that yields a long, long 800mm. Thanks to its continuous, stepless magnification, you can operate at maximum light efficiency while tailoring the focal length precisely to your needs. Vary field of view from 29.8° to 0.9°controlled by the cameraman on the air, with no blanking periods or cumbersome supplementary lens insertions. And work to a minimum object distance of just 1.8 meters. Mounted on a rugged, lightweight camera base plate with a universal head fitting, either lens is easily attached and detached from the camera.



The Canon Plumbicon Versatility Package comes complete with all controls, accessories, and protective cases. Like the other Versatility Packages we offer for other formats, it's a great way to keep your cameramen happy. Without upsetting your controller. For more information, please write or call.

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BROADCAST ENGINEERING.

The journal of the broadcast-communications industry *November, 1975 Volume 17, No. 11*

About the Cover

Our cover picture depicts the general theme of the issue and shows a circularly polarized antenna under test. Photo is by courtesy of Jampro.

Departments

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Robert E. Hertel, *Publisher*

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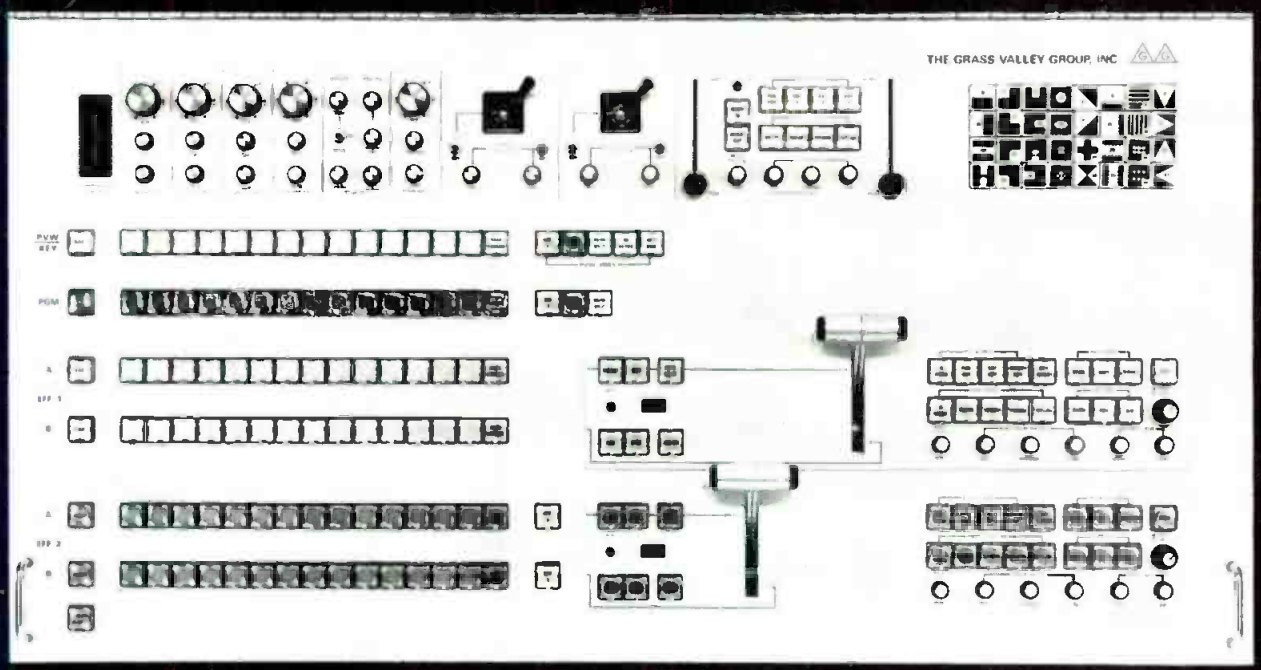
MODEL 1600-3D
SWITCHING SYSTEM



FEATURES

- 16 inputs (including color black and color background)
- 6 output buses: M/E-1 A & B, M/E-2 A & B, PGM, & PVW/KEY
- 2 complete mix/effects systems, each with modulated positioner, color matte generator, and pattern generator
- Color black generator
- Non-sync inhibit system
- Color background generator
- Camera tally system

OPTIONS

- RBG chroma keyers
- Shadow key system
- Chroma key switching matrices
- Borderline generators
- Quad split generator
- Downstream keyer with insert fade and fade to black controls
- Auxiliary switching buses with separate control panels

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DIRECT CURRENT FROM D.C.

November, 1975/By Howard T. Head and Harold L. Kassens

Commission Expected to Stay Portion of New Propatation Rules

The Commission is expected to act promptly (perhaps by the time these lines are in print) in response to a petition by the Association of Federal Communications Consulting Engineers (AFCCE) to stay the effective date of the application of a new "roughness factor" (h) to be employed in using new FM and TV propagation curves (see Oct. 1975 D.C.). This rather unusual step is being taken in the light of findings that in perhaps as many as 10% of the cases, the application of the roughness factor may lead to totally erroneous results. During the stay, a joint Industry-Government committee is being set up to study methods of correcting these deficiencies.

The Commission's action will not affect the actual adoption of the new propagation curves, or the new procedures adopted for making field strength measurements in the FM and TV frequency bands. However, the Commission is expected to postpone the requirement for filing new Grade A and Grade B coverage contour maps with license renewal applications.

FM Grant to AM/Newspaper Combination Revoked

The Commission has revoked a construction permit for a new FM station which had been granted by the Commission's Broadcast Bureau to a newspaper publisher in a small Midwestern community which was also the licensee of a local AM radio station. The Commission found that the Broadcast Bureau had inadvertently exceeded its authority in making the grant, which in the case of newspaper ownership requires consideration by the full Commission.

One of the more unusual features of the case was that the Commission had assigned the FM channel to the community on the basis of a petition by the newspaper publisher. The Commission noted that although the assignment had been made on that basis, the publisher had been given no assurance that he would ultimately be the licensee of the FM station.

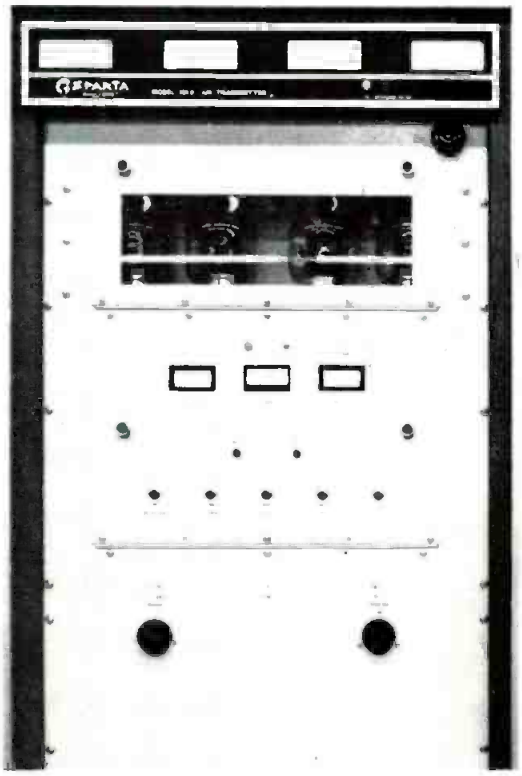
(Continued on page 6)

The New SPARTA Broadcast Equipment

VARIETY SHOW

Sparta 703B Bows In Before US Audiences After Long Road Tour!

(Sacramento) — The 2.5 kW AM Model 703B by Sparta has been in continuous production for the foreign market since 1967! Now all-solid state



up to the finals, its suitability for the F.C.C. 2.5 kW AM power classification will make it the instant leader in economy and dependable performance!

Sparta AM transmitter productions also include the 701B, 705, 710, 715 and 725 models. Ask our prompter for information!

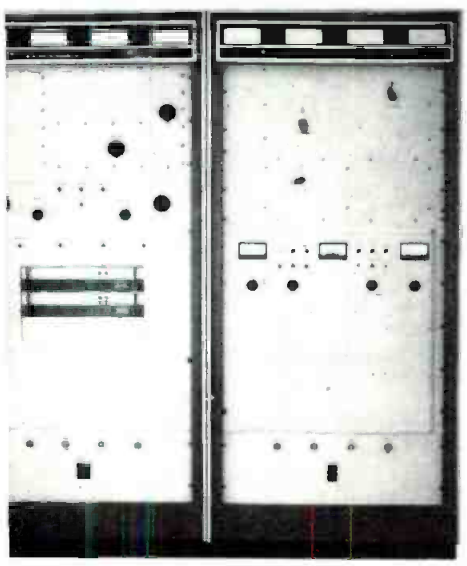
Look for sparkling action, great direction, and long LONG runs of these smash Sparta productions!

Stars Added to Brilliant Long-run 'Showcase' Sparta Productions!

Super City, USA) — Famous SPAR- 'Showcase' furniture groups have n veteran supporting actors for 0-Series audio consoles for years. e most recent productions of owcase' studio furniture include ITURION SERIES and 3000 SERIES new functional designs. The same d looks and durability are builtin which made 'Showcases' curtain-call quality performers in control rooms around the world!

CUSTOM studio staging at mass production prices...Sparta 'Showcase' furniture groups are now showstoppers for ALL THREE SPARTA CONSOLE LINES!!

Sparta 635 Headlines the FM Transmitter Cast!



(Everywhere, USA) — The husky young star of the SPARTA FM transmitter line takes a bow for greatest 100 kW ERP economy, modular construction for modest installation cost!

35 kW power output through 3 1/8" line for economy...grounded grid design for utmost high power dependability without 'tweaking'. Modules of the Model 635 fit even small existing transmitter buildings, can be arranged for engineering advantage!

The SPARTA FM cast includes 250 Watt all-solid state Model 600B, the 601A, 602A, 605B, 610A and 625A FM Transmitters...specify your needs!

Get in line early. Model 635 will be playing to SRO audiences soon!!

We're in the business of You.

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DIRECT CURRENT
FROM D.C.

(Continued from page 4)

Short Circuits

Ever wonder why things bog down? The Commission's Broadcast Bureau had to respond to 96,710 written inquiries during the fiscal year just ended...The Commission has declined to waive the requirement for the two-tone EBS signal (which goes into effect April 15, 1976) on the basis of a claim of economic hardship...The Commission has instituted an inquiry into the requirements for automatic logging and record-keeping for both operating and program logs...The Commission has instituted proceedings against a West Coast master antenna system which was receiving an FM signal, doubling and radiating it, and interfering with TV reception...The Commission has reminded FM stations that promotional material referring to radiated power must use the horizontally-polarized power only; adding the vertical power to it is a "no-no"...The United States Court of Appeals, in a fifteen page opinion, has solemnly affirmed a Commission decision that the broadcast of Polish jokes does not constitute a controversial issue of major importance.

First Use of Earth Orbiting Satellite for Pay-TV Operation

The first use of satellite transmission for pay-cable TV distribution took place on September 30 with the transmission of the Ali-Frazier prize fight from the Philippines to pay-cable TV systems in the U.S. The project was carried out by the Home Box Office (HBO) organization.

At the present time, HBO has outstanding authorizations for the construction of 7 ground receiving stations for pay-TV reception, and an additional 20 are pending. A major manufacturer is producing substantial numbers of receive-only stations.

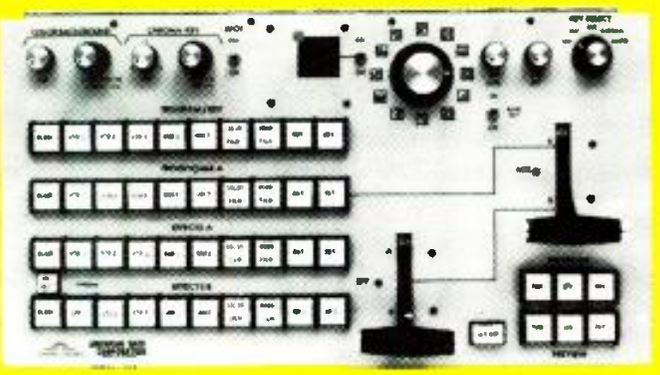
Competition for frequencies and orbital slots in the synchronous equatorial orbit is becoming increasingly brisk as satellites are now in use by various organizations in the U.S. and Canada. An interesting sidelight has been raised by the nation of Colombia, pointing out that the satellites use the "air space" over the nation and should provide some sort of remuneration for this privilege.

an ECONOMICAL Choice!

With the MAXI-

$10,795

or the mini



$8,295

The **MAXI** features 16 inputs and the **mini** has 10. All inputs may be composite or non-composite. Four busses are standard but when combined with an **"QBQS"** (one bus quad split) the capabilities of an 8 bus system is attained. The keyer is down-stream to the effects enabling wipes (or Quads) to be done behind ALL keys including chroma keys. Other STANDARD features are; a program channel processing amplifier, an internal blackburst-color matte generator, a 12 pattern **programmable** special effects generator, a positioner and a spotlight, a cutbar, program and preview output switching, "split handles" on mix and effects, a 3-input keyer with a rate adjustable "blink" feature. All this plus more, much-much more! Ask any one of **over** 50 satisfied users of the ADC 556.

OPTIONS?

Not many but there are a few—an RGB chroma keyer, Audio-follow-Video, and OBQS, Pattern modulator, longer control cables.

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NAB Calls For Accounting Changes

The National Association of Broadcasters and the Institute of Broadcasting Financial Management have jointly urged a major change in accounting for broadcasting intangible assets.

Their recommendations are contained in a position paper submitted to the Financial Accounting Standards Board (FASB) which is reviewing Accounting Principles Board (APB) Opinion No. 17 which deals with intangible assets.

In their position paper, NAB and IBFM comment that the present standards for accounting for intangibles can cause "a significant understatement of net income and stockholders' equity in the financial statements of broadcasters."

The method of accounting for the value of intangible assets has been at issue within the broadcasting industry since 1970. A similar controversy exists within the trucking and newspaper industries and papers representing the views of these industries also have been submitted to FASB.

The joint NAB/IBFM study was prepared by a committee representing several broadcast organizations. It was chaired by Ronald J. Doerfler, assistant controller of Capital Cities Communications, New York.

The paper concludes that while amortization of intangibles is an appropriate accounting practice under certain circumstances, the requirements for mandatory amortization with respect to broadcasting intangibles should be modified.

The report proposes that amortization or write-down of broadcasting intangibles be required only if their estimated value and future benefits are lower than the amounts at which they are carried in a broadcasters' financial statements.

The report comments that the current accounting practice on amoritization of broadcast intangibles adversely effects market valuation as well as the availability of new capital because of the understatement of net income and equity.

"Their (broadcasting properties) most important assets are intangibles which consist specifically of broadcasting licenses issued by the Federal Communications Commission and network affiliation contracts," the report observes.

Since both are in short supply, they have considerable value and increase in value over the years.

The position paper requests that APB Opinion No. 17 be modified by the FASB to provide that:

1. The amortization or write-down of broadcasting licenses and network affiliation contracts be required only if their estimated value and future benefits are lower than their carrying value.

2. That the amortization of these assets below their residual value not be required.

A copy of the 30-page study may be obtained by writing IBFM at Suite 910, 360 N. Michigan Ave., Chicago, Ill. 60601, or NAB's Broadcast Management Dept., 1771 N St., N.W., Washington, D.C. 20036.

This Trinicon® video camera makes it as easy to shoot color as black and white.

To know how easily it operates, you don't even have to see the whole camera.

Just look at its back.

There are *all* the simple controls for our solid-state DXC-1200.

Now look up.

That big 5" viewfinder eliminates complicated color set-up procedures.

Because all you do is make a few quick adjustments for pedestal level, video level, white balance, and electric focus—while watching them displayed on the viewfinder.

Which also adjusts up or down to eye level, whether you're tall or short.

Though the CCU is built in (so you don't need a separate one), the DXC-1200 can still be used in any multi-camera system—yes, even with other camera makes.

As for quality:

This, remember, is a Trinicon camera. And Trinicon technology is already delivering demanding broadcast quality in hundreds of TV Stations.

Because the one Trinicon® tube does for cameras what the one Trinitron® gun does for TV sets: gives stable, color-true operation.

Oh, you might find some other NTSC camera with comparable quality, true.

But it will cost you 3 to 9 times more than the DXC-1200. It's only $5000.

Write us for detailed information.

Better yet, now that you've seen its back, see the whole DXC-1200 demonstrated.

Sony Corporation of America, Video Information Center Dept. 233-I, P.O. Box 1594, Trenton, N.J. 08607.

Price shown is suggested retail and is subject to change.

SONY®

Trinicon® Color Cameras.

233-1

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For Demonstration Only circle (9) on Reply Card

NAB Proposes Specialty Shows For CATV

The National Association of Broadcasters has proposed that cable television systems be permitted to carry specialty programs broadcast by specialty format stations on a regulated basis.

However, the NAB suggested to the Federal Communications Commission that such carriage be on a program-by-program rather than a station-by-station basis. The NAB's proposals were submitted in response to various Commission proposals for deregulating carriage of special format stations or programs.

In its filing, NAB noted that there now are three recognized classifications of specialty stations: foreign language, religious oriented, and those which devote day time programming to financial reports.

It said the Commission could adopt a rule permitting carriage of these classifications and additional classifications be adopted pursuant to normal rulemaking procedures.

The NAB further proposed that if a cable system is located in a market where the local independent station is a specialty station, an additional independent could be carried only during periods of the broadcast day in which the local independent is broadcasting specialty programming.

As the NAB pointed out, "the cable system and its subscribers would be assured the equivalent of a full channel of non-specialized independent station programming. At the same time, the local independent which might actually broadcast more mass audience than specialized programming would not be confronted with undue and detrimental audience diversion resulting from carriage of an extra independent by the cable system."

The National Association of Broadcasters also said that in the context of its overall proposal, it sees no present need for a limitation on the amount of specialty program carriage or the number of channels of specialty programming.

However, it said the Commission should not permit carriage of a type of specialty programming which would duplicate the format of a local specialty station.

"I'M CUTTING MY ENERGY OUTPUT 25%.— IN THE NATIONAL INTEREST, OF COURSE!"

for automation. . . .

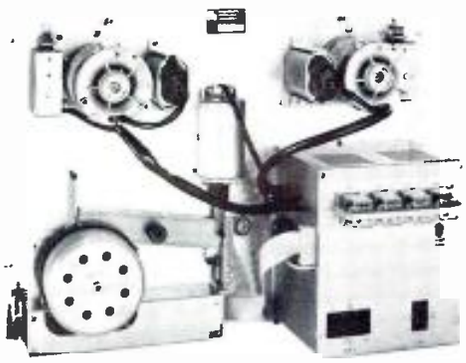
ITC's *NEW* 750 Series

A professional ITC reproducer for $1150

Why settle for a consumer machine?

Before you sign, check with a leading automation manufacturer about installing ITC's 750 Series in your system.

If you'd like more information first, give ITC a collect call (309-828-1381). We'll tell you all about our 750 and send you a complete brochure.



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SOCIETY OF BROADCAST ENGINEERS, INC.
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Certification Progress

The Certification Committee met in Washington, D.C., on October 8 and 9 to resolve the remaining questions which lay in the path to drafting a final version of the Certification Program for consideration by the SBE Board at its November 13 meeting in Chicago.

Under Committee Chairman John Wilner, SBE President Glenn Lahman, Past President Jim Wulliman, Ben Wolfe, Jerry Richards, and Ed Carl discussed each of the many letters received from members in the past few weeks and evaluated all suggestions.

Full details of the Program as adopted by the Board are included in the November issue of **The Signal,** SBE's bi-monthly newsletter.

MEMO

Vincent Flanders, Assistant Secretary at SBE National, reports that there still seems to be some confusion among members trying to reach him. Again, the **new** telephone number is: (317) 842-0836. The address remains the **same:** SBE, P.O. Box 88123, Indianapolis, Indiana 46208. Please make a note of this for future reference when you need to contact SBE National.

On the lighter side, Vince goes on to say that the new National Directory may be out sooner than expected. The directory will contain Chapter information, addresses, chairmen's names, a listing of Board members and SBE Fellows, and an alphabetical and geographical roster of all members.

The SBE Signal...

Last but not least, are there still some SBE members who are not regularly receiving **The Signal?** The newsletter has been published three times: in April, June, and September. Since issues are mailed from New York, some of you may receive them later than others; however, if you haven't received anything at all, please contact Vince Flanders at the above address.

(*Continued on page 16*)

Film editors have long enjoyed a substantial professional advantage over video editors with the availability of film edge numbers.

Video editors, until now, have had only SMPTE time code data which, as useful as it has proved, provided only the equivalent of a film sprocket hole counter.

TRI has solved that problem with the SUN family of time code products. What's more, no audio or cue tracks are used and if you happen to be working with a helical VTR, you can still frame a picture with the SUN Time Code data displayed in the still framed image.

So what's the SUN Family of Products? Well, it's a total of five products that TRI Engineers see right now!

SUN-I
This is the grandfather box. It includes an encoder, a decoder, an SMPTE generator, a character generator and an LED display. It has the capability of making the SUN SMPTE Time Code display appear in the CRT or not (it is not burned in the video).

SUN-II
This is what we call Porta-SUN. It is a little box about the size of an audio cassette recorder that encodes SUN data at the point of acquisition and it's battery operated, of course. It lets you lay down time code information in the field while you are shooting. Whether it is back-pack VTR's or microwave, Porta-SUN gives you time code data when and where you want it.

SUN-III
This is an inexpensive reader which includes a SUN decoder, a character generator, and the facility to filter out the SUN pulse.The characters may be displayed on a CRT in two sizes and at the top or bottom of the picture.

SUN IV and **SUN V**
You'll have to wait until after Christmas to hear about these in detail, but they round out the Family permitting a capability in video tape editing never before possible including High-Speed search and Auto Code Load.

SUN-I, SUN-II and SUN-III are available now, so for a "live" demo, or more information, contact the best distributor in your area.

Chances are he's our distributor.

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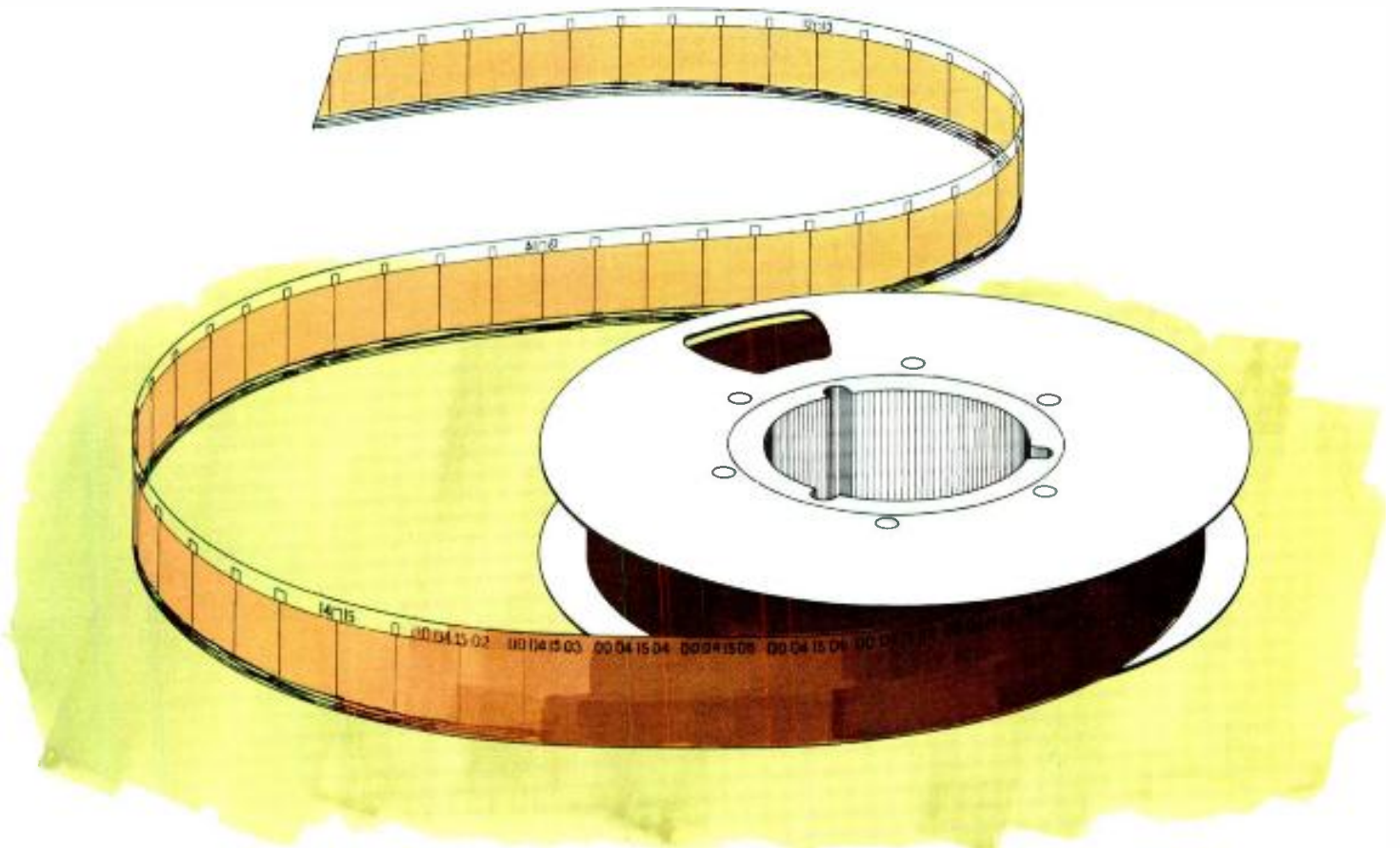
"Manufacturers and Distributors of Creative Freedom."

Film edge numbers on video tape?
Why not?
TRI introduces SUN –
an extraordinary family of video time code products



For More Details Circle (13) on Reply Card

SS 3159

The SS3159 stereo disc. reproducer provides complete facilities for professional stereo reproduction of disc. recordings. It is completely self-contained with SP10D turntable, tone arm, plug-in pickup cartridge, equalized preamplifiers, audio cue switching, power supply and pedestal assembly.

The turntable offers the highest quality, lowest noise operation available. It adds virtually nothing to the original sound as recorded on the disc. And with the advent of quadrophonic discs, it's imperative that vertical as well as horizontal "rumble" be reduced to a minimum.

FOR FURTHER INFORMATION CONTACT:

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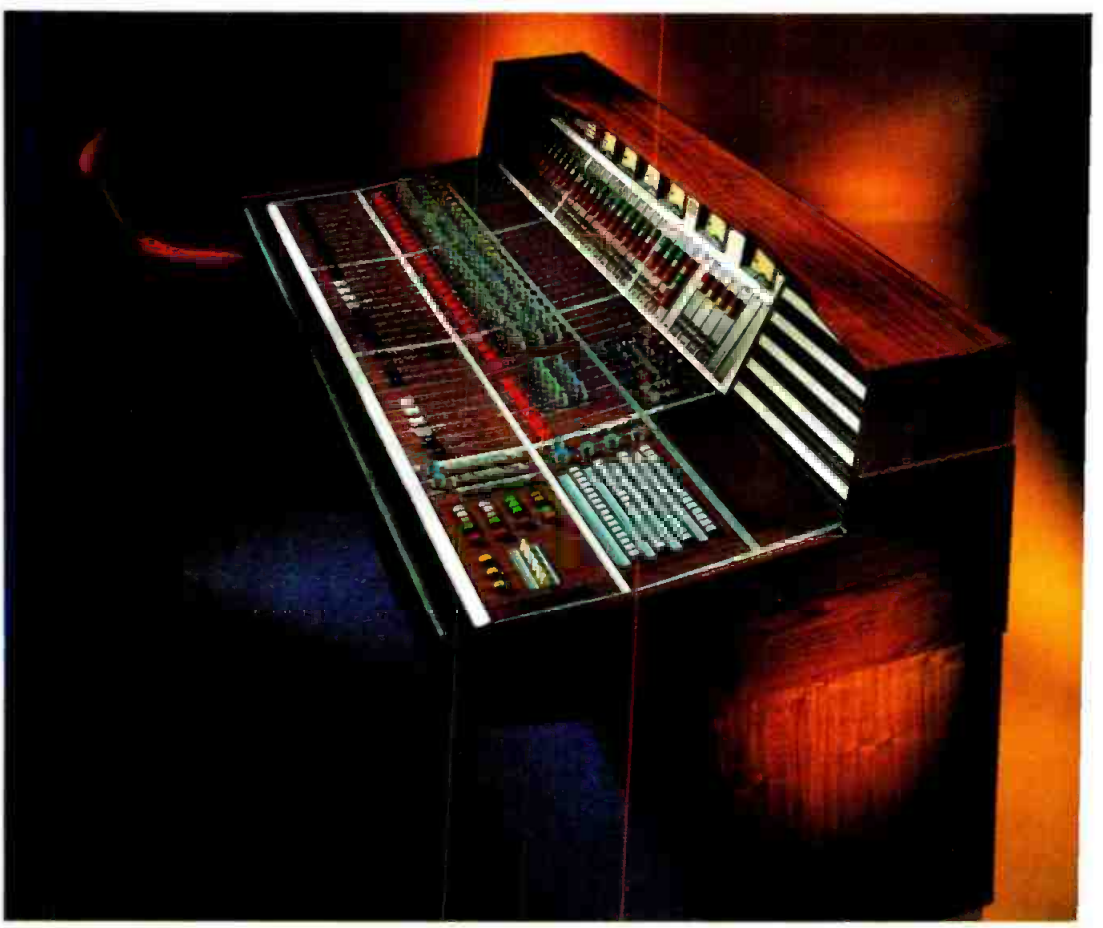
SS 7800

The SS7800 Series of modular audio consoles provides complete professional facilities for mixing and shaping today's complex audio material.

In addition to complete program mixing, monitoring and control, SS7800 Series consoles provide PA feeds and comprehensive Solo/Cue, Echo-Send/Receive, Foldback and talkback system facilities. A full range of options is also available including Equalizers, Compressors, Program Assign with Pan, and Remote Controls.



For More Details Circle (14) on Reply Card

NAEB Convention Marks Progress and Promise

William Harley, Mr. NAEB for so many years, is stepping down as President. The challenges for the new president will be even more demanding.

Among the first users of closed circuit communications were broadcast educators. They helped pioneer CCTV and have seen the educational broadcast concept grow from classroom instruction to public television. This year marks the beginning of the second fifty years of their professional organization, the National Association of Educational Broadcasters, an organization responsible for a good deal of over the air and CCTV growth and development. On the eve of the NAEB's 51st annual convention, it might be helpful to survey the highlights of its growth and look at its progress over the last fifty years.

When the NAEB meets in Washington this month (16th to the 19th) for their convention, the theme will be "The American Revolution in Communications." Curiously it may be the most apt way to kick off the second fifty years of the NAEB, an organization whose continuous evolvement and adaptation to its members' needs, could be considered something of a revolution itself.

From the days when educational broadcasting was once described as "a series of meetings occasionally interrupted by a program," to the Bicentennial celebration of today, the NAEB has made significant progress.

At the 1925 National Radio Conference in Washington, the first educational broadcasting organization, known as the Association of College and University Broadcasting Stations (ACUBS) was born. It was described as a small, loosely knit group whose membership consisted entirely of institutions that owned or operated an educational radio station. In 1934 ACUBS altered its constitution and broadened its membership when it admitted any college or university broadcasting regular educational programs over its own facilities or anyone else's. It also changed its name to the NAEB.

The NAEB grew rather slowly until after World War II when it began to take off dramatically. At the beginning of the Forties, it had 24 members; by the end, over 100. By 1954 it could claim a position of real leadership in educational broadcasting with over 200 members. When the Association for Education in Radio-Television was merged into the NAEB in 1956, individuals, for the first time, as well as institutions became members. It was at this point that the NAEB became concerned with professional development. Today, after its members approved its reconstitution in 1973, its membership is composed entirely of individuals with a focus not only on broadcasting, but also on the development of a profession in the field of telecommunications.

As broadcast educators began designing and building CCTV facilities for instructional use, the NAEB fought a battle on a different front. Largely through its efforts the channels on which public broadcasting stations operate are available because of the fight to reserve channels for educational broadcasting. The Corporation for Public Broadcasting, the Public Broadcasting Service, National Public Radio, and the old National Educational Television have all sprung, directly or indirectly, from NAEB influences.

Even though the NAEB is moving more toward Public Television with a focus on telecommunications, broadcasting with closed circuit applications still gets attention. NAEB sponsored research has studied institutional and educational applications of television cartridge and cassette systems. Just as important are the Professional Emphasis Groups in such areas as Broadcast Education and Instruction, Industrial/Military Training and Engineering/Engineering Design. NAEB members with interests in these areas hold annual conferences and training sessions to improve the quality and sense of professionalism broadcast education demands.

From a small, loosely knit group fifty years ago, the National Association of Educational Broadcasters has grown tremendously. Today, it includes everything from 10-watt radio stations to large television stations, and satellite communications. Its progress can be measured in terms of the battles it fought, battles to reserve educational broadcasting channels and for the foundations for public television and radio. The NAEB's future will probably be measured by more battles since what it has done in its first fifty years is to promote and nurture an entire movement—educational broadcasting.

(Continued from page 12)

SBE Chapter in Profile

Chapter 20: Pittsburgh, Pa.

Although Chapter 20 of the Society of Broadcast Engineers, Pittsburgh, Pa., was chartered in 1968, a regularly planned chief-engineer's luncheon preceded the formation of this chapter as far back as the late 1930's. These luncheons were attended by radio chief engineers and those in related broadcast fields. In the late 40's and early 50's, television engineers joined the group to discuss common problems and developments and to exchange ideas. The meeting dates have not changed since the fifties; luncheons are still held on the third Thursday of each month.

Chapter 20 was formally organized in 1968, primarily through the efforts of Glenn Lahman, currently our National president. Chapter chairman, Hank Kaiser was the second and Jim Hurley currently holds that position.

Programs cover a wide variety of interests, including films, lectures, and slides from vendors of products related to the broadcast industry. During the past year they have seen presentations on the use of spectrum analyzers in relation to radio proofs-of-performance, state of the art of video and audio switching, and circular polarization in television. Distributors have also contributed generous time and effort during Convention time. In 1974, the first "mini-convention" was a huge success, as was the regional Convention held October 24 this year at the Howard Johnson Motor Lodge in Monroeville, Pa.

The Chapter's expenses, such as printing, stationery, mailing, and promotion, are comfortably supported by the stations and distributors. Also, funds realized from the two Conventions have significantly helped the Chapter coffers.

Meetings begin at 12:00 noon at Buddie's Restaurant in Market Square in downtown Pittsburgh. A dutch treat lunch with a cash bar is available.

Chairman Jim Hurley is confident in Chapter 20's future. With a nucleus membership like theirs, ready to support Chapter interests, how can you miss?

Chapter 20: Pittsburgh, Pa.

The first post-summer meeting for Chapter 20 was held on September 18. The luncheon meeting focused on chapter business: the agenda for the upcoming year and further plans and discussion of their October 24 regional Convention.

Jim Hurley (Chairman), WTAE-TV, 400 Ardmore Boulevard, Pittsburgh, Pennsylvania 15230, (413) 364-4410.

Chapter 22: Central New York

Chapter 22's monthly "flier" announces the resumption of regular meetings for the remainder of this year. They will meet every third Thursday of the month, as before, unless otherwise indicated.

Mort Miller (Chairman), WNYS-TV, P.O. Box 9, Syracuse, New York 13214, (315) 446-4780.

(Continued on page 20)

PRIME TIME

VIDEO IV GRAPHICS SYSTEM: THE CHARACTER GENERATOR THAT'S AS FREE AS YOUR IMAGINATION.

From a Video IV keyboard, you can program many type faces and make messages that roll, crawl, flash, and change colors.

Video IV includes floppy-disc memory for logos, pictures, charts and graphs. A remote control panel facilitates four separate presets for utmost flexibility.

WREC-TV, Memphis, Tennessee, uses a Video IV Graphics System to update a multi-bar weather graph, and create other graphics from the keyboard.

A 20-minute video tape presentation of the Video IV is available from your RCA Broadcast Systems Representative.

NOW, 33 TV STATIONS KNOW TWO "CARTS" ARE BETTER THAN ONE.

TCR-100 box score.

More than 200 stations now enjoy the many benefits of the TCR-100 video-tape cartridge recorder. There are nearly twice as many carts in service as the next most popular brand of comparable equipment.

About 15% of these cart users own more than one TCR-100. The example of WFLA-TV best tells why.

At WFLA-TV, the second cart does more than stand by.

WFLA-TV, Tampa, Florida, installed two cart machines late in 1973. One was to be an on-air standby.

It's rarely used for its original purpose; cart reliability sees to that. But its use as a production tool has made it extremely cost-effective.

The production TCR-100 records news segments from network feed via reel VTR, for the station's evening news shows. The TCR serves as another camera for making video inserts and effects, and for sub-mastering of logos, scenes, designs and other repeat material.

TCR performance: masterful.

The TCR is also used as a master for making multiple dubs of spot commercials. In one such run, 900 dubs were made from the cart to a reel VTR. The TCR-100 has easily made multiple dubs with local tags, and "doughnut" commercials. The special insert material is cart recorded for easy drop-in on cue.

WFLA-TV maintains 1500 active cartridges. The night crew makes 15 to 20 dubs per day on the production TCR-100.

The playback cart is always loaded for several breaks ahead, both news and commercial, and is in continuous use during the station's air day—including news at 1:00, 6:00 and 11:00 P.M.

RCA

Cox Agrees To Purchase KOST-FM

Cox Broadcasting Corporation has announced that an agreement in principle has been reached under which CBC would acquire from the McLendon Pacific Corporation the operating assets of FM Radio Station KOST in Los Angeles for $2.2 million in cash and notes.

In making the announcement, CBC President Clifford M. Kirtland, Jr., said the agreement is subject to the signing of a mutually acceptable contract and to approval by the Federal Communications Commission.

Commenting on the proposed transaction, Kirtland noted that Cox Broadcasting entered the Los Angeles radio market in 1973 with the acquisition of AM Radio Station KFI.

"We're pleased we'll have a companion FM radio facility to serve the vast audience in that major metropolitan area," he remarked. "All CBC stations are characterized by high standards of public service, and we can assure Los Angeles listeners that KOST will continue in that tradition."

Vital Industries Buys Patents

Sarkes Tarzian, Inc., broadcast equipment division, has sold all its patents for TV special effects and other products to Vital Industries of Gainesville, Florida.

The patents cover digital and analog special effects and ancillary equipment. Negotiation for sale of other products is in progress with several manufacturers of broadcast equipment.

Harris Corporation Prices Increase

Harris Corporation's Broadcast Products Division announced a price increase on all Harris manufactured radio and TV broadcast products that will be effective on all new quotations immediately. The average price increase for all products is 6½ percent. All orders and quotations received prior to October 15 will be processed without the increase.

At WTCN-TV, Total Automation is a Reality!

At the heart of the station is a CDL Operations Computer System, which handles all the program switching, effects, material verification, run-sheet printing, FCC logging and machine control.

The first installation anywhere to have a *direct-wire link* to a Kaman Sciences, BCS-Traffic/Accounting System, the CDL System commands the receipt of scheduling information from and the transmission of log verification to the Traffic/Accounting Computer.

Another impressive CDL first at WTCN, is the full closed-loop control and monitoring of two Ampex ACR-25 Video Cassette Machines . . . *which don't even have to be loaded in the correct air-play sequence* . . . the CDL Computer sorts that out!

CDL's New System 100 Operations Computer System may be configured for "Total" control or may be used initially to perform automatic switching and later expanded into a fully integrated system, with business computer link-up and ACR-25 closed-loop control.

CDL's latest news . . . a System 100 with *direct-link* capability to a DCC "BIAS" Traffic/Accounting System.

A truly modular approach, the CDL System 100 is today's answer to **Total Broadcast Automation.**

For more information or to arrange for consultation about your specific requirements, please call or write.

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For More Details Circle (18) on Reply Card

(Continued from page 16)

Chapter 1: Binghamton, N.Y.

Chapter 1 met on October 18. Though the guest speaker was not yet confirmed at the time of this writing, the discussion topic for the evening was oscilloscopes and their applications.

Bill Sitzman (Chairman), Independent Broadcast Consultants, Inc., Box R, Freeville, New York 13068. (607) 273-2970.

Chapter 2: Northeastern Pa.

This group held its first meeting of the new season on September 8 at the WVIA-TV studios. Tektronix engineers Barry Enders and Phil Sambol directed the program on sideband analysis of TV signals, FM proofs-of-performance, and AM modulation measurements. To demonstrate these applications, Tektronix supplied their spectrum analyzer and signal generator for the discussion that evening.

John Kowalchik (Chairman), RCA Solid State Division, Crestwood Road, Mountaintop, Pennsylvania 18707. (717) 474-6761.

Chapter 9: Phoenix, Arizona

The October 21 meeting of Chapter 9 was held at the KPHO studios in Phoenix. The program was given by Mr. Bill Preston of Hewlett-Packard, featuring their mobile van with a complete line of test equipment.

The tentative schedule for the remainder of the year shows that the November meeting will be a tour of KOY's new studios, conducted by Mr. Jack Williams. (Some of you may have seen in last August's issue of **Broadcast Engineering** the article authored by Mr. Williams on the renovation of these facilities.)

During the month of December, the Chapter will be busy with both their regional Convention on the 5th and 6th, and later their annual Christmas party.

Leon Anglin (Chairman), SBE, P.O. Box 615, Phoenix, Arizona 85001. (602) 258-7333.

Chapter 17: Minneapolis, St. Paul

Chapter 17 held its reorganization meetings last spring and has already begun its fall line-up of programs. The first meeting this season scheduled the Harris Corporation to demonstrate its new Pulse Duration Modulation transmitters and PSM transmitters, as well as discuss enhanced modulation techniques. On October 22, Leo Domeier led the group on a tour through WTCN-TV. This brand new facility is 100% computer-controlled, so it was a particularly interesting session.

Lance Raygor (Chairman), Rt. 1, Box 337, Chicago City, Minnesota 55013. (612) 373-4807.

(Continued on page 72)

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How does AVR-2 help? Simpler design, for one thing, inside and out. It lets your operator function at top efficiency, regardless of his experience or workload. Look at the design and location of controls shown here for proof.

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in use prove it!

Operational and Editing Controls

All controls are on open, visible panels. Operational and editing controls are user-located at fingertip level, so your operator (experienced or not) is never confused by exposed electronics.

Fast editing. It's easy to align the playback of AVR-2 to match the new program material from any camera, tape machine, or remote telco line. The program doesn't even have to be synchronous with your system!

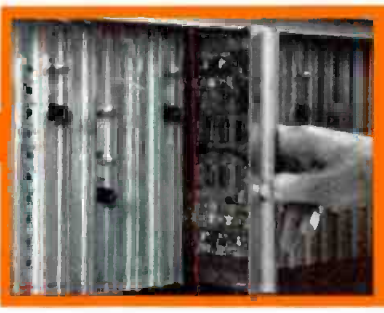
Your operator simply pushes one button and sets one control to line up vertical lines on a unique split screen display. **Result:** fast, easy, perfect edits —especially for inexperienced operators. And all from one control panel.

Secondary Controls

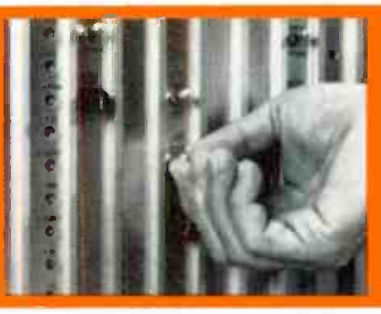
Playback equalization and differential gain controls—necessary in highly critical editing operations—are located conveniently on a tilt-out panel to allow for quick playback setup.

Video head optimizing takes less than a minute on the AVR-2. It's a simple, one-hand operation, as easy as tuning a home hi-fi receiver.

Setup Controls



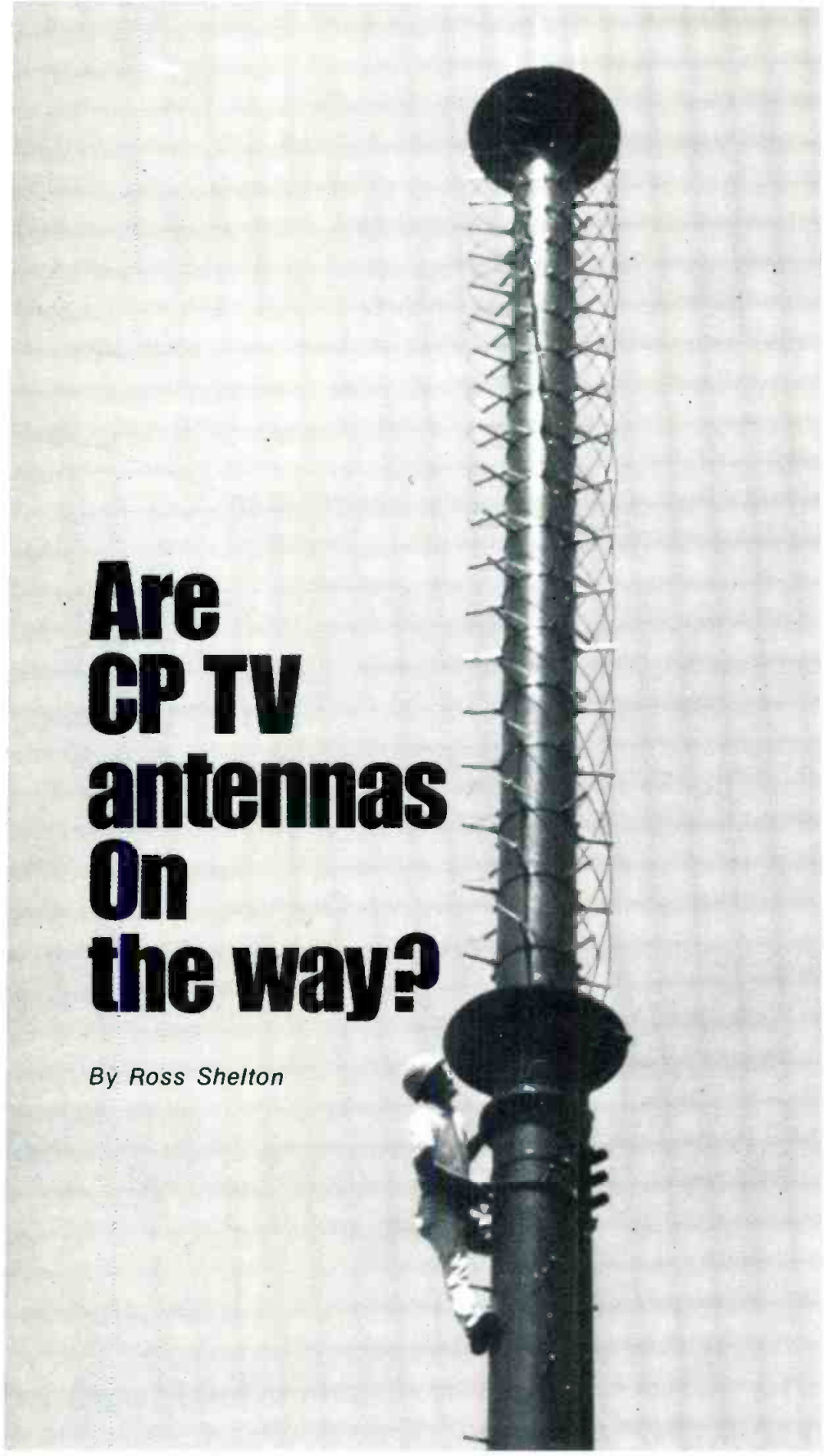
Instant visibility, accessibility, changeability. Maintenance is a cinch on AVR-2 because everything is clearly marked and accessible. There are no confusing, unmarked boards or flashing lights.



You can operate most AVR-2 set-up controls in unity (fixed position) with the door closed, for normal operation or inexperienced operators.

—or open the door and quickly switch into variable operation to adjust for any unusual condition. Switches are locking type toggles, so a knee-bump can't change their position. And don't worry about air circulation, either. AVR-2 is air-cooled whether the door is open or not.

For More Details Circle (21) on Reply Card



Are CP TV antennas On the way?

By Ross Shelton

The FCC has authorized the use of circularly polarized CP FM broadcasting antennas, for nearly 20 years. However, the Commission has not authorized CP antennas for regular television broadcasting!

The FCC history is somewhat vague on this matter of polarization for television. In the days of the big freeze in the late 40's, horizontal polarization was recognized as picking up less automobile ignition noise, on receivers with low signal sensitivity, and relatively low power broadcasting.

On the other hand, the British believed that vertical polarization had superior noise reduction qualities. Now the British, all of Europe, Africa, and Asia use vertically as well as horizontally polarized TV broadcasting antennas. As a matter of fact, only the Western Hemisphere countries use horizontally polarized TV broadcasting antennas!

CP antennas for FM broadcasting have proven themselves with signal penetration for all types of FM receivers. European governments have recently started using CP broadcasting antennas, where previously they were using only horizontally or vertically polarized antennas, for FM.

Why CP Antennas For TV?

FM stations, broadcasting with CP antennas have shown they are effective antennas. So why not use CP antennas for television? Preliminary tests, as well as theoretical calculations have proven that CP antennas should improve TV reception. This mode of broadcasting will reinforce the present horizontally polarized signal in difficult reception areas, and especially where indoor antennas, such as rabbit ears or UHF rings, are used for receiving. Another big advantage will occur if the viewer uses a circularly polarized receiving antenna. Such an antenna would be compatible with existing TV stations using horizontally polarized transmission. And it would minimize reflection ghosting from buildings and terrain.

The addition of vertically polarized ERP, with a CP transmitting antenna does not move the grade A and B contours further out, but provides more "solid" signal in those areas.

A VHF station using a CP transmitting antenna, would transmit its present maximum ERP in the horizontal as well as the vertical mode, thus doubling its ERP. This is presently permitted in the FCC Rules (73.316), for FM. The ERP value, for licensing purposes, and contour prediction would remain the same. For example, a VHF station on channel 10, with a maximum of 316 kW, would be broadcasting with 316 kW horizontally polarized radiation, and an

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Designed specifically for use with 40 KW FM transmitters, our new 4" HELIAX flexible coaxial cable handles this power level very comfortably, providing good efficiency, low VSWR and the convenience and economy of continuous lengths.

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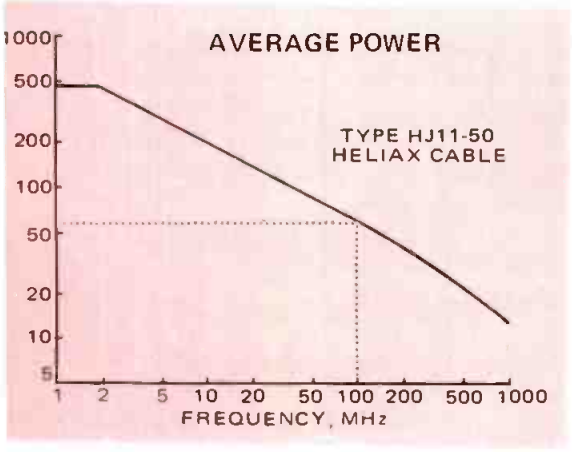

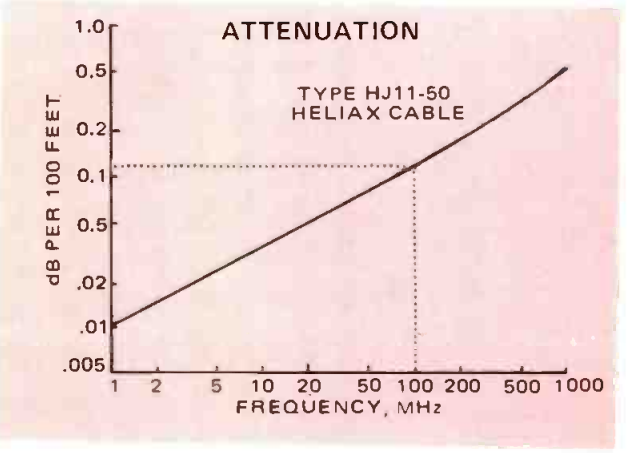

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additional 316 kW of vertically polarized radiation. Without going into technical details, suffice to say, this mode does not increase the service contour distances. Twice as much transmitter power must be used, or the physical height of the antenna must be doubled, to maintain ERP.

Doubling the transmitter power will maintain the elevation beam width of existing stations, using CP antennas of equal height to that now used. The correct combination of transmitter power and antenna gain depends on the width of elevation pattern desired. On Channels 2-6, it may be desirable to simply double the antenna aperture (height), if a 2 x 35 kW transmitter is already on hand, or if 2 X 25 kW transmitters are used, due to the 100 kW ERP limit. For Channels 7-13, 2 X 35 kW or 2 X 50 kW transmitters should be used with a 5 or 4 gain CP antenna.

Circularly Polarized TV Antennas

The technical requirements for the CP antenna are quite stringent. First, it must be as good as the present horizontally polarized antenna, in so far as the transmitter is concerned. Secondly, it must radiate power which is as circularly polarized as is technically possible. Thus, the CP radiation must not come from two different antenna elements (dipoles and rings or similar sources) as in the earlier FM elliptically polarized antennas. The new CP television antenna ideally should have a common point source, so that all the radiation is properly phased and polarized, in all azimuths.

The quality of circular polarization is described by its axial ratio and its polarization ratio. The axial ratio is determined by the ratio of currents in the major and minor axis of the ellipse. The polarization ratio describes the ratio of the horizontal and vertical signal magnitudes. Ideally, the ratios would be one.

The Spiral CP

The CP antenna developed by JAMPRO uses a number of spiral radiators around a tubular support which also acts as a reflector. The number of spirals, determines the mode of operation chosen for the best performance for any group of channels and the physical height of the antenna.

The spiral radiators are fed from one end, through a rigid coaxial feed system. The spirals are all alike, and are fed equal power. The phase is equally distributed. The resulting azimuth pattern is nearly a perfect circle. The antenna input VSWR is 1.08 or better across any one channel. The power handling capacity is very high, since four or more rigid 3-1/8-inch branching circuits are fed from one 6-1/8-inch main feeder, at each bay.

The feed system, as well as the spiral radiators, provide less envelope delay than other commonly used horizontally polarized antennas. Although bottom fed, a single bay spiral antenna has very little beam scan, which is completely eliminated in two or more bay models. The axial and polarization ratios, which describe the circular polarization quality are less than 3 dB. The single and multi-bay antennas are uniform aperture illuminated, resulting in low sidelobes and high vertical aperture gains.

In sleet environments, the spirals may be heated through passage of high currents in the spirals, especially in the larger diameter low band channels 2-6 antennas. For channels 7-13 and UHF, either electrical heating or a plastic radome may be used. Antennas are supplied with the customary accessories, such as top beacon mounting plates, lightning rods and erection hoisting ears. They may be climbed, using the spiral stand off insulators as rungs. The antennas may be pole buried or pedestal tower top mounted.

CP Antenna Tests

In cooperation with KLOC-TV, Modesto, California, an eight gain omni-directional spiral CP antenna is undergoing operational tests, under an experimental permit issued by the FCC, for operation on Channel 19. The A-B method of testing will be used. The visual and aural transmitters, after being diplexed, are switched from a special horizontally polarized antenna, with the same aperture and ERP, to the spiral CP antenna, with the same aperture and ERP. At the same time the transmitter power is switched from one antenna to the other with an electrically operated coaxial relay, identical picture slides are also switched at the studio. Each slide has the identifying letters of the type of polarization in the lower right hand corner, that is H for horizontal and CP for circular polarization. This A-B type of test is not explained to home viewers, who will be asked simply which slide picture they think to be better.

A mobile test truck contains a field intensity meter, two-way communication facilities with the studios and transmitter, a black and white receiver as well as a color receiver. A 30-foot steel test antenna support pole will be used for field strength measurements of the cluster type. A CP receiving antenna is also included. Photographic equipment has been set up to record the resulting A-B pictures, which can be switched back and forth in about one second.

The transmitter sits on a mountain 2,680 feet above a large valley. Tests will be conducted in the flat valley, as well as hilly and mountainous areas. The city of license is 17 miles distant in a flat area. Mountain tests will be made about 6 to 8 miles from the station. The ERP level for these tests is 325 kW.

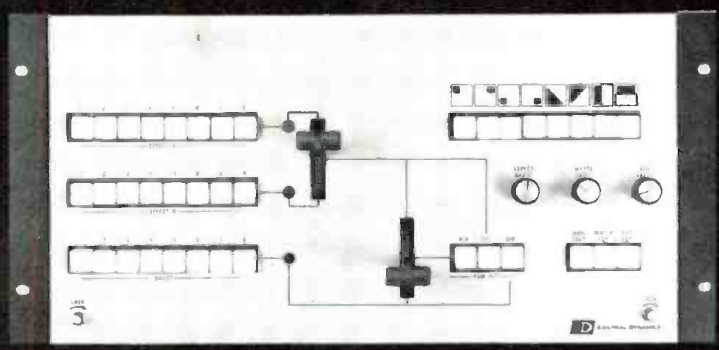
The tests are to be conducted during daylight hours as well as after sign off, in order to test CP propagation conditions, up to distances of about 125 miles. The station is located in a geographical area known for its abnormal radio refractive index. The effects of CP will be compared instantly with horizontal polarization through the A-B type of testing mentioned earlier, since this type of refractive index tends to increase the transmission path.

Reports And Findings

In its experimental authorization, the FCC has asked KLOC-TV to submit a six month and 12 month final report, to the Commission. These two reports will be available to seriously interested parties, by contacting JAMPRO, or KLOC-TV. At the conclusion of those tests, JAMPRO will file a FCC rule making petition, to permit TV stations to use circularly polarized antennas.

small... is sometimes BIG ENOUGH!

Central Dynamics Introduces the New VS-10 TV Color Production Switcher for Mobile, CATV, Industrial and Educational Applications



Priced at Only $3350, we believe it represents a major value breakthrough for professional programming with true broadcast quality

You don't always have to be *big* and sophisticated to make it as a TV Color Production Switcher. The low cost VS-10 is an 8-input, 3-bus, compact, self contained, vertical interval, solid state switcher with ample sophistication for professional programming with *true broadcast quality*. Impressive special effects, mix amplifier, wipe/key amplifier, output selector and broad operational capabilities provide real production talent. A unique automatic special effects preview allows presetting keys and wipes for smooth, dramatic transitions to effects. The VS-10 lets you chroma key, matte key, wipe or dissolve to keys, dissolve or wipe between program sources, dissolve to special effects, or insert titles. Other standard features include a Cut Bus and true On-Air tally system.
The VS-10 is compatible with NTSC, PAL-M and PAL color systems.
All this . . . plus the proven reliability of the largest and most sophisticated Central Dynamics Production Switchers.

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Control Features

Wipe - Fader positions A & B signals. Aspect Ratio Control varies configuration of 4 corner patterns.

Keys - Wipe Keys on or off. Key Level Control adjusts slicing level of key signals. Matte Level Control adjusts luminance value

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Switches - Crosspoint *and* Output Selection switched in vertical interval with illuminated momentary pushbuttons. Wipe, Key Mode & Pattern switches are mechanically interlocked pushbuttons. Tally lights on each input bus indicate "on-air" signal.

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Video - 8 loop through inputs (BNC) externally terminated.
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Unit includes module extender, Operating & Maintenance Manual.

Central Dynamics has earned a reputation as one of the unquestioned leaders in TV Broadcast Equipment. Our standard line of production switchers are priced from $11,000 to $70,000.

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A towering problem ends for KSFY-TV

By John Dunnicliff
Sioux Falls, South Dakota

This is the 1,984-foot tower which toppled during a blizzard last January. After the blizzard ended, this is how the KSFY-KELO transmitter site looked.

At 1:47 a.m. on Saturday, January 11, 1975, the 1,984 foot television tower shared by KSFY-TV and KELO-TV of Sioux Falls, South Dakota, came crashing down during one of the worst blizzards to hit the Northern Plains since the early 40's.

Inside the KELO transmitter building, engineer Les Froke froze to the frightening sound of tons of steel plummeting to the ground outside. It lasted only a few moments, but it seemed like an eternity.

Finally, when all he could hear was the howling wind, he went to investigate. Where a few minutes before the tower's lights had winked their warning in the night, there was now only total darkness, and all around the two identical buildings which housed the KSFY and KELO transmitting equipment, there was nothing but twisted cable and broken steel, already partially covered by the drifting snow.

Froke appraised his own Chief Engineer of the situation, then called Max Pierce, Chief Engineer for KSFY-TV. For the moment though, there was nothing any of them could do. Roads were blocked. Visibility was zero. The blizzard raged on.

This was the second time that the giant television tower, located near Rowena, South Dakota, nine miles southeast of Sioux Falls, had toppled. The first time was on June 24, 1968, when a North Central Airlines prop jet making an instrument approach to Sioux Falls during a thunderstorm, struck a guy cable.

For Max Pierce, it was a third encounter with disaster. In 1968, a farmer mowing hay in the field where KSOO radio has a 5-tower directional complex, cut a guy wire on one of the 200 foot towers and down it came. KSOO was the former call sign of KSFY-TV before January, 1974, when a change in ownership brought the TV operation under control of Forum Communications Company of Fargo, North Dakota.

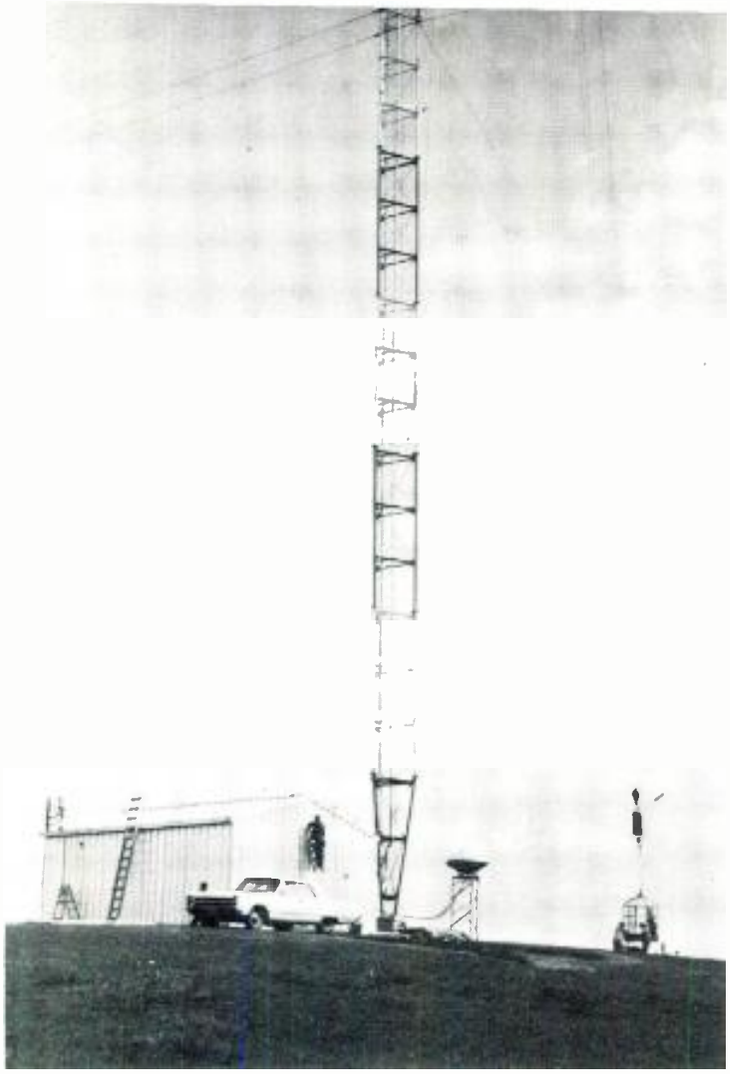
When the first TV tower went down in 1968, it took 23 days to construct an interim, 475 foot tower on the site and get the station back on the air. The second time it took only seven days. During that seven day period, Max Pierce, Sumner Rasmussen, Director of Engineering for the Forum stations, and the KSFY engineering staff cleared away enough of the wreckage to dismantle the transmitting equipment, moved it into a vacant office on the ground floor of the Court House Plaza Building next to the KSFY studios in downtown Sioux Falls, reassembled it and constructed a temporary, single bay standby antenna on top of the Court House Plaza Building itself.

Consider these facts. It was Saturday noon before the storm subsided enough to allow management and engineering to reach the tower site and make a damage assessment. It was Sunday noon before even a semblance of work could begin. Dismantling of the transmitting equipment in a building that had been heavily damaged by the falling tower, was accomplished in sub-zero temperatures and strong winds that combined for a wind chill factor that reached as low as -65 degrees. Portable heaters could do but little to dispel the bitter cold, but at least gave the men a semblance of warmth.

Finally, the entire operation was finished in time to resume regular programming by 6:30 p.m. the following Friday. When you consider what was done and the conditions under which the men had to work, you begin to appreciate what a nearly impossible job the KSFY engineering staff accomplished.

Encouraging, Discouraging

That first look at the tower site early Saturday afternoon was both disheartening and encouraging to station manager Scott Park and the engineering crew. Disheartening, because nearly 2,000 feet of tele-



Construction was underway earlier this summer on the 854-foot interim tower and temporary transmitter building.

Once inside the Court House Plaza Building, KSFY-TV engineer Clarence Ausham checked the controls of the temporary lashup.

vision tower and antenna lay scattered over the snow covered prairie, because the transmitter building was heavily damaged at one end, and because there was nothing to see in any direction but snow, whipped into hard drifts by the wind which was still blowing strong. Encouraging, because the transmitter itself had been undamaged and was still serviceable.

The engineers began what looked to them like a hopeless task, by dismantling the 11 kilowatt driver which was then hauled ten miles back into the city and reassembled in the vacant office in the Court House Plaza. At the same time, the single bay antenna was ordered from RCA at Meadowlands, Pennsylvania. Since all transmission line had also been destroyed when the tower fell, arrangements were made through Ed Tink at KWWL-TV in Waterloo, Iowa, and Al Leeman at WKBT-TV in LaCrosse, Wisconsin, to ship any spare transmission line they had on hand. Arrangements were also made with the Jerke Crane Company of Sioux Falls, to hoist the 20-foot antenna to the top of the KSFY-TV, permanently installed microwave tower on the six story Court House Plaza Building.

Putting It Back On The Air

Dismantling of the transmitting equipment and transporting it to the downtown location was finished by Wednesday afternoon. The antenna itself was flown into Minneapolis Wednesday night, where it was immediately loaded on a truck and hauled the 250 miles to Sioux Falls. Installation of the antenna was finished late Thursday. Three-phase power had been run into the temporary transmitter site early in the week, so as soon as the transmitter was moved in, KSFY engineers began the job of putting it back together again. This was finished at four p.m. Friday.

Meanwhile, the transmission line arrived on Thursday, and a double run of nearly 250 feet was made to the top of the building by the

Paul Betzing Tower crew of Sioux Falls. As soon as the installation of the 11 kilowatt driver was completed, it was tuned into a dummy load, so that when the transmission line installation was completed at six p.m., an immediate switch could be made to the line itself.

At 6:21 p.m. Friday, January 17, KSFY-TV was back on the air with a test pattern, and at 6:30 p.m. resumed regular programming of what would normally have been the six o'clock news, weather and sports block. Video power was 11 KW. Aural power, two KW.

Even though the station was operational, interim coverage left much to be desired. Reliable reception was being experienced in an approximate radius of only 21 miles. However, a temporary, 854 foot tower with a 12-bay Super turnstile antenna has since been constructed approximately 7,000 feet Northeast of the original tower site, and a second transmitter installed in a new building. Operation at one third normal power was switched to this tower May 10, with nearly full power operation at 290,000 watts resumed Saturday, May 24.

Class "B" coverage has been estimated in an approximately 50 mile radius, but early reports from the coverage area indicated good reception over distances of 70 to 80 miles, reaching Mitchell to the west, Yankton to the south, Worthington and Jackson to the east and Brookings to the north. Plans were then started for the construction of a new 1,984 foot tower at the original location.

The original installation which toppled during the January blizzard, was an RCA channel 12, TF-12AH antenna, customized, or broadbanded to accommodate both channel 13 (KSFY-TV), and channel 11 (KELO-TV). Each station fed its own signal to the top of the tower, where the combining and filtering networks were installed, by way of 6 1/8 inch co-axial transmission lines. The new 1,984 foot tower is designed to use an RCA 12-bay Super Turnstile antenna at the top, with the combining and filtering networks at the base. KSFY and KELO engineers look for several advantages from this type of installation, most important of which is an easing of their maintenance problems. The tower itself will be built to a height of 1,909 feet, with the Super Turnstile antenna mounted on top. It might be mentioned that when the original tower was built, KSFY-TV, (then KSOO) and KELO-TV were two of the first stations in the country to use a common antenna.

KELO-TV came out of the January blizzard in much better condition than their competitor. They were able to remain on the air by utilizing their former 1,032 foot tower and transmitting equipment near Sioux Falls.

Bermuda Antennas?

With three television and radio towers toppling in a short, six-year period, engineers around the Sioux Falls area were beginning to believe they lived in a "Bermuda Triangle" of broadcast antennas. When two more towers toppled during the next three months, they were very nearly convinced. On the afternoon of March 23rd, the F-M antenna of KLOH radio at Pipestone, Minnesota, 50 miles northeast of Sioux Falls, crumpled during a violent windstorm, while late on the morning of March 27th, the 1,565 foot tower of KXON-TV, located near Salem, South Dakota, 38 miles west of Sioux Falls, also came down. KLOH F-M was back on the air within a week.

Max Pierce, KSFY-TV Chief Engineer, Sumner Rasmussen, Forum Communications technical director and KSFY-TV staff engineers Bill Kading, Kenneth Bratzel, Diek Chambers, Clarence Ausham and Gene Schultz hope that the tower toppling phenomenon that seems to have plagued the area is over. They're deservedly proud of the hundreds of man hours they racked up to put a television station without an antenna back on the air, but they'd rather not even think about having to do it again!

Antennas Revive LIVE Specials

By Thomas J. Vaughan
Professional Engineer

Electronic News Gathering (ENG) has made available to the broadcaster a completely new source of program material.

The original concept was Live News Broadcasting. Because of recent advances and reliability of equipment, some systems are now being used for scheduled prime time programs from remote locations...even moving locations.

A.B.C. covered the Day Time Emmy's from a cruise ship that was sailing up and down the Hudson river. This was probably the first time a major network relied entirely

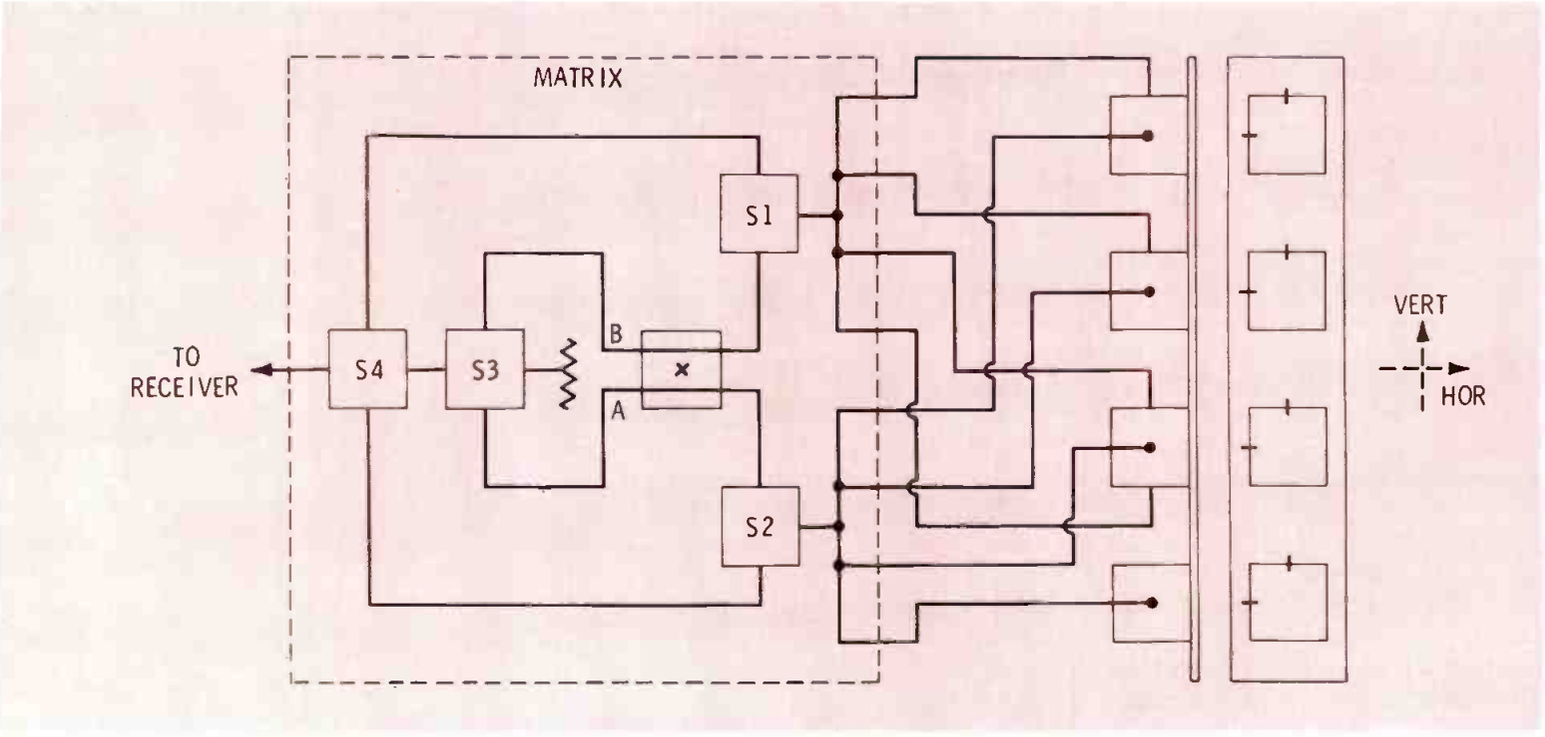


Fig. 1 Antenna module schematic.

Emmy Awards for the daytime shows were presented this year live from a moving boat. With the cooperation of weather and electronics, the unusual program proved that specials as well as news can be live. Here we see Rich Dawson and Carol Wayne "on stage". The antenna system, by Micro Communications, is described in this article.

on a live ENG system for an hour and a half program. Of equal significance, there was no backup or support system. The transmission path was from the cruise ship to the Empire State building and then to the studio via Tel-Com lines.

The System

The problems associated with the mounting and locations of the ENG antenna are in many respects quite different from the problems associated with the locations of the TV transmitting antenna.

The TV transmitting antenna should be as high as possible, since the signal at the receiving location will increase with transmitting antenna height.

The ENG antenna should be in a location that is viewable from anywhere in the city but not necessarily the higher location, unless null fill and beam tilt is used. Unfortunately, the choice of locations is usually limited and governed by other restrictions.

Horizontal Polarization

If the received signal is in the horizontal plane, the signal is received in all four horns. The signal is then connected through the four way combiner to S_2. When the horizontal command is initiated the proper voltage is applied to the PIN diodes in S_1, S_2, S_3, S_4, to route the energy from S_2, to S_4, and, hence, to the receiver. The driver circuit located in each matrix will provide latching. The memory circuit will hold the bias voltage until a new command is initiated. At that point the logic will be removed and the new logic established.

Vertical Polarization

When the vertical polarization is received the signal is connected through the other four-way combiner to S_1, and from S_1 through the by-pass line to S_4, and then to the receiver.

Right Circular Polarizations

Any circularly polarized signal can be reduced to two orthogonal linear (say horizontal and vertical, although, not limited to this orientation) components. If the phase angle between these components is $+90°$, the resultant wave will be right circular. The equal magnitude signals are then connected via the four way combiner to S_1 and S_2 and then to the $\pi/2$ Hybrid.

The properties of the hybird are such that when equal magnitude signals and +90° phase difference are impressed on the input all of the signal will come out port A.

A load is then connected to the fourth port B to keep the hybrid in balance. S3 and S4 are then biased to connect the right circular signal to the receiver.

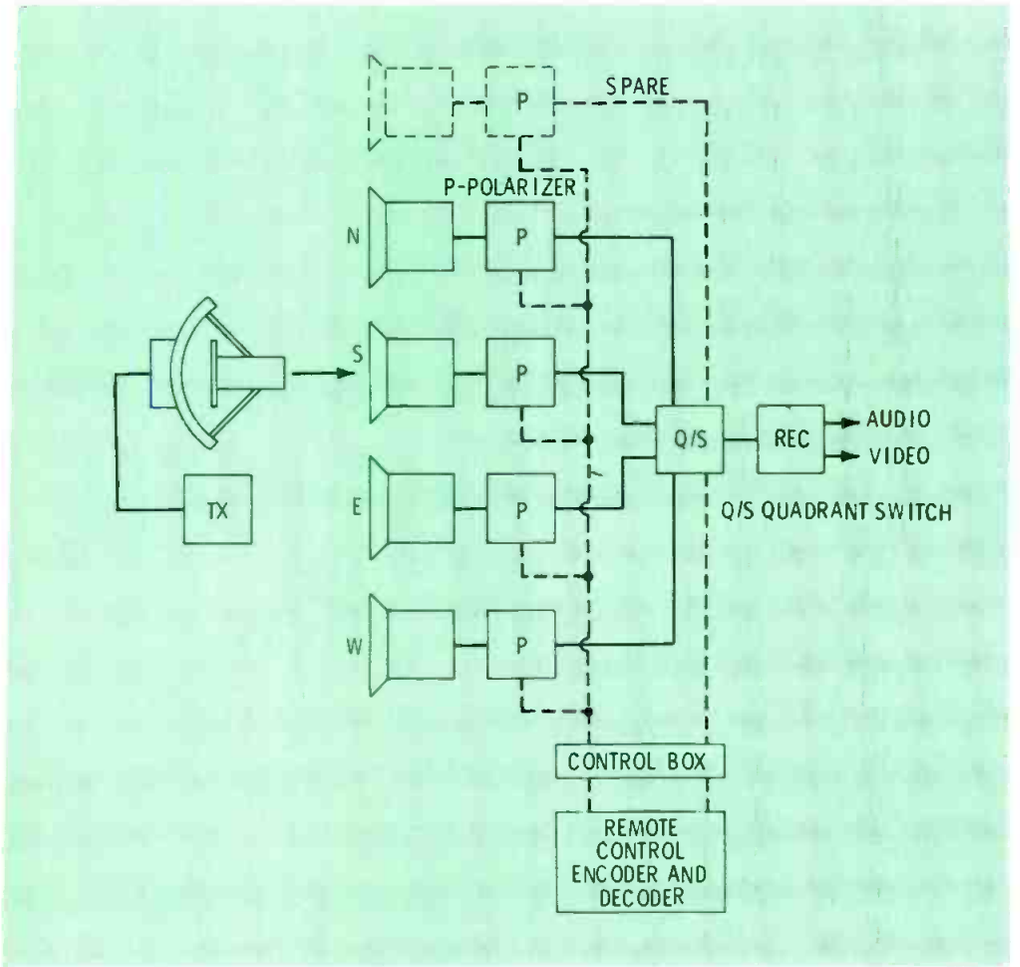


Fig. 2 A block diagram for Electronic News Gathering.

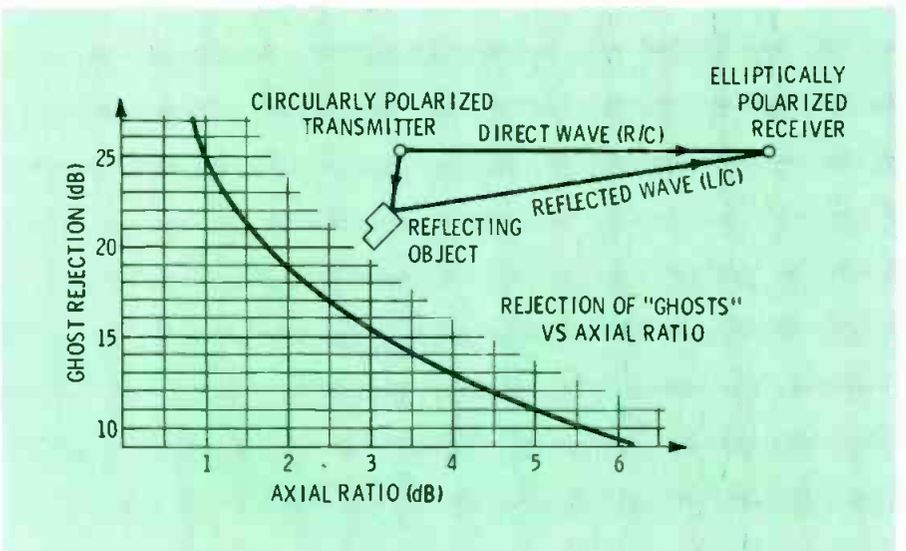


Fig. 3 The ghost rejection or multipath discrimination of the system is directly related to the purity or axial ratio of the CP transmitting and receiving antennas. If the axial ratio of the antenna system is less than 1 dB, the ghost rejection can be as high as 25 dB.

Left Circular Polarization

The operation is the same as for right circular, except if the signals now have a -90° phase difference, they will be left circular. Because of this all the power will come out port B, and the load switched to port A. As in the above the signal will then be connected to the receiver via S3, S4.

The array is a 4 x 1 matrix. The resultant pattern is 74° (half-power beam width) in the azimuth plane and 13° in the elevation plane resulting in an aperature gain of 14.6 dB. The tradeoff on beam width is influenced by the following factors.

Omni-Directional Coverage

If the receiving antenna is centrally located in the community, the desired pattern is omni-directional. Any number of horns or radiators could be used, to make up this cylindrical array. If a single omni-directional radiator is used (like a TV antenna) the gain would be very low.

Even more objectional would be the fact that there is no pattern directivity or discrimination against multiple reflected signal. In a highly reflective environment, such as a large city and a non-L.O.S. path, it is important that use be made of pattern directivity to discriminate against reflected signals.

This increase is due to the reflected signals* adding in phase when a low gain (dipole) is located at one end of the link.

To analyze the signal variation vs. distance, a computer program was written which permits us to input the required parameters.

*Transmission of Circular Polarized Waves Between Elevated Antenna. By T. J. Vaughn and R. Pozgay.—IEEE Transactions publication dated September of 1974, Volume BC-20 Number 3.

A microwave transmitting dish aboard the S.S. Emmy Dayliner transmitted the signal to the top of the Empire State building. (*Photos courtesy of ABC.*)

The program calculates the L.O.S. loss, and corrects for reduction in power level as the distance from the tower is decreased. The signal is then plotted relative to the threshold levels as a function of the horizontal distance in miles.

There is no difference in signal from 10 to 50 miles, but the signal for a 500 Ft. height is 11 dB stronger than the 2,000 Ft. height at a distance of one mile. It is assumed that in many locations new sources may occur well within the mile range. It can also be seen that the first null will move out from 0.37 miles at 500 ft. to 1.45 miles at 2,000 ft.

Mechanical beam tilt may be necessary when the antennas are located on a tall building, or if the receiving antenna location is adjacent to a mountain range, lake or other natural border where no news will occur. An example would be the Sears building in the loop in Chicago. The distance to Lake Michigan, an easterly direction, is only 0.6 of a mile.

If the antenna has 0° mechanical beam tilt, the peak of the beam is pointed approximately to the radio horizon. As the beam is tilted down the signal at the radio horizon will decrease as the top side of the pattern is placed on the radio horizon.

Additionally, the first null will move in from .37 miles to .16 miles (500 ft.), .75 miles to .32 miles (1,000 ft.), and 1.45 miles to .67 miles (2,000 ft.). The signal at the radio horizon will decrease approximately 7 dB, but it is assumed that mechanical tilt would only be used when there is no coverage requirement out to great distances.

With a 4 element array for the vertical pattern, the amplitude and phase across the array can be programmed to fill in the first null. Just as in the TV antenna, the ideal distribution would be $\csc^2\theta$. This is approximated with the distribution used here.

Editor's Note: Back in the days of the "blue banana", there was a cry for deeper and deeper committments to video taping. And as the years went by, we somehow forgot about the advantages of being live.

ENG was the reawakening we needed. And it came about when antenna specialists were busy designing around the ghosts of the past and present. Considering the live antennas **Broadcast Engineering** has covered, a case has been made for special live broadcast other than for news events. And, of course, we can feel a bit easier about live news.

Tall towers ▫▫▫ TOO MUCH OF A GOOD THING?

By Bob Jones
BE Consulting Editor, and broadcast consultant, La Grange, Ill.

Are all tall towers used with AM radio facilities really useful? Or are there some hidden secrets—if properly used— that could justify their existence?

Most of us are familiar with FCC Figure 8A of the Rules, and most of us realize the upper curve depicts a value of field intensity that corresponds to different tower heights. Of course this figure is predicated upon a power of 1 kW, and the field intensity is the inverse distance value measured at one mile. So much for the facts.

It should be obvious to the most casual observer that the maximum field intensity is achieved when a tower has a height equal to 0.625 wavelengths. Or, as commonly expressed, 5/8th wavelength. You would then conclude that in order to achieve maximum radiation for any given power and any given frequency, you merely compute 5/8 wavelength for that frequency, then build a tower of that physical height. Unfortunately it isn't quite that simple. All towers are affected by what I call "influencing factors."

Influencing Factors

Some of these are very obvious... side mounted FM antennas, or top mounted TV and FM antennas, as well as the use of tower lighting chokes in lieu of Austin type transformers to carry A.C. power across the tower base. Some readers may even be familiar with the "end effect." But there are other factors.

For instance, the physical width of a tower affects its electrical length. True, you may say, but its effect can be considered insignificant for AM towers. This is not always true. For example, a tower having a face of 48 inches and standing 400 feet in height, would have a 1 percent W/H ratio. That is, the width would be 1 percent of the height. Please don't get this figure of width percentage confused with effective diameter. The effective diameter can only be predicted precisely when you use a solid pole antenna. All other towers, not being circular in physical shape, will produce an effective diameter somewhat close to their physical diameter, but usually less.

The worst case of a width-to-height problem is represented by a self supporting tower. In fact, non-uniform width is another of the factors influencing the radiation efficiency of a tower.

Other Factors

Less obvious factors are such things as the height of the flashing beacon or lightning rod atop a tower. Using our previous example, a 48-inch lightning rod would add 1 percent to the height of a 400 foot tower. Another common factor is the influence of FM or TV transmission lines on a tower. These are commonly installed on stand-off insulators for a quarter-wavelength. Almost as common is the use of isocouplers at the tower base. In this same category would be communications antennas and their respective transmission lines and cables.

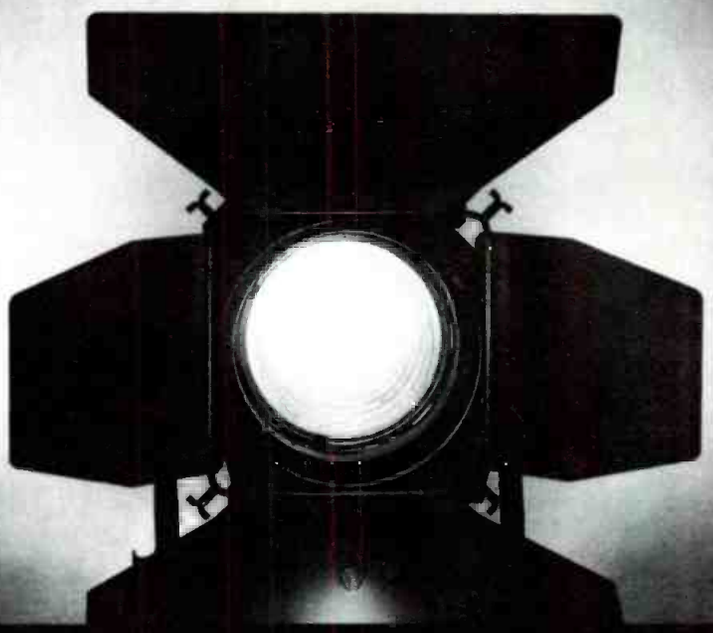
Keep in mind that it is common to mount these communications antennas on cross arms or outriggers. **These metal appurtenances add capacity to ground.** This is just one more influence. Such things as defective base insulators, defective guy wire insulators, improper guy wire insulator spacing, etc., can all affect a given towers' radiation efficiency.

One last factor is the height of the tower's pier. Since most stations use a tower pier, and since they are from 1 foot to 12 feet in height, and since they are usually lined with one or more copper straps, they will radiate. Using again our example of the 400 foot tower, a pier of 8 feet would represent a 2 percent influence.

Precautions To Observe

You may ask, why bother, when most of these factors only cause a 1 percent to 2 percent effect? The reason is that cumulatively these factors can add up to a 5 percent to 12 percent change. You may then conclude that even this total effect won't be felt. Actually it can. Let me first cite two hypothetical cases, then refer to two recent cases. That of a tall tower at WPRS, Paris, Illinois and another at KMO, Tacoma, Washington.

Consider the licensee who decides to construct a tower of precisely 5/8



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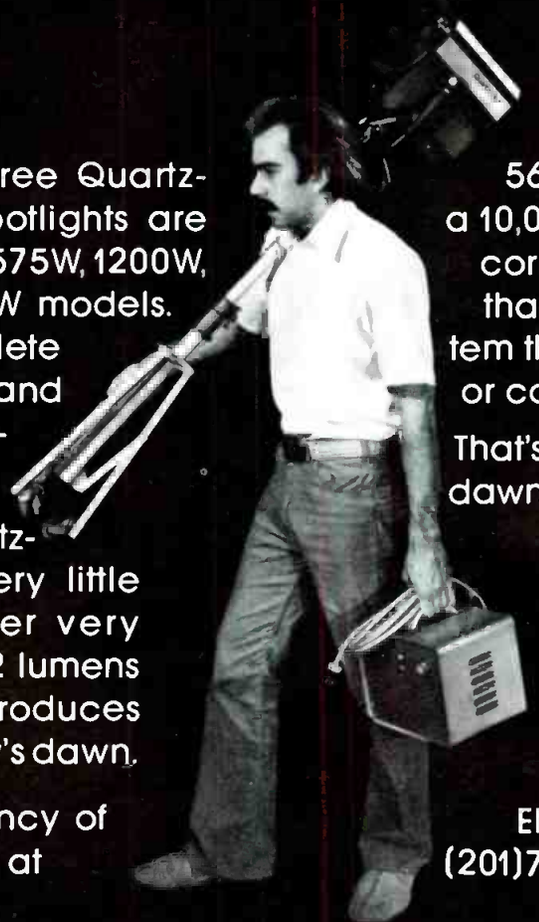

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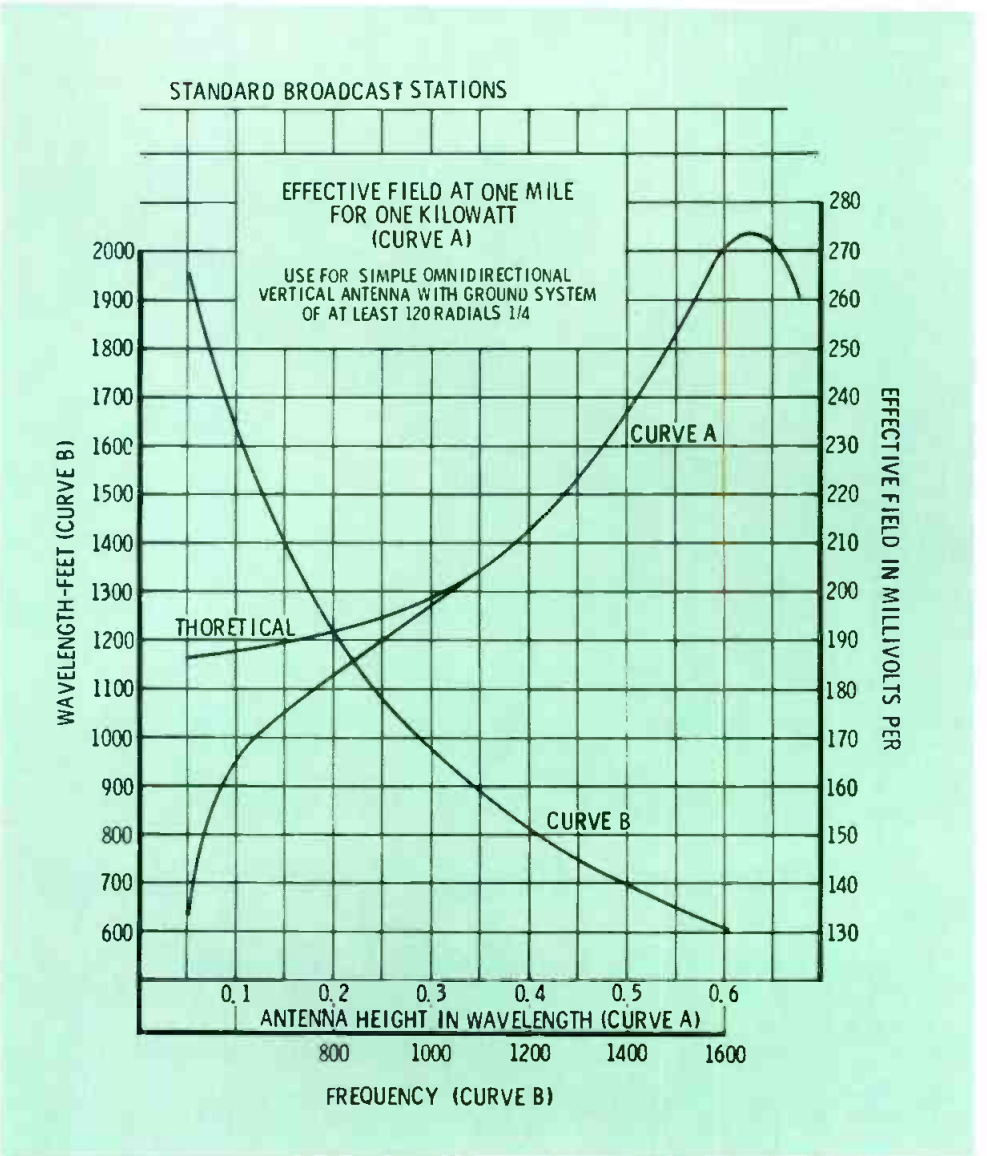

Fig. 1 This is the FCC's Figure 8A.

wavelength to achieve maximum possible radiation, and because of these influencing factors, goofs. After construction, the electrical height exceeds the physical height and instead of achieving 273 MV/M/kW he gets 246 MV/M (-10%). Will the chief engineer get that past the manager's desk?

I know of a case where one Caribbean station had to remove 75 feet from the top of its tower to achieve 5/8th effectiveness.

Consider the licensee who has a radiation restriction on his efficiency. If the tower he constructs turns out to be too long, hence too efficient, he ends up in trouble with the FCC. Of course I realize this can be corrected by installing a resistor to absorb a few watts, or the alternative, one can cut back the transmitter power. But either solution adds additional expense and time. In severe cases, if the over efficiency goes undetected, until found by an FCC inspector, it could result in a fine.

The WPRS Problem

WPRS at Paris, Illinois decided to change the height of their AM radiator in order to increase the height of their sister FM stations' antenna. Because of co-channel allocations, WPRS is not permitted to increase their daytime radiation above the value generated by their former 200-foot tower, namely 197 MV/M. If they did, it could result in increased co-channel interference to other licensees. This, we all know, the FCC will not permit.

From the start WPRS recognized that some reduction in transmitter power, and/or other solution, might be necessary in order to maintain their FCC radiation limit of 197 MV/M. WPRS's management decided to go for all the FM height they could get first, then worry about the AM.

By maximum use of FCC and FAA Rules we were granted a 490-foot tower. It should be pointed out that no ill effects will be caused to the FM station by or from the use of any specific tower height. The physical tower height, employed at WPRS excluding influencing factors, represents 0.717 wavelengths at WPRS's operating frequency. Adding in a factor of 1 percent for the tower width, plus 1 percent for the lightning rod and top beacon and another 1 percent for the tower pier, I predicted an electrical height of 0.739 wavelengths.

However, when you turn to FCC Figure 8A of the Rules to "look up" the radiation efficiency for this

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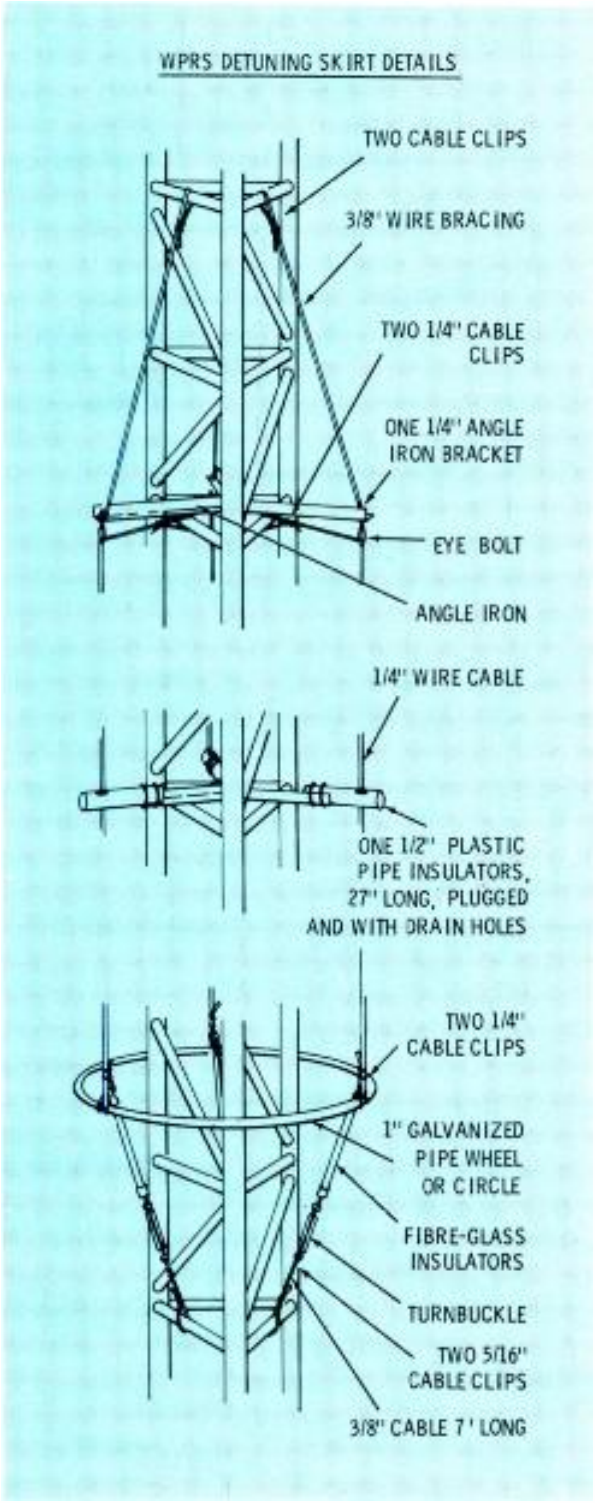

Fig. 2 WPRS detuning skirt details.

electrical height, you discover there is no FCC prediction! In fact, a careful examination of Figure 8A shows that the upper curve only goes as far as 0.625 wavelength.

Does this mean the FCC will not permit towers in excess of that height? No it doesn't.

All it means is that most people interested in purely groundwave radiation, will not erect a structure whose height exceeds that of a 0.625 wavelength tower. Keep in mind that FCC Figure 8A has been with us for 30 years and was prepared long before the days of multiple use towers.

Getting back to our problem with WPRS, there was no doubt the horizontal plane radiation efficiency would yield less than 273 MV/M. In fact, we were willing to gamble that it would be well below this ultimate. It should, theoretically, have been close to our FCC limit of 197 MV/M. Does this mean a 0.739 wavelength tower has only the same efficiency as a 0.25 wavelength? No it doesn't. It means that in the horizontal plane the radiated signal may be the same. That's all it means.

Upon completion of construction, a full eight radial proof of performance was taken. Much to my surprise, I found the radiation efficiency to be substantially below 197 MV/M. In fact, it was measured at 108 MV/M. This you will recognize may be good efficiency for 250 watts, but not for a 1000 watt station.

This less than predicted efficiency could only be accounted for from a tower of 0.785 wavelength. Obviously, some additional influences caused the elongation of the WPRS tower. No doubt these factors were the six bay FM antenna, the two communications antennas plus their supporting cross arms, and the various transmission lines on the tower. Part of the problem, I suspect, was caused by the fact that each cable on the tower was mounted on its own separate standoff insulator. Each of the three legs had a cable running up it.

Once faced with the problem though, the real question was what to do about it? One possible solution would be to open up the tower at 200 feet above ground, install insulators, and isolate the upper portion. This, however, would have added 50 percent to the cost of the project. It was rejected as uneconomical.

A second possible solution would be to operate the transmitter at 4000 watts output, in order to double the radiation along the ground. However, I'm afraid the FCC would not go along with this solution.

The third possible solution was to install a wire skirt to isolate the upper portion of the tower....or, if you will, "detune" the upper half. This solution we proceeded to implement because it was the most practical economical solution. A local welding shop was hired to construct two metal spiders. These were tri-legged because our tower was triangular.

Each of the arms extends 24 inches beyond the tower face. Any distance greater than that would be

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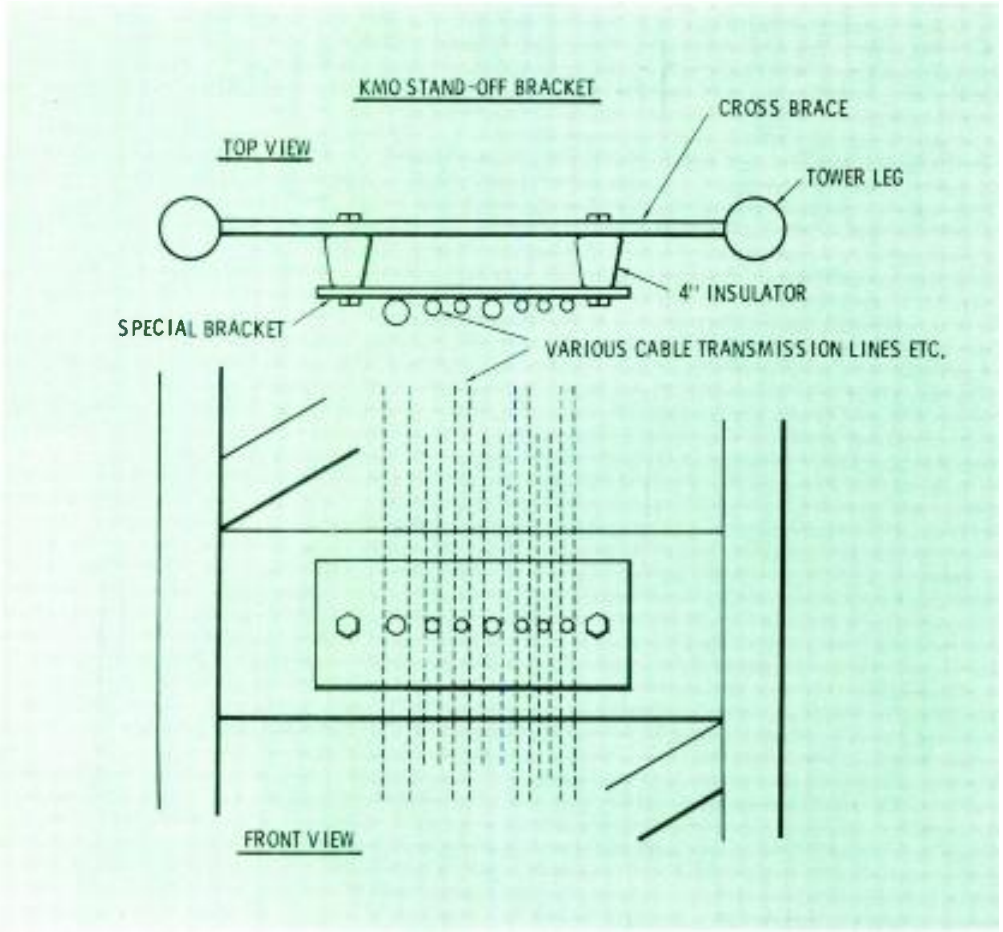

Fig. 3 This is the standoff bracket arrangement used at KMO. The dashed vertical lines represent various cable transmission lines that will run up the side of the tower.

difficult for a tower rigger to work on or maintain. Three ¼-inch guy wires were installed, one parallel to each tower face, to form the skirt. Installing these wires in the center of each face permitted a tower climber to work on the tower without contacting the skirt, or being burned electrically. The upper end of each wire was securely bonded to the tower.

The lower end of each wire was connected to a 48-inch insulator, which in turn was connected to a support wire and then to a galvanized turnbuckle. To make certain each vertical wire had an equal R.F. voltage potential on it, a horizontal pipe ring was looped around the tower, immediately above the fiber glass insulators. One precaution to take is to make certain this loop stays clear of the tower legs. The second spider was mounted half way up the skirt to act as a mechanical support.

In the case of WPRS, we used a vertical cable length of 160 feet. This represents 0.234 wavelength at WPRS's frequency.

Why didn't we choose a precise quarter wavelength? For a very good reason. We didn't know precisely how much detuning would be required. Because of the influencing factors, it is known that a physical length, somewhat less than a quarter wave in free space, was needed to produce an electrical quarter wavelength. Also, it was true that by "under" estimating the length, we could always tune the skirt with a capacitor to achieve the maximum electrical effect, if required. It was reasoned, that if we could avoid tuning to a precise resonant point, we would have a much more stable skirt. In practice we did.

The skirt caused a significant change in the base resistance of the tower, as would be expected. But the field intensity results proved successful. By reducing the electrical height from 0.785 down to 0.351 wavelength, we doubled our groundwave field intensity. In fact, we came close enough with the 160-foot skirt that it was unnecessary to trim it either physically or electrically.

This solution we employed at WPRS proved both practical and economical. It effectively achieved the desired radiation efficiency with a full 1000 watts transmitter output power, even though the overall tower height exceeds 0.739 wavelengths.

KMO Problems

In the case of Radio Station KMO, we wanted to achieve the maximum RMS for a 5000 Watt fulltime station. Unlike the situation at WPRS, where the FM requirements dictated the physical height, it was the AM efficiency that controlled our choice of tower height.

Radio KMO operates on a frequency of 1360 kHz. If we constructed a 5/8 wavelength tower, it would be 455 feet in free space. The physical length would have to be somewhat less than that, or we could "overshoot." After applying for the new tower, it was found that considerable interest existed on the part of other radio users to lease space upon this our "tall tower."

Before construction plans were finally set, we had two FM broadcast antennas, one STL antenna plus several communications type facilities signed up. I might point out that KMO's Manager, Mr. Jim Baine, had wisely selected one of the highest hills in the Tacoma-

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You need a little nerve for a job like this. Here we see a welder on the KMO tower.

The author, Robert Jones, inspects the base and standoff arrangement at KMO.

Seattle area for the new AM tower site. This resulted in the new tower becoming the tallest above sea level, in the area.

At that point it was necessary to rethink our plans, taking into account the effect of these appurtenances upon the AM radiation efficiency of the KMO tower, to achieve perfect 5/8 wavelength results. In addition we had the structural problems of supporting all the various antennas, including respective transmission lines. We chose a tower with a face of 48 inches. The width-to-length ratio was then 1 percent, since we previously selected an overall height of 452 feet. Each of the FM antennas was assumed to add 1 percent more, plus a lump sum of 1.5 percent was assumed for the smaller antenna and hardware.

In order to achieve the maximum radiation predicted by Figure 8A of the FCC Rules for a 5/8 wavelength radiator, we constructed a physical tower height of 435 feet.

To avoid some of the WPRS loading effects, we mounted all cables and conduits on one side of the tower. These mountings were fashioned by a local shop, with mounting holes and brackets to accommodate future cables and conduits. The drawing shows the method by which these steel brackets were supported by two pillar insulators. At the electrical quarter-wave point, a copper strap was connected between the tower legs and the steel plates. In essence, we just shorted out the pillar insulators at that point on the tower.

While I have not discussed it, one has to recognize that ground systems, the amount of copper around the tower pier, as well as the copper up and over the top of the pier, can all result in influences upon the radiation efficiency. Please be mindful that our only yardstick here is one of radiation efficiency.

At KMO we decided on a full 120 radial system, plus 120 short interspaced wires, plus a copper sheaved pier. All of this resulted in a positive influence.

We conducted a full eight radial proof of performance to prove conclusively the true radiation efficiency. Fortunately, the results proved us to be exactly correct. For 5000 Watts, we obtained at one mile an I.D. field intensity of 610 MV/M. But suppose we had less than the full 5/8 wavelength efficiency. What would we have done then?

First the engineer is faced with a most important decision. Is the reason for the lower radiation efficiency the fact that the tower is too tall, or is it the fact that it has not yet reached the optimum height? One solution would be to add 20 feet to the height of the tower and see what happens. This is both expensive, hiring tower climbers, plus risky if one doesn't obtain prior FAA/FCC approval. But putting that aside for a moment, if you did it and the efficiency dropped, you could reasonably conclude that your original height was too much.

If the opposite resulted, you would be too short. Hence, the addition of height or capacity to ground would be the proper solution. If your tower is too long, then an approach similar to that used at WPRS is the cheapest approach. But is there a way to tell if your tower is too tall, or conversely not tall enough? I think there is.

The ideal solution is to excite the tower at various frequencies above and below the ideal frequency to determine that frequency at which the signal intensity at one mile peaks. This should not be attempted by substituting a VFO for the rock in your BC-1H and drift-

(Continued on page 64)

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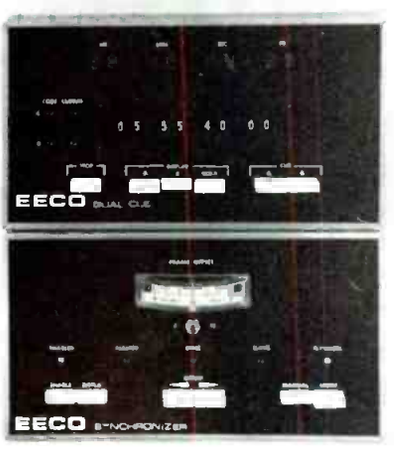

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Antenna Relocation Vs. The Environmentalist

By Frank Coile
KSWU-TV, Washington State University

It was in December of 1969, shortly after Washington State University had relocated its AM radio transmitter to an off-campus site, that the Radio-Television Services Department of WSU initiated planning for the eventual relocation of its television transmitting facility. As the month of June arrived in 1972 our plans were complete, funds were available, FCC and FAA permits were in hand, the lease agreement for a site was practically signed, and project specifications had gone out to prospective bidders.

The history of the KWSU-TV relocation project is unique simply because both time and circumstance combined to cause the station to become, as far as I know, the first non-commercial, public broadcasting station to file an environmental impact statement for a project of this type; a dubious distinction and an action all the more unusual because the Federal agencies concerned had ruled that such a statement was not required.

In Good Faith

The National Environmental Protection Policy Act that was established by Congress in 1969 requires all agencies of the Federal Government to consult with and obtain the comments of expert Federal agencies and individuals before taking any major action significantly affecting the quality of the human environment.

The areas of concern listed in the Guidelines prepared by the Council on Environmental Quality, a consultative agency, are these: Water quality and pollution control; Air quality and pollution control; Water supplies and hygiene; Solid waste management; Radiation problems; Noise; Herbicides and toxic materials; Land use and management; Electric power generation; Urban development; Industrial develop-

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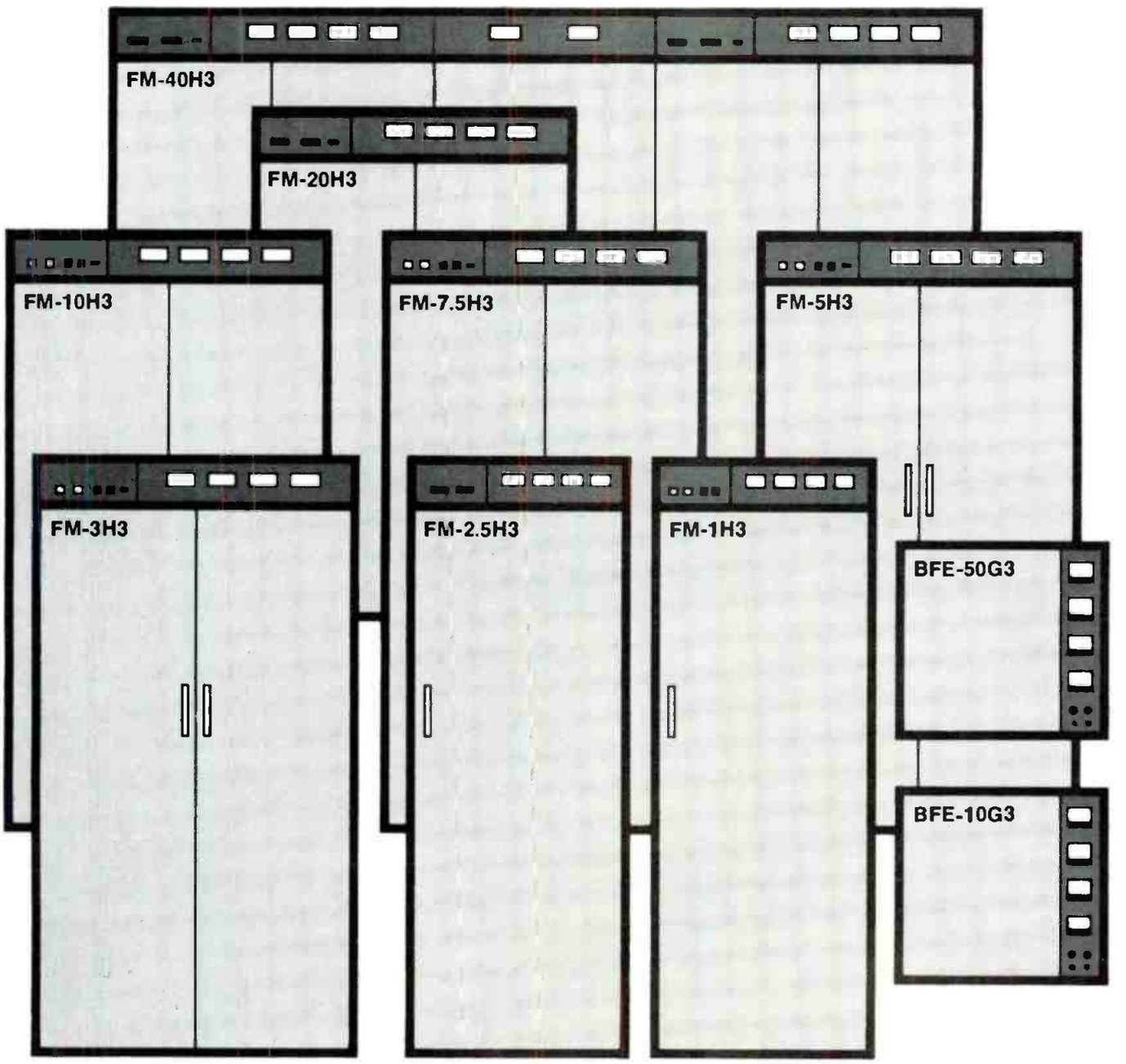

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ment; Transportation and handling of hazardous materials. The intent of the guidelines relate to possible physical damage or significant impact to the types of areas listed.

Because of the apparent failure of our project to fall within those areas covered by the Act, the Educational Broadcast Facilities Branch, Office of Education, Department of Health, Education, and Welfare, felt no obligation to require an impact study. HEW was the agency having jurisdiction over our project because it had provided approximately $100,000 of the estimated $174,000 the project would cost. And even though the Federal Communications Commission had not yet established its own environmental policy procedures, that agency concurred with the HEW finding of no significant impact.

Nevertheless, because the opposition faction that had developed refused to accept the HEW/FCC determinations, and because prudence dictated that we take the initiative, a "Draft Statement of Environmental Concerns" was prepared and submitted to HEW for analysis. It should be pointed out that a statement of concerns is distinctly different from an impact statement. The former is prepared by the applicant and covers its assessment of the project while the latter is prepared by the agency having jurisdiction.

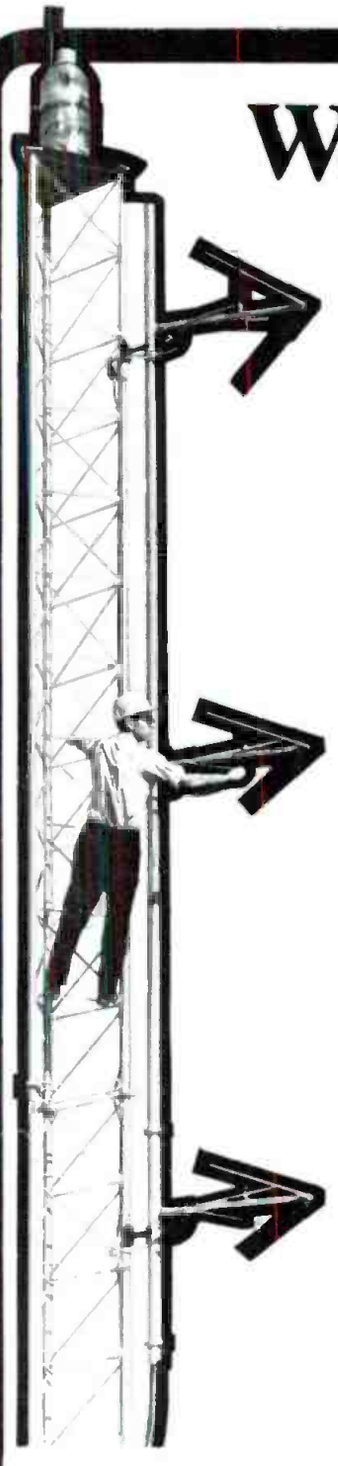
The preparation of our statement and the dispute generated by it introduced us to a new element of broadcasting, the Environmentalist. This person is known to most of us only in an abstract way, but he has been visible for many years in the form of the Sierra Club and other like-minded organizations. However, as we discovered, unanimity of purpose makes all such groups a force not to be ignored when planning projects that come under their areas of interest.

KWSU Background

KWSU-TV was established as a minimal-power broadcast station in 1962, to be operated in conjunction with the communications courses being offered by Washington State University.

The original ERP of 3.35kW was increased to 14.3kW in 1968. This power increase, coupled with the central-campus location of the transmitting antenna, created electronic interference to computers, pill counters, chart recorders, high-fidelity playback systems, and other assorted items of equipment.

The number of interference complaints blossomed to such an extent that two engineers spent many hours doing public relations work. It is of interest to note that the majority of complaints were satisfied by pointed references to proper grounding techniques and by suggesting alternate locations for equipment that was overly sensitive to RF interference. When such counter-measures were ineffective, education was resorted to. The principles of electromagnetic radia-



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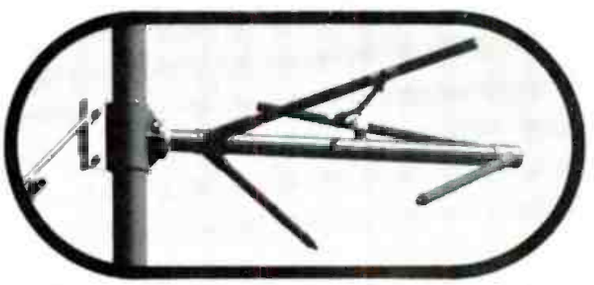

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tion from transmitting antennas were explained to the complainers, concluding with the statement that their proximity to our antenna puts them under our "blanket-coverage-umbrella".

The only really practical cure, however, was for KWSU-TV to move its antenna to an off-campus location.

An interesting, though not unexpected, fact we discovered was that the vast majority of consumer-oriented, and some professional types, of solid-state equipment are not RFI proof.

To further enhance our position that the station was broadcasting well within the FCC limits, and to head off a threatened formal complaint to the Commission, an RF spectrum analyzer was used to investigate the characteristics of our radiated signals. Thus, photographic proof was provided that not a single spurious signal exceeded the allowable level. And we were so impressed with the performance of the loaned unit that we subsequently purchased one for the station. Though these units are rather expensive, I believe the expense is justifiable, especially in these days of remote-controlled and unattended transmitters. And their versatility is such that "quickie" TV transmitter proofs and FM deviation measurements can be readily accomplished.

Even though our operation had been vindicated, the results were only academic because the interference was detrimental to those experiencing it. Something else had to be done.

In addition to the interference problems, other practical necessities dictated that the transmitter should be moved. To wit: The 14kW ERP and terrain considerations limit our Grade "B" coverage to approximately 13 miles. By contrast, radiating 122kW from a suitable height would increase this to almost 70 miles, resulting in a ten-fold increase of viewers. This would give: A much wider distribution of our programs could be effected by providing a suitable signal to the many CATV systems located within a 150 mile radius of Pullman, Washington; 122 kW ERP would furnish a direct signal to each of the television translators operated by WSU in Eastern Washington; the pressures created by the imminent construction of a new 3.5 million dollar communications complex; and the need to increase the number of hours in our broadcast day in order to maintain eligibility for federal funding. Because we created intolerable interference, KWSU-TV did not sign-on until 4:00 PM.

Opposition Emerges

During 1971 and the first half of 1972 the project was well publicized, but no opposition was evident. However, subsequent to our call for bids, a letter-to-the-editor appeared in the local weekly newspaper inquiring about the project. That letter appears to have been the catalyst for a small core of opposition to develop among some WSU students and faculty members. A petition circulated on campus, containing incorrect information, garnered approximately 1,000 signatures out of a student body population of 14,800. But a rallying-cry had been sounded.

Although it short-circuits the narrative somewhat, by omitting various details, suffice it to say that we did not immediately appreciate the emotional involvement our project generated among some of the environmentalists. But it was painfully clear that logical and lucid explanations were to no avail and that persuasion was a useless tool in our efforts to gain their support.

The recurring theme of the opposition was that the planned location of the transmitting tower would cause significant impact on the environment, both aesthetically and ecologically. And that wildlife migratory patterns would be upset by the traffic to and from the site. Concern was also expressed about the possible degradation of one of the few remaining "retreats" in the

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surrounding area.

For these reasons, it was argued, and environmental impact statement should be prepared. That one was not required, failed to penetrate, and the University was accused of acting illegally.

In a situation such as this, it is better to hold a project in abeyance until the negative reactions can be overcome. Our task then became that of furnishing convincing proof that the project was based on recognized environmental, engineering, and economical principles, and to demonstrate that the plan was, indeed, legally conceived and pursued.

It is axiomatic that the relationship between a State-owned institution and its student body bears little resemblance to the attitudes this same body displays toward private enterprise. A simplified explanation would be that such institutions operate on an unwritten, but often expressed, "we versus them" basis, creating suspicion and distrust on some major issues. That the Washington State University Administrators "went an extra mile" to prove our contentions is convincing proof that it doesn't have to be that way.

Site Selection

A television broadcast antenna site, or any other type of antenna site, for that matter, is not randomly selected. In our case, a total of eight potential sites were evaluated according to the criteria we established. (1) It must be located at the highest practical elevation to be consistent with minimum tower height requirements. (2) It must be readily accessible year-round. (3) It must provide line-of-sight contact with the studio to facilitate the use of microwave STL. (4) It must be able to furnish a direct signal to our system of TV translators. (5) It must be within a reasonable distance of the studio to facilitate maintenance because the transmitter will be remote-controlled. (6) It must be available for the purpose.

The site we selected is on a small butte called Kamiak Mountain, nine air miles North of Pullman, Washington. Its claim to fame is predicated on the fact that a State Park was formerly located there, occupying approximately one-half of the butte. The site has an elevation of 3,600 feet AMSL, affording a vantage point for the antenna center-of-radiation of 1,350 feet above average terrain. It is almost an ideal site for a television transmitting antenna that is to meet our requirements.

The butte is divided roughly in half by Chief Kamiaken Park and privately-owned lands. In contrast to the park lands, which are thickly wooded with pine trees and other vegetation, the private lands, on which our site is located, have only scattered growth. Even so, the tree cover is such that a low-profile building would be practically hidden from view and only about 65 percent of the proposed tower would extend above tree top level. Public access to the park is on the northeast slope of the butte at an elevation of 2,660 feet, approximately two miles from the KWSU-TV site on the Western slope at an elevation of 3,600 feet. Thus, terrain elevations and tree cover would completely obstruct any possible view of a tower from the park area.

Draft Statement Of Concerns

As stated earlier, WSU took the initiative and prepared a "Draft Statement of Environmental Concerns", using as its reference the guidelines published by the Council on Environmental Quality. It discussed in some detail our assessment of the proposed tower project. And because the FCC now requires this same type of information to accompany almost every application for construction permit, it seems appropriate to indicate the types of data we included in ours.

While other statements may not follow ours in sequence they should contain essentially the same information, such as: station history and background for the project; basic requirements of the project; why a specific site was chosen; the environmental relationship between the proposed site and adjacent lands; impact on the environment; efforts that will be made to minimize soil erosion, if appropriate; unavoidable adverse effects; aesthetic concerns; opinions of soil experts, biologists, zoologists, etc.; alternatives to the project; an analysis of alternate sites; economic considerations; long-term and short-term construction effects; agency approvals, such as FCC, FAA, Planning Commissions, etc.; retrieveability of commitments, now and in the future; and a summary assessment based on the factors listed. Particularly helpful to a reviewing agency would be charts, graphs, photographs, and all correspondence related to public interests aspects of the project.

Based on information contained in your assessment, the reviewing agency will determine whether or not a full-scale impact study is required. If the determination is positive, the agency concerned assumes responsibility for its preparation.

If comments from the general public are received, don't be too surprised if they run the gamut from utterly impossible to overly simplistic. Nor when, in spite of your logical explanations, statements designed to confuse and enflame are issued by your opponents. It is very difficult, in these situations, to keep your cool while patiently attempting to counter such statements. But excessive negative reactions on your part will generate further animosity. Think positively and always act within the framework of contemporary moral and legal precedent.

Washington State University found itself embroiled in continued controversy even after every effort had been made to disseminate every shred of information, both by the printed word and in numerous meetings. Consequently, we firmly, but gently, prodded HEW into conducting a full-blown environmental impact study. Surprisingly, the study consumed 15 months, during which time HEW digested our information and then made its own investigation.

The result was the issuance of a "Draft Marginal Impact Statement" concluding that there had been no change in the determinations previously made but which allowed 30 more days for public comments to be submitted. So it is

understandable that we were "border-line euphorics" when the "Final Marginal Impact Statement" was released, confirming our belief that the project was not environmentally significant. However, our balloon was soon punctured because we learned that the opposition faction would not accept HEW's conclusions as the final word.

In one last attempt to put to rest, once and for all, the notion that WSU had not complied with every applicable law, rule, and regulation, a public hearing was convened by the WSU Board of Regents. To cover the history of the project over a 30 month period, an eleven page summary review was prepared, including a 14 by 8 matrix site comparison chart, which is a convenient way to graphically display relevant data for rapid digestion.

The hearing resulted in our position being affirmed in all respects. But the passing resolution stipulated that KWSU-TV should re-evaluate its plan to determine what concessions, if any, could be made relative to the tower's aesthetic impact.

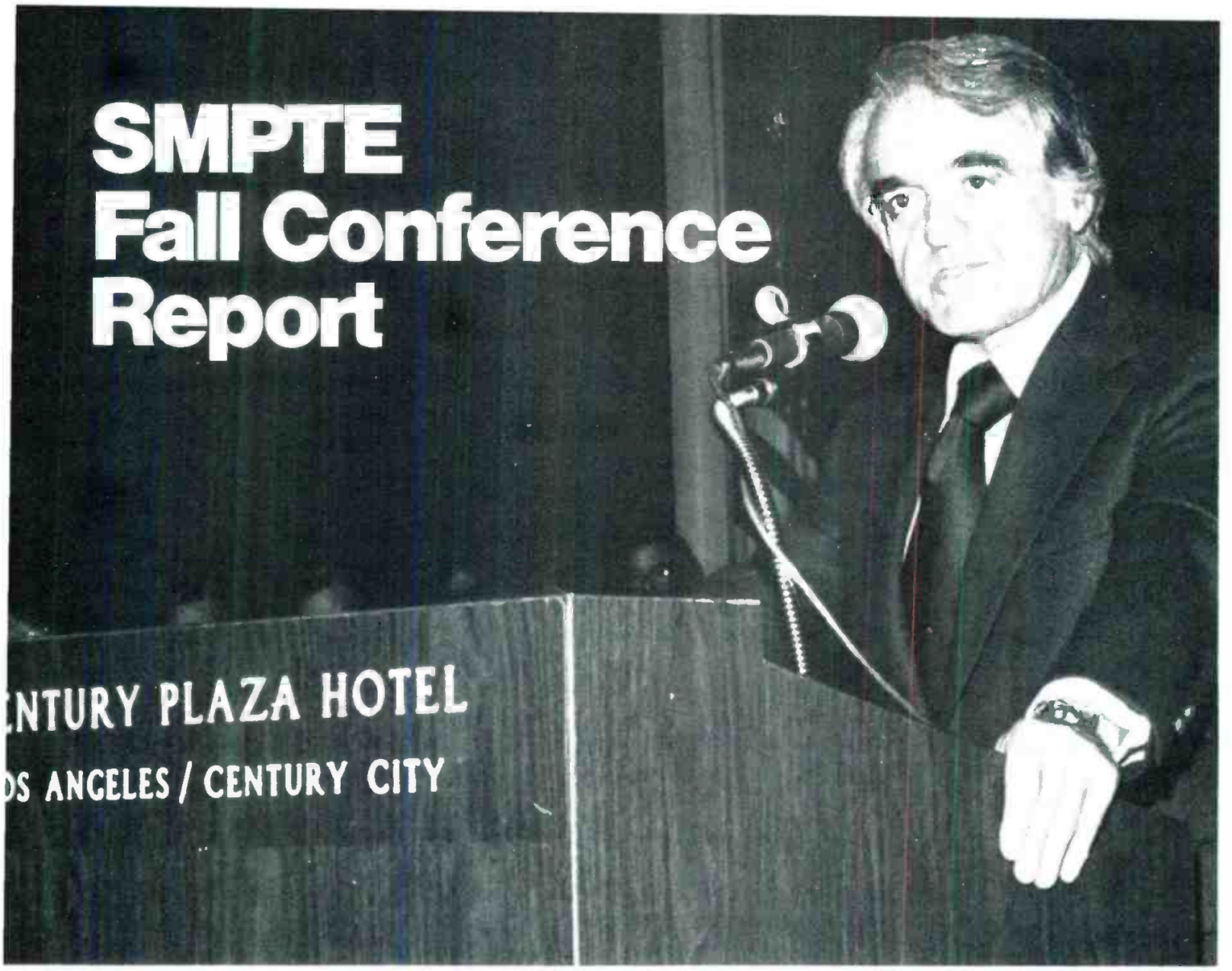
Three small, but significant, concessions were made. (1) The overall tower height was reduced from 307 feet to 300 feet in order to reduce the number of side-lamp levels required. (2) The trees to be removed from the site would be judiciously selected but tower safety would take preference. (3) The design of the guy cable anchor piers would be modified to present the least visual impact.

It is very difficult to express the frustration we felt when after 30 months of agony those immovable objects continued to resist becoming mobile. Their response was to request a court injunction to block construction of the project. On what grounds, I do not know. At any rate, the court suit fell through when the opposition failed to gain the support of local citizens.

One of the penalties we must pay for following the procedures that were forced upon us, even though the delay created by a small group of people is a testimonial to our Democratic processes, is related to economics. The project is now expected to cost $42,000 more than the original estimate. This additional cost is directly related to the rate of inflation that has occurred and not to any changes we may have made in the original plans.

When one comprehends the history of the KWSU-TV antenna relocation project and the ramifications inherent in the newly adopted FCC rules relating to the environment, it is readily apparent that broadcasters and other entities doing business with the Commission have a "new road to plow" called "environmental concerns". Hopefully, the ground will not be too hard. But the experience of Washington State University is an example of what one broadcaster had to endure prior to obtaining authorization for its project to be constructed.

SMPTE Fall Conference Report



Jack Valenti, President of the Motion Picture Association, spoke vehemently for the lifting of foreign trade barriers against U.S. film and TV programs. He addressed a distinguished group of SMPTE award winners, officials, and past presidents of the Society, as well as several hundred members who attended the luncheon. (All photos by Donna Foster Roizen)

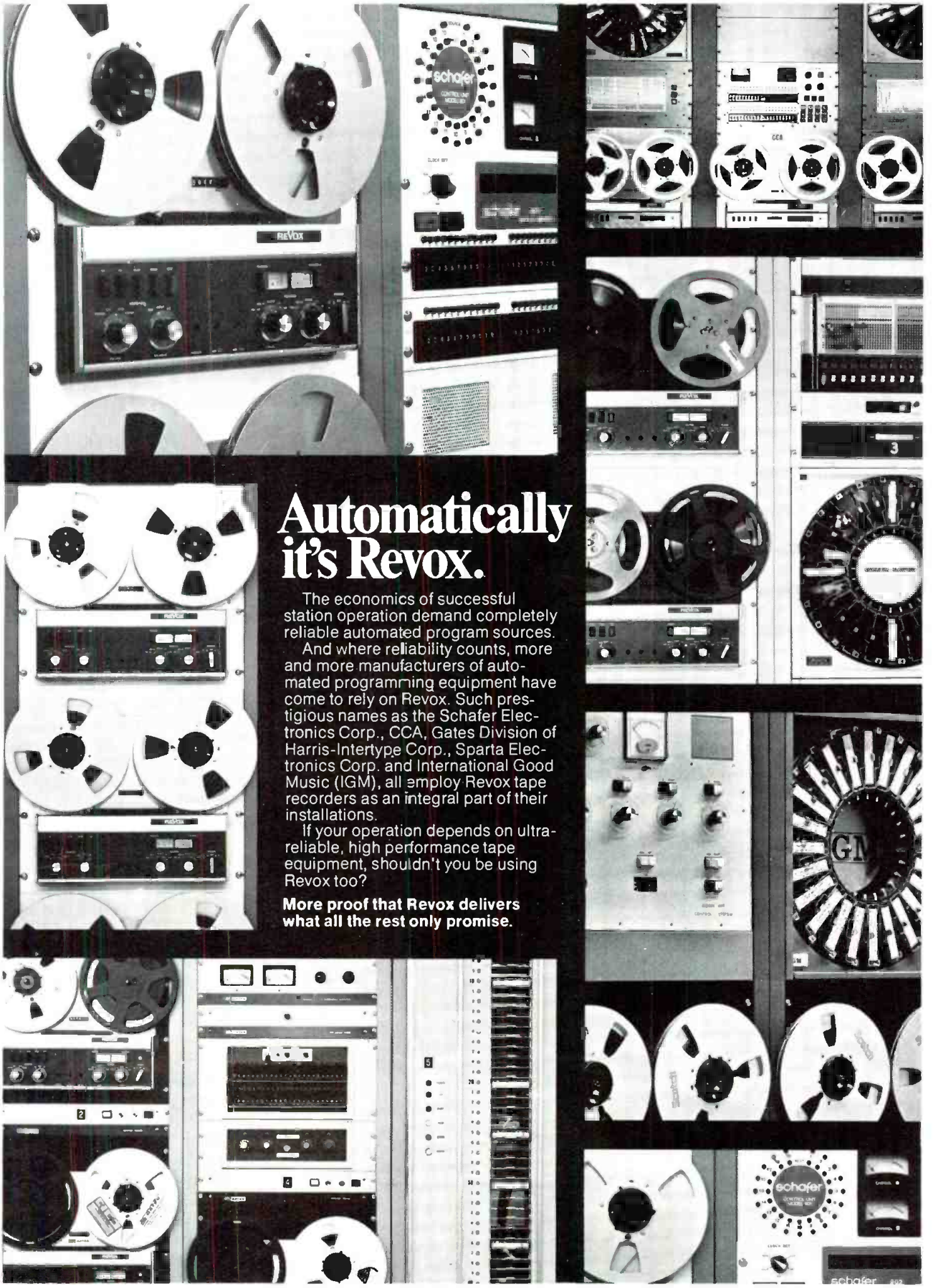
By Joe Roizen

The SMPTE has recently decided to accede to the growing objection among members and exhibitors to the twice yearly technical conferences that were held in New York and Los Angeles. This year's Fall Conference was the first of the single annual meetings that will from now on alternate between the East and West Coasts.

As a result of this decision, the 1975 technical symposium and equipment exhibit was the largest ever held, with 162 booths housing 110 exhibitors. About one thousand registrants and many more visitors came to the Century Plaza Hotel to tour the exhibits, participate in the functions and attend more than one hundred papers that covered the gamut of film and television technology.

The SMPTE also used this occasion to hold various standards committee meetings, to review or discuss both existent and new areas of standardization in these fields.

One of the highlights of this week long event was a luncheon speech by Jack Valenti, president of the Motion Picture Association, where he reviewed the status of American program production and called for a worldwide free trade arrangement to permit U.S. programs to more competitively enter foreign markets. The same luncheon saw a variety of awards being



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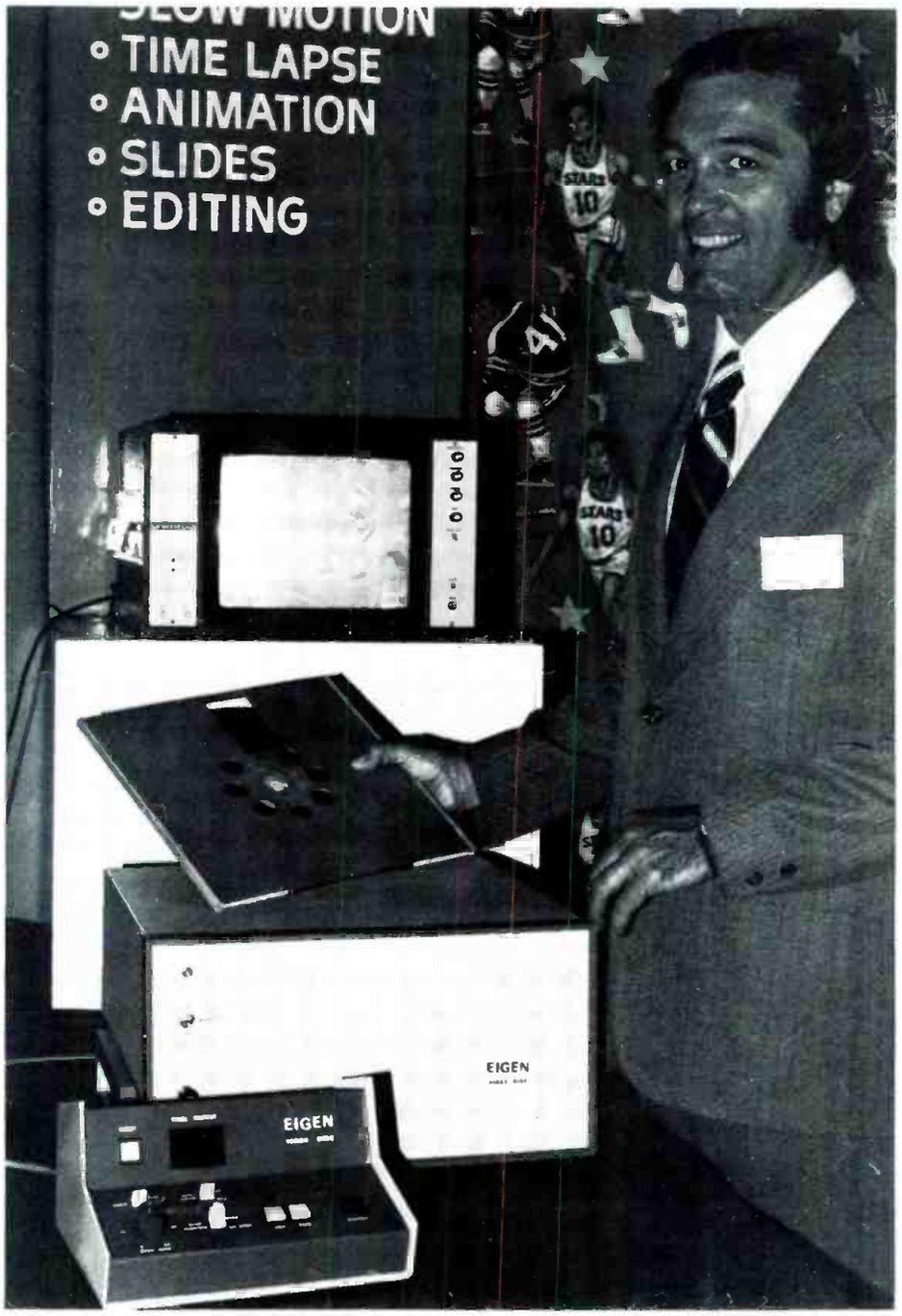

A new video disc recorder using floppy magnetic discs and selling for less than $10,000 is a product of the Eigen Company of Grass Valley, California. The disc has 10 second storage and time base manipulation capabilities.

given to individuals who had contributed significantly to current technology.

In the field of international program exchange, the development of Digital Intercontinental Conversion Equipment by John Baldwin's team of British engineers working for the Independent Broadcasting Authority of the United Kingdom was acknowledged by the Society. It presented Mr. Baldwin with the David Sarnoff Gold Medal Award for this achievement.

This noble metal medallion now has two reasons to be coveted by recipients. In addition to its honorary aspect, the six ounces of pure gold is worth almost $1,400 at today's market value. No wonder then that a bronze replica is also provided, to serve as a souvenir paperweight while the original is deposited with the family jewels in a safe place.

The Society also elected 14 members to Fellowship; one of these was Norman Ritter of the 3M Company,

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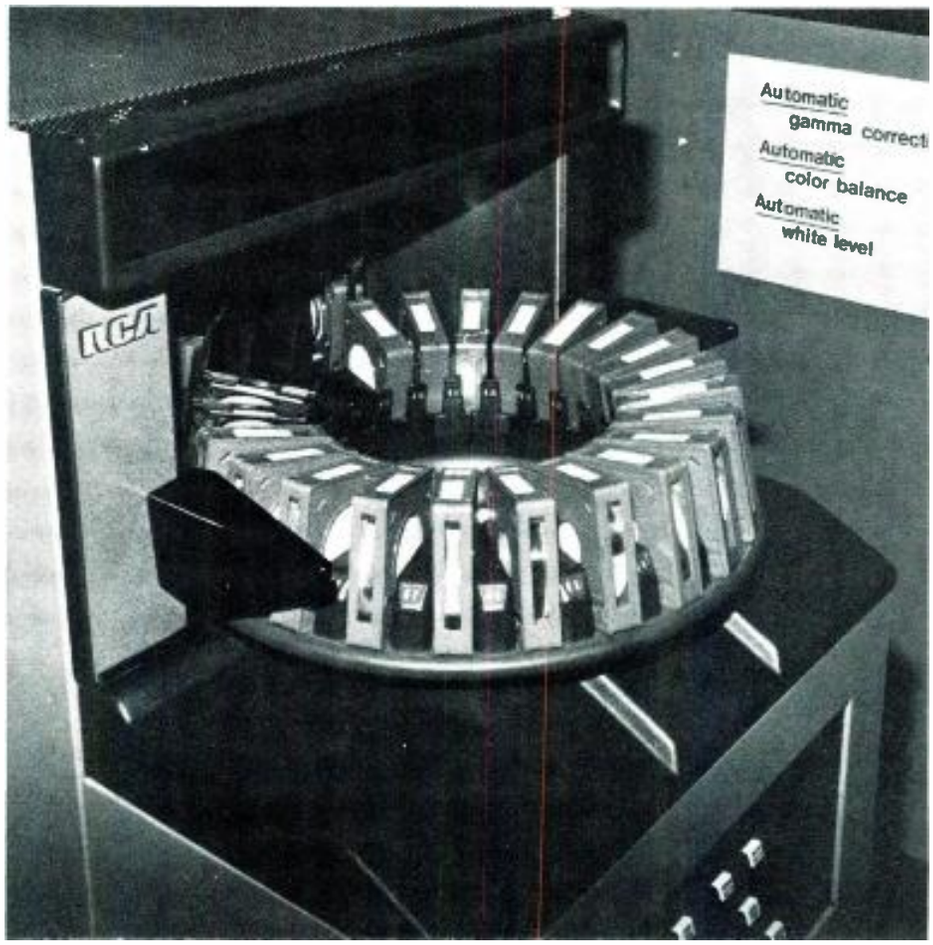


Film fights back! This RCA film cartridge machine can rapidly sequence and cue up to 24 film clips of 16mm program material. This telecine system is intended to rival tape cartridge machines for commercial inserts and station breaks.

a conscientious and hard working chairman of the VTR standards committee.

The Exhibits

A tour of the three halls that housed the equipment exhibits showed the increasing penetration of video equipment into what was an almost exclusively film hardware show a few years ago.

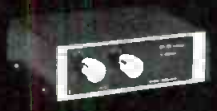
The emphasis in the video exhibits was on Electronic News Gathering, digital techniques, editing systems and a new gadgetry. On the film side, it appeared that proponents of this medium were fighting back against the claims of the ENG equipment makers by offering more versatile news cameras and rapid processors that handle high ASA color film.

The RCA exhibit played both sides of the fence, with the production version of their ENG camera, the TK 76, and their fast sequence film cartridge scanner, the TCP 1624, they could handle either medium.

The IVC exhibit had three new products on display; a portable version of their 7000 series color cameras (7000P) for ENG or other remote applications; a 9000 two inch segmented-scan helical VTR which is now becoming available in a 655 line 24 frame configuration for tape to film transfers of large-screen projection quality; and a digital frame synchronizer, the DFS 3000, made by Quantel. The synchronizer which holds a full frame in its memory is less than half the size of comparable units now available.

The Ampex booth had their full range of VTR's; however, a new package of a Sony U-matic player hooked to an Ampex digital TBC produced stable images from ENG-type field acquisition equipment in the U-matic format. While not

Our new E series audio equipment will improve your sound and cut your costs . . . or your money back!

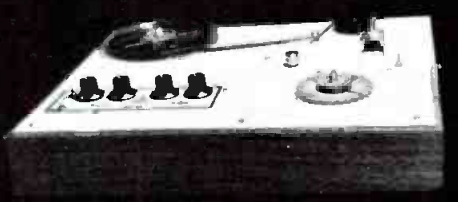


TURNTABLE PREAMPS

MIC & LINE AMPLIFIERS

AUDIO DISTRIBUTION AMPLIFIERS

AUDIO CONSOLES & CONTROLLERS



AUTOMATIC TAPE CARTRIDGE & CASSETTE LOADERS

STUDIO MONITOR AMPLIFIERS

REMOTE POWER CONTROLLERS

TEN DAY FREE EVALUATION AND 2 YEAR GUARANTEE
INSURE YOUR UNCOMPROMISED SATISFACTION

TURNTABLE PREAMPS

Preamps costing almost 3 times more will not compare with these units. RIAA/NAB equalized ±1db, 0.5MV sensitivity at 1KHz for +4dbm out, balanced outputs, —75db s/n at 10mv in, 0.05% distortion, +21dbm max. out. Internal power supply.

MP-8E Mono $86 SP-8E Stereo $137

MIC & LINE AMPLIFIERS

Dual function and superb performance. Inputs for mic and line, ±0.5db response 10Hz-20KHz, 67db gain on mic channel(s) +26db gain on line inputs. Balanced inputs & outputs, +21dbm out max, 0.1% distortion. Internal power supply.

MLA-1E Mono $98

MLA-2E Dual Mono/Stereo $139

AUDIO DISTRIBUTION AMPLIFIERS

From 1 in/6 out to 20 in/80 out in one small package. Whatever your distribution requirements we have an answer. All units meet or exceed the following specifications: Balanced bridging/matching inputs, balanced 600ohm outputs, ±0.5db response 10Hz-20KHz, ±3db 5Hz-40KHz, 26db gain, +21dbm out. max. capability, 0.1% or less distortion, outputs isolated by 80db, hum and noise 90db down referenced to +21dbm out. Internal power supplies.

DA-6/E	Table top. 1 in/6 out.	$131
DA-6R/E	Rack mount. 1 in/6 out.	$149
DA-6BR/E	Rack mount. 1 in/6 out. Individual level controls for each output.	$165
DA-6RS/E	Rack mount. 1 in/6 out stereo or 2 in/12 out mono.	$229
DA-16BR/E	Rack mount. 1 in/8 out stereo or 2 in/16 out mono. Individual output level controls, selectable metering & headphone monitoring.	$287
DA-2080/E	Rack mount main frame with protected power supply, metering & headphone monitor. Will accept up to 10 slide in modules. Each module has 2 inputs & 8 outputs. Individual output level controls & selectable meter switch. Up to 20 in/80 out.	
DA-2080/E	Main Frame	$150
DA-2080/E	Modules 2 in/8 out	$135 ea.

AUDIO CONSOLES & CONTROLLERS

Our new series 35 audio controller Introduces a new concept in audio mixing. Allows separation of controls from the audio functions. Controls can be placed in any convenient location in the studio, while electronics may be mounted anywhere for easy maintenance & hookup. Remote DC control for completely unaffected audio.

This versatility gives you a custom designed console at a standard production model cost.

Features include; 8 channels, mono, dual channel mono, stereo, dual channel stereo, or combinations; paralleling 2 units for quad, fail safe power supply & plug in interchangeable cards.

Performance specifications are; 0.3% or less distortion, 124dbm equivalent noise on low level channels, approximately 25w power consumption, —70db crosstalk, balanced bridging/matching inputs & response within ±2db 20Hz-20KHz. Series 35 audio controllers start at $1200.

AUTOMATIC TAPE CARTRIDGE AND CASSETTE LOADERS

So easy to use & accurate that our largest winder competitor has been using one of these to load their own carts.

Eliminates guesswork. Set the dials to the length desired. The exact amount of tape is fed onto the cart or cassette hub and then shuts off automatically. Also has exclusive torque control for proper tape pack on different size hubs. Winds at 30 IPS.

ACL-25/E $185

Winders also come in higher speed models (ACL-60 series). Same operation as above but winds at 60 IPS. Accepts 14" pancakes.

ACL-60T/E	(tone stop only)	$266
ACL-60B/E	(Blank tape loader)	$331
ACL-60BT/E	(for both prerecorded and blank tape)	$375

STUDIO MONITOR AMPLIFIERS

Exceptional reproduction! Internal muting. ±2db response from 20Hz-40KHz. 25w music power, 20w RMS into 8 ohms. Hum & noise 65db below rated outputs.

Distortion less than 0.25% at less than 20w out, 1% or less at 20w. Works into 4-16ohms. Balanced bridging inputs, variable bass contour, internal overload & short circuit protection.

SMA-50/E	Table top (mono)	$125
SMA-500/E	Rack mount (mono)	$142
SMA-1000/E	Rack mount (stereo-40w)	$196

REMOTE POWER CONTROLLERS (DUAL)

Safe, transient free means of controlling 110V/AC. Turntables, on the air lights, etc.

PR-2	(toggle switch on/off)	$39
PR-28	(momentary contact actuation)	$54

Give us a call or write today for further details. You'll be money and performance ahead.

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Sacramento, California 95823

RAMKO RESEARCH

This Sun II portable time code generator can be slung over the operator's shoulder and provide the SMPTE address code for remote recordings.

officially announced, rumor has it that Ampex will handle Sony gear for broadcast applications in their own regional offices.

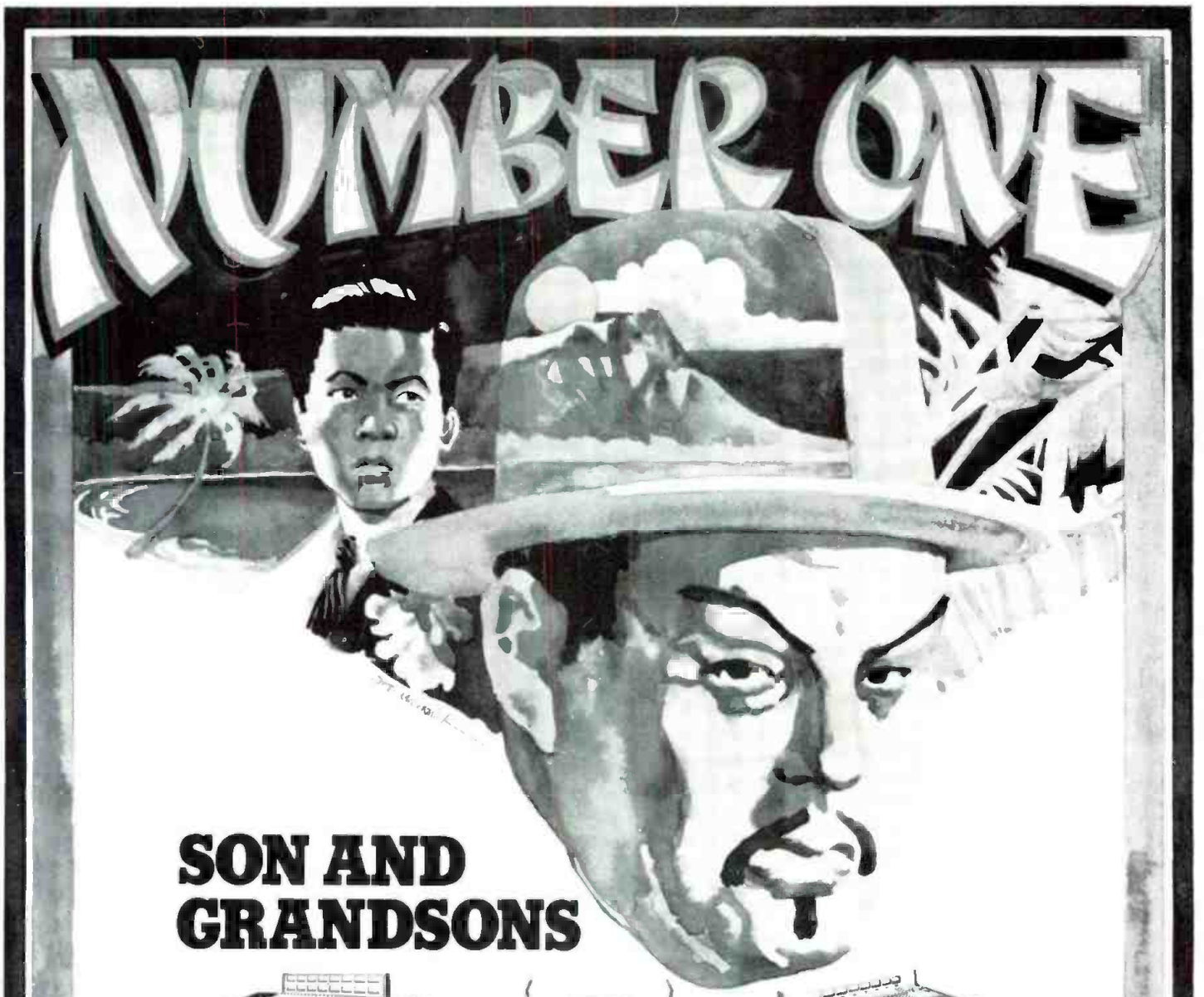
Television Research International, a relative newcomer to the hardware field had several new products on display, as well as their EA5 editor that is aimed at ENG and CCTV applications. The new products included a portable production console, PPC-1, for video programming which included wireless mike inputs for audio. Two types of time code generators (SUN 1 and PORTA SUN) covered studio and remote address code needs. The portable generator is about the size of an audio cassette recorder, weighs 2.5 lbs. and can be carried on a shoulder strap to insert time code into roving video equipment.

Datatron had their ENG version of the Vidicue series editors connected to Sony 2850 U-matics. They have improved the system with better lock up time (under 1 sec.) and a keyboard entry feature. Still other editing packages using modified helical recorders were available from National Video Corporation and Convergence Company, both California-based firms. The Convergence unit appears to be the smallest, least expensive editing package aimed at LIVE journalism applications.

Among the new products exhibited was a unique short-range transmission system for video signals using infra-red (8900 angstrom) signals. This package made by International Audio Visual Inc. of Van Nuys uses fast infra-red emitting diodes (hence the trade name FIRE) and can go several hundred feet (line of sight) with 10 MHz bandpass. Direct camera color images shown were good and according to the maker were limited by the camera and monitor resolution. No FCC permit is required and political convention floor coverage or similar applications are foreseen for this unit.

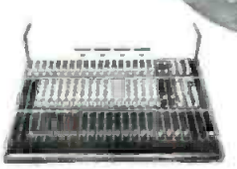
Eigen Video of Grass Valley, California showed a color disc recorder using a floppy magnetic disc in a protective sleeve. The unit had a ten second capacity and can do time base manipulation or freeze frame. Eigen calls this the first "Instant Replay" disc for under $10,000. Replacement discs cost $75 each.

A variety of portable color cameras were in evidence at several booths, either on their own or in conjunction with other displays. Asaka, Ikegami, IVC and RCA were all there, but the newest one was a Toshiba unit called the CK38, which uses no backpack and makes good quality three-tube images for an introductory price of 12K. It uses two-third inch Chalnicon pickup tubes and has a one and half inch electronic viewfinder



SON AND GRANDSONS

SON 52 inputs
26 mixing positions



GRANDSON 36 inputs
18 mixing positions

GRANDSON II 48 inputs
24 mixing positions

For years, the Auditronics family of consoles has produced sound leaders. From New York to Bangkok.

Our Son and Grandsons deliver faultless performances night after night. In front of the most hardened authorities.

Yet our success is no mystery. In both recording and the broadcast industry, Auditronics has become a standard for craftsmanship and technology. A reputation won on the firing line.

Think about it. And don't make a sound without calling us first.

Leasing/Financing Plans Available.

INTERNATIONAL DEALERS: J-Mar Electronics, Ltd., Toronto, Canada/Studio Equipment, Paris, France/ Syntec Electronic Distributors, Sydney, Australia.

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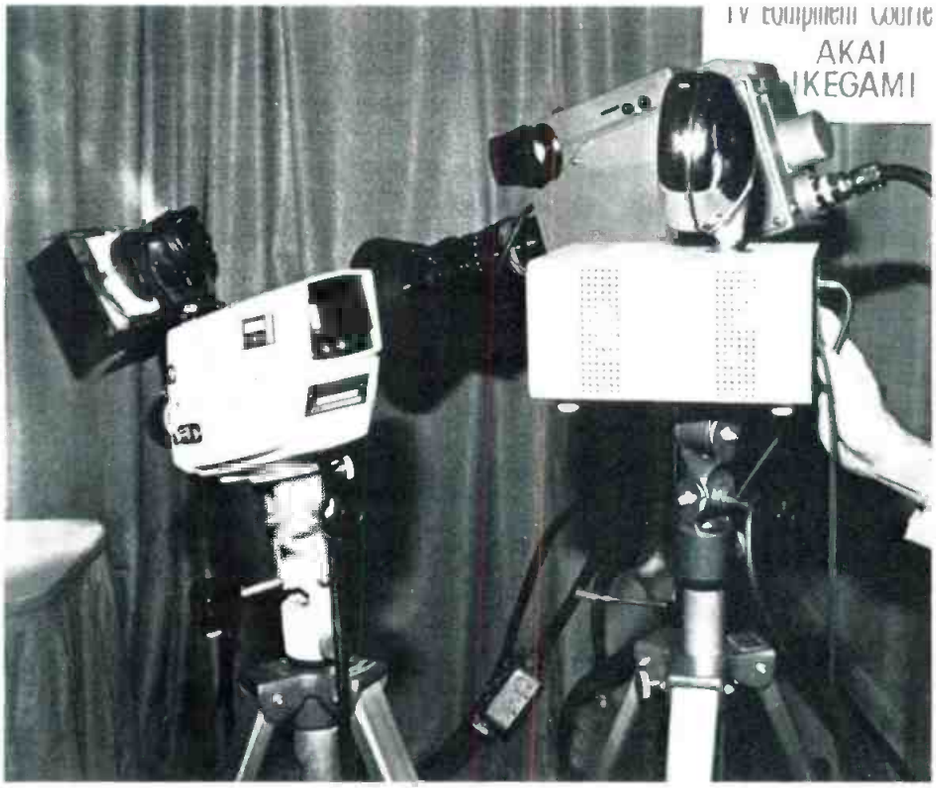
For More Details Circle (46) on Reply Card



Short range video transmission of up to a few hundred feet is accomplished by this optical transmitter, using a fast Infra-Red Emitter. The system has a 10 MHz bandwidth. It made excellent color pictures at the show.

that snaps on to either side of the camera. Weight of camera, zoom lens, viewfinder, and battery pack is about 22 lbs. Output is a fully encoded signal ready for transmission or recording on a VTR.

The Technical Papers

There was no shortage of technical papers at the SMPTE Fall Conference. Over one hundred presentations were made with the split about the same as in the exhibits, about two-thirds film or optics oriented and one-third video.

A whole series of film-oriented papers were aimed at ecological improvements through better photo chemical waste disposal and treatment. Holography was the glamour subject that included both tutorial and specialized reviews of this growing field. A series of three dimensional holograms were on display in the registration area.

The video papers concentrated on ENG cameras, both electronic and film as they apply to station operations. Coupled with this, there were a series of papers on the SMPTE address code and its use with minicomputer control or directly. Digital video techniques came in for some attention, including a description of the inter-continental digital standards converter by Mr. Baldwin. A few papers related to educational television and one on electrical safety of AV equipment rounded out the conference.

Summary

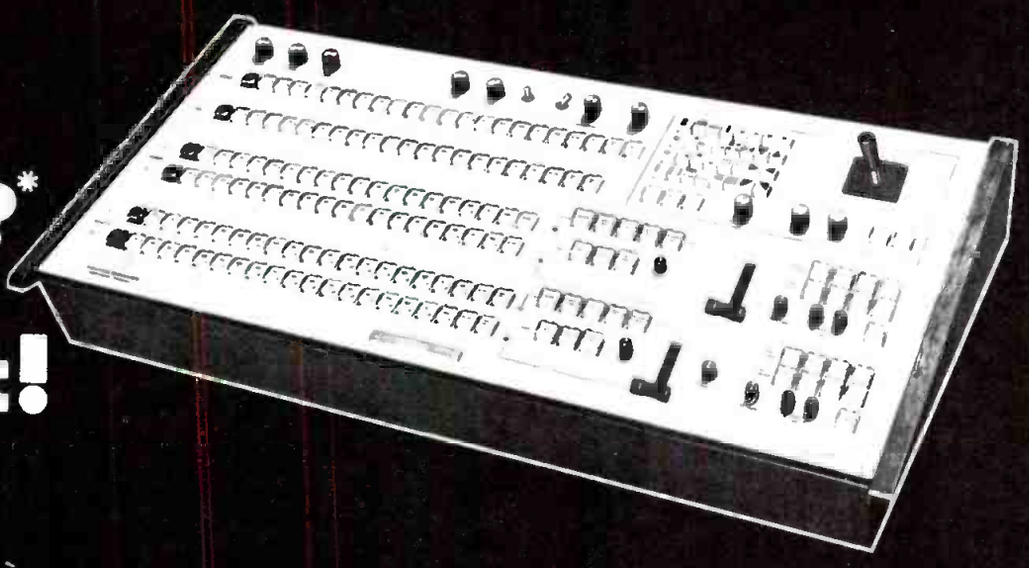
Billed as the largest meeting and greatest exhibit in SMPTE history, the Fall Conference starts a new trend that will be interesting to observe in the future. In particular, will a single yearly meeting suffice to keep the membership informed on what is new in this field.

The importance of this industry was illustrated by Jack Valenti when, during his speech, he said that American program production brings back to the USA an annual surplus of over 450 million dollars, even under present restrictions in foreign markets. Valenti further claimed that 50 cents of every dollar spent on domestic programs came from abroad, not an inconsequential item in these days of economic difficulties here at home.

a standard switcher from CDL?

only 90 day delivery?

only $34,000?*



that's right!

And in addition... loaded with "custom" features and CDL Quality

it's the VSP-1260S!

When you need a "Big" Video Production Switcher there are only a few manufacturers who make them. You've been accustomed to a "Big" delivery (6 months and longer), and at a "Big" price.

That's how it has been . . .

Here's how it is NOW!

- **We've taken your most wanted "Custom" options and made them STANDARD.**
- **Standardizing features and production have reduced costs, and delivery schedules to less than 4 months.**
- **The VSP-1260S also has all the other original features of Central Dynamics' VSP-1200 Series Switchers.**

*U.S. Price

You get these most wanted "Custom" features:

- 20 inputs
- 8 Busses including 2 Mix/Effects, Preview/Key, Program *AND* 2 prewired Utility busses for a variety of applications.
- VK-2140 Encoded Chroma Keyer integrated and timed into switcher and including 4x1 input selector.
- Dual 2x1 Chroma Key Switcher to delegate VK-2140 or RGB Chroma Keyer to either M/E amplifier.
- 1 Key Border Module: can be used with either Mix/Effects bus.
- 32 Non-Repeating Effects Patterns
- Soft Edge Key
- Soft Edge Wipes and Vignettes
- Spotlight & Mask Keys
- Non-Add Insert on each M/E
- Fade to Black from nonsynchronous sources
- Automatic Color Black system

Following options can be added any time on a plug-in basis:

- ☐ **RGB Chroma Keyer and Input selector**
- ☐ **Utility Bus Control Panels**
- ☐ **Additional Key Border Module**

To see the effects of VSP-1200 Series Switchers in color, request our "On-with-the-Show" Brochure.

You can also see the effects "Live". VSP-1200 Switchers are operating in most major cities across the country.

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For More Details Circle (48) on Reply Card

Tall Towers

(Continued from page 44)

ing up and down the broadcast band. No, there is an easier way.

Connect a good signal generator to the base of your tower. By maintaining a constant output power from the signal generator, keeping in mind the tower impedance shifts with frequency and hence the load on the signal generator, you merely tune up and down until you find the frequency at which you observe maximum signal on your field intensity meter. Keep in mind that for a 5/8 wavelength tower this usually means at a distance far enough removed to get out of the induction field.

Once you know the frequency at which maximum signal occurs, you have the problem solved. For example if your operating frequency is 1360 kHz, and you discover experimentally that maximum signal occurs at 1420 kHz, you immediately know your tower is too short. In fact, you even know by how much. Since electrical height is inversely proportional to height, you are too short by a factor of 1420 ÷ 1360 x 100%, or 4.4%. You would then add 4.4% to the height of your tower. If by chance your optimum radiation occurred at 1310 kHz, you are too long, by 3.8%.

Conclusions

All towers, in practice, exhibit physical properties that tend to elongate them for any given frequency. This is not a contradiction to what I just said above. They are elongated. To design a physical tower height to achieve a given electrical height's performance, you must make it shorter. Just how much shorter is the question. But by applying reasonable percentage points for height to width ratio, FM antennas, cross arms, and ground systems, we can usually predict correctly within a few feet. □

TECHNICAL DATA

Tektronix has just published "Display Monitors," a 20-page, 2-color booklet designed to help OEM buyers choose the right monitor for their system. The booklet explains how to select a monitor based on an understanding of its operating parameters and the requirements of the system it will become part of.

For More Details Circle (102) on Reply Card

JVC Industries has issued a 20-page full-line catalog on their video products: Color videocassette players, color videocassette recorders, with or without built-in tuners, videocassette accessories, black and white and color video tape recorders, including a portable system, a complete line of video tape recorder accessories, many superior black and white and color cameras, monitors, and an assortment of special effect accessories.

For More Details Circle (103) on Reply Card

A new 44-page booklet providing complete information for the type 36A Radio Multiplex System is now available from **GTE Lenkurt Incorporated.**

Designed for light-route and spur-route radio networks, the 36A Radio Multiplex System provides up to 132 channels between 12 kHz and 552 kHz. In addition, the system provides two auxiliary service channels between 4 kHz and 12 kHz for order wire, alarm and control functions.

For More Details Circle (104) on Reply Card

Scientific-Atlanta has published an applications note describing the methods for measuring the properties of an antenna. "Basic Antenna Measurements" is a 12-page booklet discussing antenna pattern, directivity, gain, and polarization measurements.

For More Details Circle (105) on Reply Card

A 752-page manual on the theory and applications of solid-state devices, including discrete types and monolithic integrated circuits, is available from **RCA Solid State Division.**

The "RCA Solid-State Devices Manual," Technical Series SC-16, covers silicon rectifiers, bipolar power transistors (low-, medium-, and high-frequency types), MOS field-effect transistors (MOS/FET's), thyristors (SCR's and triacs), and monolithic integrated circuits (bipolar and COS/MOS types) for linear and digital applications.

For More Details Circle (106) on Reply Card

A new 72 page catalog including a 20 page OSHA Reference Section, has just been published by **Seton Name Plate Corporation.** The catalog illustrates and describes hundreds of Accident Prevention signs and tags which are offered to meet OSHA requirements. A "sign selection" guide is furnished in chart form to help the reader identify and select the proper signs and tags to meet OSHA obligations.

For More Details Circle (107) on Reply Card

A new catalog sheet from **Walther M.A. Andersen & Associates, Inc.** covers the recently introduced T27-1 Dual delay line in full detail.

The T27-1 Dual, which provides dual 1H storage in a miniature package, is designed for applications which require two 1H delays in a single, extremely small, lightweight PC board mounting package. 1H delay refers to the time for one horizontal sweep of TV video, ~ 63.5 usec.

For More Details Circle (108) on Reply Card

CVI offers a new 8-page short form catalog listing 35 unique video instruments, including slow scan equipment, video digitizers, quantizers, disc memories, and video x-y devices.

For More Details Circle (109) on Reply Card

A new 12-page product guide, "RCA Camera Tube Product Guide" CAM-703C, covering RCA's line of vidicons, silicon intensifier target tubes, image isocons, image orthicons, and focus-deflection assemblies is now available from **Electro-Optics and Devices, RCA Solid State Division.**

For More Details Circle (110) on Reply Card

A new 32-page catalog, "Assembled Instruments—#811/16" is available from **Heath/Schlumberger** detailing such products as: frequency counters, oscilloscopes, power supplies, meters, generators, and strip chart recorders.

For More Details Circle (111) on Reply Card

Comrex Corporation has available Engineering/Applications notes discussing the "whys and hows" of their 450 MHz Remote Broadcast System which was designed for use with ENG. Also in this package is a paper interpreting the FCC Rules and Regulations governing remote broadcasting.

For More Details Circle (112) on Reply Card

Shure Brothers has published "Cartridges at a Glance", a 14-page catalog of specifications of high fidelity phono cartridges, replacement styli, tone arms, preamplifiers, headphone amplifiers, and a stylus force gauge.

For More Details Circle (113) on Reply Card

A new 60-page instrumentation catalog, the 4400, is available from **Simpson Electric Co.** describing a selection of over 2,000 stock ranges, sizes and types of analog, digital and AnaLed panel meters, chart recorders, meter relays, pyrometers, controllers, digital and analog test equipment and a variety of portable instrumentation.

For More Details Circle (114) on Reply Card

A comprehensive new manual listing over a hundred incandescent lamps used in lighting TV and motion picture studios, theatres and photographic studios, has been released by **Westinghouse.**

The reference source contains photos of various lamp types and information on Watts, voltage, color temperature, filament type, hours and initial lumens.

For More Details Circle (115) on Reply Card

NEW PRODUCTS

Sideband Analyzer

Telemet has developed a sideband analyzer that features single channel plug-in crystal controlled frequency stability and crystal filtered dual conversion IF.

Called the 3706, this analyzer includes composite and noncomposite outputs, H sync and blanking internally generated, variable sweep rates (including manual control), point to point response readout on a front panel meter, seven discrete markers at the required measuring frequencies, and 1 MHz crystal comb frequency markers across the sweep width.

For More Details Circle (116) on Reply Card

Professional Bulk Tape Eraser

A new degausser to erase professional and industrial-size reels of magnetic tape as well as digital cassettes is now available from the Data Products Division of **Robins Industries Corp.**

It is a rugged unit, of heavy-duty construction, that will demagnetize reels up to 1" wide and 17" in diameter. A number of safety features protect the eraser, Model R24024, while insuring a powerful degaussing field. A forced air cooling system provides a relatively long use cycle.

Operating on 115v AC, 50-60 Hz, 18 amps, the R24024 is capable of degaussing 100 reels of ½" tape in approximately 15 to 30 minutes. One-inch reels are handled by doing one side and then flipping over the reel to repeat the erasing operation, which is simply to place the reel on the spindle, turning on the main power switch and slowly rotating the reel, at a constant rate, for three or four revolutions.

Robins' caution to customers graphically illustrates the R24024's

strength. "Any device whose operation can be adversely affected by a magnetic field should be kept at least two feet away from the unit," it says. "This includes such items as magnetic tapes or films with sound tracks, hearing aids, pacemakers, electronic watches and test instruments."

In normal use, the new Robins bulk tape eraser may be operated for 40 minutes continuously, before requiring a 10-minute cooling off period.

Safety features include automatic overheat phase, indicated by a panel light, during which the magnetic field is automatically shut off but a cooling fan continues to run, a three-conductor power cord, fuses and pilot light.

For More Details Circle (117) on Reply Card

Multi-deck Cart Machine

Broadcast Electronics, Inc. announces the introduction of a new series of SPOTMASTER multiple deck tape cartridge machines. Designated the Series 5000, these new models incorporate improved electronic and mechanical design for increased reliability, versatility, and maintenance accessibility.

Mechanically, the Series 5000 design features a fold down front panel, slide out decks, ribbon cable in place of conventional wire harnesses, and a completely removable electronic package. The automatic release decks have massive machined deck plates, direct drive hysteresis synchronous motors and large silent-operating air damped solenoids.

The Series 5000 machines are available in 3-deck and 5-deck configurations, mono or stereo, with options including record function, secondary cue tones, tertiary cue tones and remote control panels. All machines accept size A or B cartridges.

For More Details Circle (118) on Reply Card

Remotes Transmitter

Marti Electronics, long noted for their portable remote radio gear, now has a portable transmitter that weighs only 5½ pounds. It's all solid state, with a built-in nickel-cadium battery.

Called the RPT-1, this unit is capable of dual frequency operation

(crystal), and it uses a broadcast quality compressor/limiter for tough remote conditions. It includes two microphone inputs (one is push to talk) and one high level input each with individual mixing gain control.

The RPT I operates on 150 MHz.

For More Details Circle (119) on Reply Card

Downstream Chroma Keyer

Dynasciences Video Products has announced the introduction of their Model 7200, Downstream Chroma Keyer. The chroma keyer allows the user to electronically switch from one video signal to another according to the 'color' present in various parts of a keying signal.

The Model 7200 produces a chroma-keyed output from two encoded video input signals. A separate insert keyer is not required. The unit is capable of keying on any color in the NTSC spectrum. A comb filter is provided for minimum noise and 'chroma crawl' in the keyed signal. Both A and B video inputs to the model 7200 may be either composite or non-composite video. The capability of adding sync to non-composite outputs is provided. A vertical interval switch for disabling the key is also provided.

Dynasciences Chroma Keyer provides zero chroma delay of the keyed output signal.

For More Details Circle (120) on Reply Card

Console Modules

Two new console input modules, providing complete facilities for dual channel, stereo or monaural broadcast and/or production console applications are available from **Modular Audio Products**, a unit of Modular Devices, Inc., Bohemia, New York.

Known as Models STM-22 Stereo Mic Input Module and STL-22 Stereo Line Input Module, the new units feature extremely low noise, distortion and crosstalk, with excellent frequency response which meets or exceeds NAB proof of performance specifications. Both models utilize the MAP 1731A Audio Operational Amplifier as the active element, providing exceptional stability and reliability of performance.

A high quality conductive plastic slide attenuator is incorporated into each module, along with preamplification, switching and control facilities, making each module a completely self-contained operating channel. The modules simply plug-in via an 18 PIN PC connector provided with each module.

A unique feature of these modules

is independent input to output selection which allows left and right inputs to be separately routed to left, right or both bus assign switches. Signal can then be assigned to either of two output buses. This feature allows the user instant selection of Stereo, Monaural or Combined operation, individually selected at each module.

Other features include: independent left and right mic trim controls, a separate channel on/off switch with provisions for mating logic and on air light control, combined left and right cue feed through detented cue switch at bottom of fader travel and transformer coupled inputs for both mic and line level sources.

For More Details Circle (121) on Reply Card

Color For Weather Radar

New model WRT-75 weather radar television converter from **Development Labs, Inc.**, transforms weather radar output signal from monochrome to full NTSC color. The WRT-75 uses the radar receiver output signal directly and therefore eliminates the need for the radar PPI scope and pick-up camera normally used.

It colorizes the weather radar picture in up to six different colors each representing a range of rainfall rates. For example, Heavy Rainfall can be shown in red, Moderate Rainfall in Yellow and Light Rainfall in green. This eliminates the confusing "black-hole" isocontour representation of heavy rainfall. The WRT-75 uses digital video integration and processing (DVIP) to increase the accuracy of the radar's estimate of rainfall rate.

The radar picture is stored in solid-state digital memory and thus is free of the rapid fade associated with PPI radar scopes.

For More Details Circle (122) on Reply Card

Scene Lighting Machine

Joseph N. Tawil has formed **The Great American Market**, a company specializing in lighting products and accessories for the theatre, motion picture and television industries.

According to Tawil, the initial product has been dubbed "The Great American Scene Machine"—a spotlight that produces unlimited special background effects.

Consisting of an effect head body containing a 1kW quartz halogen lamp, the Great American Scene Machine is reported to give three times the light output of other, conventional effects units. Accessories include disc, film and spiral machines, and a slide carrier. Nearly 200 effect matts, discs and endless film patterns are available for the Scene Machine. Interchangeable objective lenses include 4", 6" and 8" focal lengths.

For More Details Circle (123) on Reply Card

Audio Processing

A new, complete system of audio-processing components, all constructed on compact printed-circuit modules, has been announced by **Robins-Fairchild.** All the modules in the new Robins-Fairchild Integra 3 system use the latest integrated-circuit operational amplifiers.

By interconnecting the proper modules into a complete audio system, it is possible to assemble an audio mixer for broadcast-station or recording studio use, a sound reinforcement system, a portable or theater sound system and an audio distribution, switching or monitoring system.

All Integra 3 modules are constructed on 2½ by 7½ in. epoxy-glass two ounce clad printed-circuit boards with precious metal-plated contacts. The modular cards operate from low-voltage power supplies, thereby permitting the use of more reliable components.

The various modules are available separately or they may be obtained as part of a complete factory-engineered, wired and tested custom-designed console. The cards can be used with standard readily available mounting hardware, card files and rack frames.

For More Details Circle (124) on Reply Card

Lighting Controls

Berkey Colortran is offering a 6 kW dimmer pack system with two scene preset. Actually, the dimmer pack system is available in 6, 3.6, and 2.4 kW dimmers. With three in a system, it's possible to hit from 14,000 to 36,000 watts.

The system is RFI filtered and includes magnetic circuit breakers.

The control pack has two scene preset capability, while the master pack can control 120 dimmers. Because of the modular design, the system can be used in a permanent or portable arrangement.

For More Details Circle (125) on Reply Card

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(Continued from page 20)

Chapter 26: Chicago, Illinois

Chapter 26 met on September 30 at the Standard Oil Building. Mr. Paul Roston, a regional Ikegami dealer, spoke on design criteria, capabilities, and specifications of the Ikegami H.L. 35 handy-looky color TV camera. Afterwards, Mr. Roston and an engineer from New York, fielded questions on the camera and on the concept of electronic news gathering. Host Byron Houston, supervisor of the TV services for Standard Oil, also arranged a tour of Standard Oil's facilities.

Bob Churchill (Chairman) c/o SBE, 121 W. Wacker Drive, Room 540, Chicago, Illinois 60601, (312) 729-5215.

Chapter 28: Milwaukee, Wisc.

The Milwaukee Chapter met on October 8, its first fall session, to hear Mr. Jerry Smith of RCA, Camden, New Jersey, speak on RCA's new AM stereo.

Bob Truscott (Chairman), WITI-TV, 5445 North 27th Street, Milwaukee, Wisconsin 53209, (414) 462-6666.

Chapter 32: Tucson, Arizona

Chapter 32 met on Thursday, September 25 at the University of Arizona. Ralph Baker, senior electronics engineer, spoke on the vidicon tube. Baker is an avid "ham" and has been involved in a wide range of projects. The most recent, one of TV's more flamboyant and far-reaching space specials, starred the planet Jupiter. This telecast was seen live and in color throughout the U.S. Baker devised the Pioneer's image-converter system for the Jupiter-Earth TV hookup.

H. J. "Bart" Paine (Chairman), Chief Television Engineer, University of Arizona, College of Medicine, Tucson, Arizona 85724, (602) 882-6644.

Chapter 36: San Diego, Calif.

Chapter 36 met on Wednesday, September 24, at General Convair. The guest speaker, Robert Switzer of Harris Corporation, spoke on the solid-state AM transmitter. This was an excellent opportunity for the Chapter to hear current information on new solid-state transmitter technology.

Chapter 36 also advertises to its members that it has technical information available upon request. Most recently added to the library is a series of four video engineering tapes by Tektronix. The new NTC specifications are also available.

Bill Montgomery (Chairman), SBE, 6841 Convoy Court, San Diego, California 92111, (714) 566-8080.

Chapter 37: Washington, D.C./ Alexandria, Va.

The September meeting was held at the Capitol Center in Washington. The members had a short tour of the facilities and concluded the evening with a business session. At this time they also heard a presentation on the SBE Certification program.

It appears from recent announcements by Chapter 37, that they are planning a "directory." They are in the process of putting together information on all members and friends, such as where they are employed, special interests, etc., in order to facilitate communication among all interested people.

Charles F. Riley (Chairman), Tele-Color Productions, Inc., 708 N. West Street, Alexandria, Virginia 22314, (703) 683-3203.

"WE HAD THE 'TOP FORTY' TAPE ON BACKWARDS FOR TWO DAYS AND NO ONE NOTICED!"

bookreview

Unique Op-Amp Applications by Walter G. Jung explores the uses of op-amps that have characteristics that set them apart from general-purpose or standard op-amps. These can be divided into four general categories.

There are the programmable characteristic amplifiers typified by the 4250 and 776 as covered in Chapter 2; the multichanneled digitally programmable types such as the 2400 as given in Chapter 3. Also examined are the operational transconductance amplifiers (OTAs) typified by the 3080 and 3094 of Chapter 4 and the current-differencing amplifiers (CDAs) such as the 3401 and 3900 covered in Chapter 5.

Chapter 1 introduces and discusses the various devices, and compares their operation to the standard types. It also covers general operating procedures and precautions to be observed in using the various devices.

This publication is available from Howard W. Sams & Co., Inc. of Indianapolis, Indiana.

For More Details Circle (126) on Reply Card

TTL Cookbook, by Don Lancaster, explains what transistor-transistor logic (TTL) is, how it works, and how to use it.

In the first chapter, the basics of TTL are given: what it is, how to interconnect it, how to power it and so on. Chapter 2 is a catalog of TTL devices, giving physical and electrical specifications of all the devices mentioned in the book. Logic is covered in Chapter 3, starting with the usual basics, then going to more advanced logic designs. Particular attention is given to showing how TTL yields single-package solutions to traditionally difficult problems.

Gate and timer circuits are discussed in Chapter 4. Some pratical applications are given, including controlled oscillators, two-tone alarms, digital capacitance measurement, frequency meters, digital thermometers, and others.

This completely illustrated book is available from Howard W. Sams & Co., Inc., Indianapolis, Indiana.

For More Details Circle (127) on Reply Card

Metrics For The Millions, by Rufus P. Turner, was written to explain the metric system in comparison with the U.S. system.

Prior to the switch from our present system of feet, pounds, gallons, miles, etc., a great many Americans will need to learn the metric system. The book was designed for everyone—the newcomer who needs an introduction to metrics and the old hand who wants a refresher. Both will find it a valuable reference to the metric system.

This book is available through Howard W. Sams & Co., Inc., Indianapolis, Indiana.

For More Details Circle (128) on Reply Card

New Products

(Continued from page 71)

Solid State Teleprinter

The Extel® Series AF Receiver-Only teleprinter, offering electronic reliability and simplicity, is now available for leasing from the **RCA Service Company**, a division of **RCA**. The unit is an extremely quiet, mechanically simple, solid state printer that is fully compatible with all standard teleprinter signals and equipment.

The Extel offers five-level Baudot coding (two-speed switchable—75 or 100 wpm) and optional eight-level ASCII coding (two-speed switchable—100 or 150 wpm). The teleprinter needs no ribbon because it prints on pressure-sensitive paper that can make up to three copies. An optional ribbon printer is also available.

Some 80% of the teleprinter's functions are performed electronically. Printing is done by means of a 5 X 7 dot matrix. The unit has various system applications, including applications with data sets, telephone couplers and multiplexing equipment.

For More Details Circle (129) on Reply Card

Parametric Equalizers

Orban/Parasound announces the availability of the new models 621A/621B Parametric Equalizers. The models 621A/621B offer four cascaded equalization sections, each with non-interacting, continuously adjustable center frequency, bandwidth, and amount of boost or cut controls. Each section provides up to 16 dB peak and can dip to minus infinity, permitting use as a notch filter to eliminate hum and other fixed-frequency interference.

Each section tunes over a 20:1 frequency range, with broadly overlapping coverage for maximum flexibility. Bandwidth is continuously adjustable from approximately ¼ octave to 3 octaves.

An overload light is provided which monitors each section and indicates the presence of peak clipping in any part of the equalizer. The light is driven by a peak-stretching circuit so that very short overloads will light the lamp long enough to be easily seen. Overloads can be instantly corrected with the integral gain control. Up to 12 dB gain is available so that the equalizer can be used at either line or intermediate-level patch points.

Typical 1 kHz harmonic distortion is 0.06% at +20 dBm out, and un-

Studio Color Monitor

Unimedia announces a feature loaded studio color monitor.

The new SMT-12 includes Full-View Tally Identification, A-B Electronic Video Selection, Internal-External Sync Selector Switch, Keyed Back Porch Clamp with Full DC Restoration and Variable Aperture Control. A new set up switch allows the user to set color threshold and grey scale tracking.

The SMT-12 now features front panel doors for concealing secondary controls which include RGB background adjustments and variable aperture control on the right side. The left panel conceals horizontal, vertical adjustments and the new set-up switch. Options such as pulse cross and underscan are accessible from behind the left side.

The SMT-12 has a new look about it with satin pewter anodized front panels and new extrusions mounted on the sides of the cabinet. Now available as an option with the new SMT-12 are Rack slides for ease in removing the unit from the rack.

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weighted noise in a 26 kHz noise bandwidth is typically -80 dBm with equalizer controls flat. Slew rate exceeds 2.5 v/microsecond.

For More Details Circle (130) on Reply Card

Monitor Woofers

Cetec Audio, a division of Cetec Corporation, announces the new Gauss Models 2831 and 5831 12" and 15" low frequency loudspeakers. Designed specifically for studio monitoring applications, they may also be used for home hi-fi applications where high power handling and smooth low frequency response is a must.

The Models 2831 and 5831 incorporate the features of other Gauss loudspeakers, such as dual spider system, rigid 8-spoke frame and 18½ pound magnet assembly using Alnico V as the magnet material. Specifications for Model 2831 include rated power capacity of 150 watts (continuous sine wave power), 8 ohms nominal impedance, 43dB sensitivity and free air resonance of 19Hz.

The Model 5831 has rated power capacity of 200 watts RMS, 8 ohms nominal impedance, 49dB sensitivity and free air resonance of 32Hz.

For More Details Circle (131) on Reply Card

PEOPLE IN THE NEWS

William J. Overhauser has stepped down as chief executive of the Sparta Division of Cetec Corporation. Bill started the company over 15 years ago. He'll be replaced by **Jack Lawson** under the title of acting General Manager....**James Glynn** has been appointed Engineering Manager of antenna systems for Cablewave's new microwave antenna line....**Peter T. Coe** takes over as President of Berkey Colortran. Coe has been a Berkey group vice president....

Richard C. Belmont moves up to Sales Manager at Modular Audio Products, a unit of Modular Devices....**Daniel R. Ohlbaum** has been appointed to the FCC's Review Board. He succeeds **Donald Berkemeyer** who has retired. **Werner K. Hartenberger** will replace Ohlbaum as Deputy General Counsel....

Raymond B. Combs is named to the newly created position of Vice President, Operations for United Recording Electronics Industries (UREI)....**Arch Madsen,** President of Bonneville Communications Corporation, and President of the Association of Maximum Service Telecasters, announces appointment of **Robert W. Flanders** and **James E. Bloyd** as members of the Association's Engineering Committee....

James M. Richardson, formerly with TeleMation, has been named executive Vice President by SystaMatics....**Arie H. Landrum** moves to National Sales Manager and **Richard Reilly** to Western Regional Manager at IVC....

James C. McCaffery joins KLIF as General Sales Manager. McCaffery was previously with WIP, WASH-FM, and WROR....**Bill MacPhail,** former Vice President of Sports at CBS TV network, joins the Robert Wold Company as VP and New York Manager. He will spearhead the company's expansion in program services commereial and cable TV....**J. A. Leonard** has been promoted to Operations Manager by the Fernseh Group of the Robert Bosch Corporation, according to **Anthony R. Pignoni,** General Manager.

Joining the Video Systems Division of Peirce-Phelps, Inc. as their Government Marketing Specialist is **Don Schmitt**....**Rufus "Ruf" Baldwin** has become Western Regional Sales Manager for Cablewave Systems, being responsible for all antenna and transmission line sales throughout the western USA, western Canada, and Alaska.

John B. Summers and **Donald P. Zeifang** have been named executive vice presidents for Legal Affairs and Governemnt Relations, respectively, of the NAB. Also at the NAB is the retirement of **Everett E. Revercomb,** Secretary-Treasurer.

From Cetec Corporation comes the appointment of **Wesley M. (Mort) Fujii** as Vice-President and General Manager of its Cetec Audio Division....Also from Cetec is word of the appointment of **Jules L. Sack** as

Director of Marketing and Sales....**Terry S. McGhee** has joined the Electronic Systems Group of GTE Sylvania Inc. as Security Systems Product Marketing Manager....**Don Nelson** has become part of the sales staff of Anixter-Pruzan's Northeast District.

Robert Russin, American sculptor, has been commissioned to do a plaque for the Grover C. Cobb Memorial Award to be presented by the Television and Radio Political Education Committee for the first time next spring for Industry Government Relations. The award will be made annually to a broadcaster or public personality who is involved in government relations activity on behalf of the broadcasting industry and the people it serves. It was established as a memorial to Grover C. Cobb, Senior Executive Vice President and former Board Chairman of the NAB who died March 7, 1975.

Jack W. King has become Chief Engineer of KGNS-TV, Laredo, Texas....**Arthur A. Silver** has been appointed Broadcast Sales manager for Collins Radio Group of Rockwell International Corporation. He will serve Collins' Northeast District....**Aaron Shelton** has become a director of International Nuclear Corporation, Nashville. Shelton had served for 45 years as Chief Technical Administrator of WSM Radio and Television until his retirement in June, 1975.

Gerow D. Brill has been appointed product manager for the Broadcast Equipment Division of Philips Audio Video Systems Corporation....From Conrac Corporation comes news of the appointment of **David A. Richmond** as operations manager of the Conrac Division of that company, being responsible for all production operations, including manufacturing, production control, industrial engineering and maintenance, and purchasing at the division's plant in Covina, Ca.

Walter A. Shubin has been named as Western Regional Sales Manager for CMX Systems, Sunnyvale, Ca....**Joseph Ewansky** has joined Fernseh Group of Robert Bosch Corporation as Regional Sales Manager for the Northeast Region....Also from Fernseh is the appointment of **Robert N. Blair** as Product Manager....**James P. Rodgers** has been named Videotape Recorder Product Manager specializing in 1-inch products for International Video Corporation.

Roberto Brauning has joined the production staff of the Catholic Television Network of Chicago (CTN/C) where he will create and produce three weekly Spanish-language programs as well as produce a variety of English-language programs for the Network.

The Armstrong Medal, highest honor of the Radio Club of America, has been awarded to **Dr. Henri G. Busignies,** chief scientist emeritus of ITT, for his outstanding contributions over many years to the arts of telecommunications, radar and avionics....**Roger W. Slinkman** has become Vice President and General Manager of the Electronic Tube Division of GTE Sylvania..

Attention, Please.... The Sky Is Falling!

Radio Station WFBL bounced into the news when John Leslie, its afternoon personality, dropped 2,000 ping pong balls from a hot air balloon at an altitude of 1,000 feet!

It was probably the first broadcast from a hot air balloon and drew an audience of thousands of neck-craning fans in a local shopping center.

One thousand of the ping pong balls were redeemable for prizes contributed by local merchants.

Joe Bell, station manager, noted that WFBL's new superradio format has brought about an unprecedented response from listeners and advertisers. He pointed out that a local theater used one on-the-air announcement about a special midnight show and drew 12,000 ticket buyers.

Bell said that Leslie recently called a restaurant in Rome, Italy, and ordered a pizza to be sent air freight. When receipt of the pie was announced, the station was swamped with calls from people who wanted to buy it. Management raffled it off slice-by-slice and gave the proceeds to a local charity.

EBS System

In response to the new FCC regulations for Emergency Broadcasting, to be required starting April 15, 1976, **Time & Frequency Technology, Inc.** has developed an all new EBS broadcast system and has been Type Accepted and Certified by the FCC.

The TFT Model 760 system consists of independent modules: a two-tone EBS generator, a two-tone EBS decoder and a receiver which can be either AM frequency synthesized or FM fixed-tuned. These modules are available as a total EBS system packaged or may be purchased separately, depending on individual requirements.

The TFT two-tone generator produces the required 853 and 960 Hz tones simultaneously with an accuracy of ±0.25 Hz. Two types of decoders are available. One is for the new two-tone signaling only, another is a dual-purpose decoder that decodes the 1000 Hz signaling scheme presently in use as well as the future two-tone signal. Both decoders may be used with the TFT AM receiver of FM receiver or any audio source having the EBS signal at 200 MV RMS or greater.

TFT also offers a choice of two receivers. The AM receiver is a continuously turnable broadcast receiver that uses a frequency synthesized local oscillator, phase locked to a 5 MHz crystal oscillator. A three digit thumbwheel is used to tune the local oscillator in 10 kHz steps. This feature allows the station to tune to the alternate EBS stations in the event the prime EBS station is off the air. A carrier drop out alarm light and circuitry to operate external alarm are provided.

For More Details Circle (133) on Reply Card

Dual Beam Oscilloscope

The **Tektronix** 5444 True Dual-Bean Oscilloscope is a new member of the 5000-Series Oscilloscope line. The 5444's two gun structures—two electron sources, two vertical deflection systems, and two horizontal deflection systems—provide completely independent operation and full beam overlap. Full beam overlap is the ability to position each beam anywhere over the entire 8-division crt area. The 5444, with the 5B44 Dual Time Base (a plug-in with two independent time bases) and two appropriate amplifiers, is virtually two oscilloscopes in one.

With these design features, the 5444 will display one signal at two sweep speeds or two signals at the same or different sweep speeds. These signals may be positioned anywhere on the crt face. This capability allows you to compare any two traces easily and accurately, even those from fast, single-shot events. If you need to compare more than two signals, the 5444 can display up to four repetitive waveforms at 60 MHz in the alternate or chop mode (or up to 8 at reduced bandwidth), and four multiple-trace, single-shot events at sweep speeds up to 100 μ s/div in the chop mode.

The 5444's large crt has a bright display and an illuminated internal graticule. The crt readout automatically documents the sweep speed and vertical deflection factor for each beam. A user addressable readout option allows the user to program photograph number, device under test, and other pertinent information (up to two 10-character words) on the crt screen. The TEKTRONIX C-27 Option 1 Camera with 10,000 speed film and the Writing Speed Enhancer (WSEN) or P-11 phosphor option make it possible to photograph the display to the full bandwidth of the system.

The 5444 True Dual-Beam, a modular system capable of bandwidths up to 60 MHz, uses three plug-ins from the TEKTRONIX 5000-Series plug-in family. The 5B44 Dual Time Base, which has two independent time bases and a maximum sweep speed of 5 ns/div, is a recommended part of the system. Thirteen amplifiers—including high-gain differential, dual-trace, and multitrace plug-ins—are also available. The 5444 weighs about 26 lbs, uses less than 100 Watts with typical plug-ins, and stands 5¼ in. high when rackmounted.

For More Details Circle (134) on Reply Card

New U-Matic Machines

Sony Corporation of America demonstrated, for the first time, two new types of its ¾-inch U-Matic videocassette recorders and players at the opening of Video Expo '75 at Madison Square Garden.

The new units, called Type II and Type III, bring new dimensions to the already successful U-Matic format, and will provide current and future users of this system greater flexibility.

The Type II line consists of: The VP-2000 player; the VO-2800, editing recorder; and the VO-2600 recorder player. These units embody new features such as feather touch push button controls, freeze frame, remote control capability, a tape protection system and a dew or moisture detection control. These units also continue the use of tape transport design begun with the Sony VO-2850 master editor-recorder. The Type II units have a signal-to-noise ratio of better than 45 dB.

The Type III unit, or VP-3000, called the Video Traveler, is the first portable U-Matic player. Lightweight and compact, it allows videocassette communication to be taken to the audience. The Type III continued the design features first shown in the VO-3800, and also uses the KCS 20 minute cassette.

For More Details Circle (135) on Reply Card

Modular Audio-Console

The new **Spotmaster** 4006 SLIDE-MOD is a totally modular console for the broadcaster.

It accepts up to ten input and two remote modules (a total of 26 inputs). Each input module accommodates two high or low level (switchable) sources. In stereo modules, left and right channels of each input are individually level selectable. All inputs are balanced and specially RFI protected.

Each module is completely enclosed and shielded. In addition, the low-noise FET input stage is shielded and sealed within the input transformer for quiet operation. Each module also contains its own voltage regulator to eliminate crosstalk and externally generated noise. All "live" switching is performed by fast, low-noise reed relays for quiet, and distortion-free operation. The mix-buss output of each module is balanced to eliminate the possibility of unwanted noise pick-up, crosstalk, or ground loops.

The Slide-Mod consoles have four muting control relays. A miniature switch matrix and logic in each input module allows any relay to be programmed to function when any combination of inputs and mix-busses are activated (16 combinations for each input module!). Monitor outputs and relay contacts are brought out for each relay.

The remote modules accept three high-level inputs each (two stereo and one mono in stereo versions). The remote source selected may either be fed to the "A" input of the adjacent input module for mixing; or it may be connected to the Intercom system for full two-way communication; or the output of the monitor amplifier may be sent down the line for timing and cuing. The line remains balanced and isolated at all times.

For More Details Circle (136) on Reply Card

Broadcast Automation

Schafer Electronics Corporation has announced an all new broadcast automation system. Called the 903E, the control unit contains a three-day 8000 event memory capable of programming any radio station for three days in advance.

A Schafer spokesman said that the 903E uses many of the same concepts

as the Company's successful 903, but that the 903E has four times the memory capability. The 903E also has, as standard equipment, complete manual/remote control that allows manual control of the system for programming or one-time bulletin insertions, two alarm systems and a built-in shelf for the keyboard/entry unit. The 903E is available in standard racks, or in Schafer's new designer series cabinetry.

For More Details Circle (137) on Reply Card

Precision Oscillator

A new precision oscillator designed for performance testing of high quality audio equipment which accept input levels from -80dBm to +18dBm is available from **Modular Audio Products**, a unit of Modular Devices, Inc., Bohemia, New York.

Known as Model 3600, the new unit, with low distortion (typically .02%) tests microphone preamplifiers, line amplifiers, power amplifiers and complete audio systems.

For More Details Circle (138) on Reply Card

Toll-Free Hot Line Service

Communications Medias, broadcast component distributors, has introduced a new toll free "hot line" service to facilitate ordering new and used equipment and making lease financing arrangements. The toll-free number (1-800-523-9380) operates 9 a.m.-5:30 p.m. (Eastern Time Zone) Monday through Friday. The firm distributes for Spotmaster, Fidelipac, Roh, Russco, Electro-Voice, Otari, Ramko, Scotch, Stanton, Nortronics, Shure, Telex, Sennheiser, Magnecord and Viking.

NAFMB Changes Cause Stir In Industry

As most **Broadcast Engineering** readers already know, the National Association of FM Broadcasters (NAFMB) has changed its name. And it is changing its structure...somewhat. Since the announcement that the Association would change its name to the National Radio Broadcasters Association and include AM broadcasters in its membership, there have been rumors afloat that the NRBA would distract from the efforts of the NAB, weakening the position of commercial broadcasting.

The NAB is, and probably will remain, the industry standard bearer. It is true that a number of organizations have established professional associations so their unique needs would receive prime time attention. Both the NAFMB and the Society of Broadcast Engineers (SBE) have been growing in stature and numbers.

What probably stirred more attention and brought more interest to these two associations was that they attracted exhibitors to their annual meetings (NAFMB) and to regional meetings (SBE).

In an effort to squelch rumors as to the supposed and/or intended negative effects, Robert G. Herpe, Chairman of the Board of the NRBA has issued the

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NAFMB Changes Cause Stir In Industry

(Continued from page 81)

following statement:

"Following the recent Board meeting of the National Association of FM Broadcasters in Atlanta, Georgia, at which time we announced that our organization had changed it's name to the National Radio Broadcasters Association and would amend its By-Laws to accept membership from AM radio operators as well as FM, numerous comments—both pro and con—have been expressed by broadcasters and the trade press. Some of these comments seem to indicate confusion as to what effect the National Radio Broadcasters Association might have on other broadcast organizations, as well as the industry in general.

"Will the NRBA cause the weakening of efforts at the governmental level? Will it be just another faction running at ends with, or duplicating the work of others? Is it the start of another bureaucracy for the edification of a few? I believe these to be honest questions which deserve to be answered now, lest prolonged misunderstanding be at the expense of this most vital industry of which we are all a part.

"Let me state that the goals and concerns of the NRBA are only to promote a stronger and more effective radio industry. Our action in Atlanta was in no way meant to be divisive, nor will such future

decisions give cause to work against what is best for radio. The NRBA looks to be a catalyst towards a reformation of a stronger and more meaningful **total** broadcast force that can better serve the radio broadcaster. We seek to cooperate with the NAB, or any other organization, in any and all efforts that may be beneficial to radio.

"We intend to maintain the flexibility to act quickly on problems that in the past have all too often been strangled in bureaucratic red tape. If along the way a more "radio active" NAB can be nurtured, we will certainly not be opposed. But, should there be no action, the NRBA will see that the radio broadcaster is heard loud and clear.

"We are not unaware that there will remain some areas where all broadcasters (TV as well as radio) must pull together. To be effective in such circumstances, some common structure or cooperative organization must be maintained. Indeed, the NRBA looks only to improve the system, not to destroy it. But, above all, **radio will be heard.**

"We, as professional communicators, have all too often failed to communicate with those who count. Only through greater public and governmental understanding of radio's position in society can our industry continue to move forward for the betterment of all concerned. To these ends the NRBA dedicates its efforts and welcomes all who would work toward their accomplishment."

Building A PPL Tone-burst Decoder

By Chris Downing

The four major networks employ a tone-burst transmission to alert their affiliates to news bulletins. A tone-burst is transmitted prior to the bulletin itself or an advisory on the bulletin, and decoders sense the tone and activate the alarm device.

Customarily, the decoder consists of an **RC** or **LC** filter preceding an AC-coupled amplifier. The output of the AC amplifier is rectified and filtered to drive a DC amplifier and relay. This approach requires precision components in the filter, since most filter configurations providing the necessary narrow bandwidth are not readily adjustable. Reliability of the decoder is dependent upon a narrow filter bandwidth to prevent triggering on program material, and inefficiencies in some passive filters necessitate a high input level.

A better approach is to use a phase-locked loop as a decoder. The PLL is inherently stable, requires a minimum input level for reliable operation and will not trigger on anything other than the tone it is set for. The circuit in Figure 1 provides reliable operation over a frequency range of 2000 to 20,000 Hz.

A bridging input of -20 dB or greater is coupled to the PLL

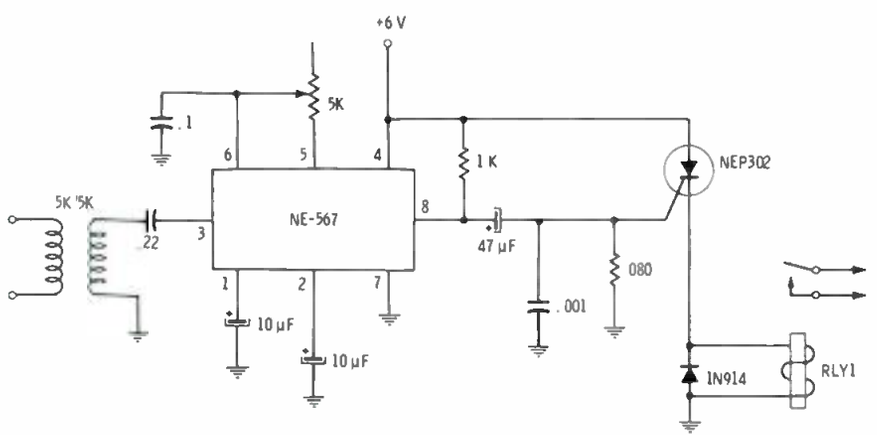

Figure 1.

through a .22 mfd. capacitor. The two electrolytics connected to pins 1 and 2 of the NE-567 provide output filtering and determine decoder bandwidth, respectively. The .1 uf. capacitor and 5k pot comprise the "tuned circuit", with the pot controlling a current-controlled internal reference oscillator. Pin 4 is the V+ supply point for the IC, and pin 8 is a current sink, **i.e.** is switched to ground when the input frequency is within decoder bandwidth.

In operation, the 47 uf. capacitor initially charges to V+ through the 1k and 680 Ohm resistors. When a tone of the proper frequency appears at pin 3, pin 8 is switched to ground potential, discharging the 47 uf. capacitor through the 680 Ohm resistor. The pulse generated is of wrong polarity to fire the SCR, but when the tone is no longer present at pin 3, pin 8 is lifted from ground and the 47 uf. capacitor charges through the 1k and 680 Ohm resistors. The pulse generated by charging current fires the SCR and pulls in RLY 1.

A 5k ten-turn pot will make adjustment easier, but even a single-turn PC-type pot presents no real problem in adjusting the decoder to whatever frequency your network uses for bulletin alerts.

One note of caution: levels in excess of +20 dB will render the decoder inoperative as the input signal then overrides the internal reference.

When activated, the circuit draws about 15 ma plus relay current, making piggy-backing possible. Make sure that the supply is fairly well regulated (a dropping resistor is not advised) or changes in V+ will change the internal reference frequency.

Audio Tape Cart Timing

In case you're interested in building the timer covered in the May issue of Broadcast Engineering, the author has furnished the parts list you'll need:

C1, 2, 5—25 MF/50V.
C3, 4, 6, 7—25 MF/10V.
D1, 2—1N4730A Zener (equiv.)
J1—Amphenol #143-012-01 p.c. socket
J2—Amphenol #77-MIP-12 chassis socket (Mating plug: Amphenol #86-PM12-11)
Q1—2N3904 (equiv.)
R1, 11—1800 ohm
R2, 6, 9, 12, 15—3900 ohm
R3, 14—470 ohm
R4, 7, 8, 13, 16—620 ohm
R5, 10—1500 ohm (all Rs ¼W., 10%)
U1—SN7400

Also, please note that there are changes needed in the schematic. Polarity of C5 in Figure 1 schematic was shown reversed. In Figure 5, cable connections ES400-JR should read ES400-J2. Further questions should be directed to Don McGuire, Independence Mall East, Philadelphia, Pa. 19106. Don has the PC cards available for sale at $10 each.

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MANAGER/CHIEF ENGINEER. Strong management background. Communication station design and construction. AM-DA, stereo FM, automation, limited TV. HF transmitters to 200KW, LF VLF transmitters to 2 million watts, UHF, microwave, data transmission, FCC Rules, proofs, renewals. Currently chief 100 KW FM stereo and owner small electronics firm. Looking for real challenge in interesting location. Write: Dept. 339, Broadcast Engineering, 1014 Wyandotte St., Kansas City, Mo. 64105. 10-75-2t

HELP WANTED

ELECTRONIC MAINTENANCE TECHNICIAN/ENGINEER, with executive potential, for Computer Animation system and supporting hardware. Should also have a good familiarity with basic broadcast video equipment. New York City location. Call J. Mitwell, (212) 628-5987, 10-12 a.m. 10-75-3t

HELP WANTED (CONT.)

CATV MANAGER AND CHIEF TECHNICIAN WANTED—Prefer dual-skill individual, but will consider applications for either position. Preferably available Spring 1976 to monitor construction of County-Wide Bi-Directional CATV System in Western Wisconsin. Send resume and salary requirements to: WWCC CABLE, c/o Ralph Evans, 3500 N. Sherman Blvd., Milwaukee, Wisconsin 53216. 10-75-2t

MOVE UP from your present job in broadcast engineering. We handle all engineering jobs and openings coast to coast. Send full resume confidentially now. The AMPS Agency, 6331 Hollywood Blvd., Suite 623, Los Angeles, Calif. 90028. Tel: (213) 462-7301. 8-73-tf

TV MAINTENANCE TECHNICIAN— A major eastern market quality conscious TV operation is looking for that unique, logic minded technician to fill a vacancy in our maintenance department. This well-paid, challenging position is a rare opportunity to work in a self-fulfilling job, in a people oriented atmosphere. An equal opportunity employer. Write Dept. 342, Broadcast Engineering, 1014 Wyandotte St., Kansas City, Mo. 64105. 11-75-2t

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NEW PATENTED master antenna system used throughout U.S. needs local supervision of installations one day per week. I made over $200.00 per day last year in supervision fees. Only top broadcast troubleshooters need apply. Send complete resume to Melvin Cohen, 1620 N. Federal Highway, Boynton Beach, Fla. 33435. 11-75-2t

MEDIUM MARKET AM DAYTIMER SEEKS CHIEF ENGINEER RESPONSIBILITIES INCLUDE REMOTE TRANSMITTER TWO AIR STUDIOS MOBILE REMOTE BROADCAST STUDIO MICROWAVE. STL EXPERIENCE PREFERRED, SEND RESUME REFERENCES TO DEPT 344, BROADCAST ENGINEERING, 1014 WYANDOTTE STREET, KANSAS CITY, MO 64105. 11-75-2t

CHIEF ENGINEER with experience in installation, maintenance and operation of broadcast studio equipment, AM transmitters, directional antenna phasing equipment, FM transmitters (stereo), microwave relays, remote control and telemetering and monitoring equipment. Must be capable of thorough and accurate work in planning and installation. Must have a thorough technical background. Must have a thorough knowledge of FCC rules and regulations and be detail oriented to the extent of preparing engineering schedules and in preparing FCC forms. Non-Union position supervising seven (7) full-time engineers. Steelers and Pitt football networks set-up invloved. List training, experience, and business and professional references in application. Send replies to Ted J. Atkins, Vice President and Station Manager, WTAE AM & FM, 400 Ardmore Boulevard, Pittsburgh, Penn. 15230. An Equal Opportunity Employer. M/F. 11-75-1t

WANTED

WANTED: Used or surplus repairable b-w and/or color television studio equipment. State Vocational-Technical School training technicians and building small itv studio. Low budget. Donations tax deductible. Write or call: Ralph Easley, State Area Vocational-Technical School, Rt. 2, Box 230, Dickson, Tenn. 37055, (615) 446-4710. 11-75-1t

WANTED: Wired Remote Control System. WMCF, Stuart, Florida. Call 305-465-1413. 11-75-1t

6181 TUBES, Used. RCA MI-40790 Headwheels, RCA PK-730 Color Camera. Box 609, Altoona, PA 16603. (814) 943-2607. 10-75-2t

WANTED: PRE 1926 RADIOS AND TUBES, ESPECIALLY IN NEW CONDITION. STATE MAKE, MODEL, CONDITION AND PRICE WANTED. AUGUST J. LINK, SURCOM ASSOCIATES, 1147 VENICE BLVD., LOS ANGELES, CALIFORNIA 90015. 8-75-tf

WANTED (CONT.)

WANTED: All surplus broadcast equipment especially clean A.M. & F.M. transmitters, contactors, capacitors. Surpluss Equipment Sales. Clark & Potomac Phase monitors. 2 Thorncliffe Pk. Dr., Unit 28, Toronto 17, Ont., Canada. 1-73-tf

PRODUCTS WANTED: NY based national TV marketing specialist looking for products. We offer marketing and technical expertise. Smith-Beemish, Inc., P.O. Box 591, Farmingdale, N.Y. 11735 (516) 420-0986. 9-75-3t

WANTED: Education Public Broadcast Station needs surplus broadcast equipment, 1 or 1.5 kw FM transmitter, and studio equipment. Tax exempt status. Contact Boulder Community Broadcast Association, 885 Arapahoe, Boulder, Colorado 80302. 6-75-6t

NON-COMMERCIAL EDUCATIONAL FM Station desires donations of studio and technical equipment of all types. All donations are tax-deductible. Contact Paul Copeland, Northwest Junior College, Box GG, Senatobia, Miss. 38668. 10-75-2t

WANTED: 14" Aluminum Tape Reels. MultiMedia Associates, 3290 E. 48th Street, Indianapolis, IN 46205. 10-75-2t

RCA B&W TV CAMERA. TK-10, 11, 30 or 31. Electronics should be reasonably intact, need not be working. Kenneth Tusar, 201 Evergreen 5-1C, Vestal, New York 13850. 607-797-3941. 10-75-3t

SERVICES

FREQUENCY MEASURING SERVICE—WE'RE #2—MONITOR REPAIRS—MOBILE UNIT—covers Northern ⅔ Ill., Eastern Iowa, Eastern Minn., Southern ⅔ Wis., Western Mich., and Western Ind., monthly. Radio Aids, 528 Ravine Ave., Lake Bluff, Illinois 60044, (312) 234-0953. 2-74-tf

BROADCAST CRYSTALS for AM, FM or TV transmitters. Frequency change, repair or replacement of oven types; also new vacuum types. Quality products, reasonable prices and better delivery! Don't be without a spare crystal. Repair of G.R. 1931-A/B modulation monitors and frequency change of AM and FM frequency monitors. Over 30 years in the business. Eidson Electronic Co., Box 96, Temple, Texas 76501. Phone (817) 773-3901. 12-74-tf

COMMERCIAL RADIO MONITORING CO. Precision frequency measurements since 1932. Local and mobile service covering entire midwest plus. Test instruments, counters, monitors repaired and certified. Lee's Summit, Mo. 64063. (816) 524-3777. 9-74-tf

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ONE STOP FOR ALL YOUR PROFESSIONAL AUDIO REQUIREMENTS. Bottom line oriented. F.T.C. Brewer Company, P.O. Box 8057, Pensacola, Florida 32505. 7-71-tf

HELIAX-STYROFLEX. Large stock—bargain prices—tested and certified. Write for price and stock lists. Sierra Western Electric. Box 23872, Oakland, Calif. 94623. Telephone (415) 832-3527. 1-73-tf

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SERVICES (CONT.)

CAMERA TUBES...ALL TYPES EXCEPT ORTHICONS CAN NOW BE RECONDITIONED AT AN UNBELIEVABLE PRICE, LEAD OXIDE TYPES $300.00, VIDICONS FROM $35 TO $200.00. ALL RECONDITIONED TUBES COME WITH 500 HOUR WARRANTY. FOR DETAILS WRITE: RODONCO ENGINEERING, CAMERA TUBE DIV., 4020 STAPLETON DR., BLOOMINGTON, IND. 47401. 8-75-tf

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FOR SALE

RCA TK-27 Color Film Chain Island includes TK-27 Camera, TP-7 Slide Projector, TP-55 Multiplexer, (2) Eastman 250 updated Projectors, all excellent condition, complete for $36,000.00, available immediately. 205-591-4800.

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FOR SALE: Collins 900 C-1 FM Stereo Modulation Monitor. $400. Not modified for use as official monitor. Good condition. WMCF, Stuart, Florida 33494. 11-75-1t

EQUIPMENT FOR SALE

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BROADCAST CRYSTALS for AM, FM or TV transmitters. frequency change, repair or replacement of oven types. Also new vacuum types for RCA, Gates, Collins, etc. transmitters. Quality products, reasonable prices and better delivery! Don't be without a spare crystal. Frequency change and service for AM and FM frequency monitors. Over 30 years in the business. Eidson Electronic Co., Box 96, Temple, Texas, 76501. Phone (817) 773-3901. 12-74-tf

10-IVC MODEL 800-VTR'S Record-Playback, Color, 1 year old. Dave Castellano, 415-221-7975. 640 Parkway S., San Francisco, Calif. 94080. 10-75-2t

VIDEO TAPE: Scotch type 399. Ten Dollars per half hour, Twenty Dollars per hour. Scotch 3M Type 400 cleaned and evaluated by a Recortec, very good condition, 35 Dollars per half hour roll. Short ends type 400, One dollar per minute. All tape shipped in plastic shipper. Terms COD Plus shipping charges. QUAD TAPE SALES, P.O. Box 23534, Washington, D.C. 20024. Phone (703) 569-9212. 10-75-2t

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AMPEX MM-1000 eight track 1 inch tape machine, with sync and tape lock accessories, one alignment tape and 5 reels of 3M mastering tape. Approximately 30 hours use. Write: Dept. 341, Broadcast Engineering, 1014 Wyandotte, K.C., Mo. 64105. 10-75-3t

A FEW COMPETITIVELY PRICED used Revox A77 decks available. Completely reconditioned by Revox, virtually indistinguishable from new and have the standard Revox 90 day warranty for rebuilt machines. Satisfaction guaranteed. Example, A77 with Dolby, $675, plus shipping. Write requirements to ESSI, Box 854, Hicksville, N.Y. 11802 (516) 921-2620. 10-75-6t

STODDART RADIO interference-field intensity meters. Stoddart NM-22A, 150KHZ-32MHZ. Complete - $2,195, less antennas - $1,595. Stoddart NM-30A, 20-400MHZ. Complete - $1,295. Stoddart NM-52A, 375-1000MHZ. Complete - $1,495, less antennas - $1,095. All are in excellent condition and calibrated prior to shipment. Surcom Associates, (213) 382-6985. 6-75-tf

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1-72-tf

FM TRANSMITTERS: Collins 732 1 KW, $1300.00; CCA FM-1000D 1 KW, $2000.00; BTF-3B 3 KW, $1200.00; Collins 737 5 KW, $1600.00; RCA BTF-5B 5 KW, $3600.00; RCA BTF-10D 10 KW, $6000.00; Westinghouse FM-10 10 KW, $1900.00; Collins FM Amp. 3 KW, $400.00. COMMUNICATION SYSTEMS, INC., Drawer C, Cape Girardeau, Missouri 63701. (314) 334-6097. 11-75-1t

TRANSMISSION LINE, used, RCA MI-19113 steatite, 51½ ohm, 3-1/8 inch, 1600 feet available. KDAL-TV, Duluth, Minn., Rudy Luukinen, 218-727-8911. 11-75-1t

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NORELCO PC-70 COLOR CAMARA S/N 462, 3400 HOURS, IN EXCELLENT CONDITION. VINTON MARK II PAN HEAD, 100 FEET OF CAMERA CABLE AND CAMERA CONTROL UNIT WITH CONTOURS OUT OF GREEN, SUPER FET FRONT END AND ANGENIEUX 20x18JI FULL SERVO ZOOM LENS WITH SHOT BOX, CLOSE-UP ATTACHMENT AND PORTRAIT LENS. ALSO INCLUDED ARE CARRYING CASES FOR CAMERA HEAD AND LENS AS WELL AS A SPARE SET OF INTEGRAL MESH PLUMBICONS IN GOOD CONDITION. $28,000 OR BEST OFFER. UNIVERSITY OF CALIFORNIA MEDICAL CENTER, TELEVISION DEPARTMENT, 431-N, SAN FRANCISCO, CALIF. 94143. (415) 666-1958. 11-75-1t

SPOTMASTER EQUIPMENT AND PARTS now in Texas from Sales Southwest, 4002 Houston Highway, Victoria, Texas 77901. 512-578-4323. 11-75-tf

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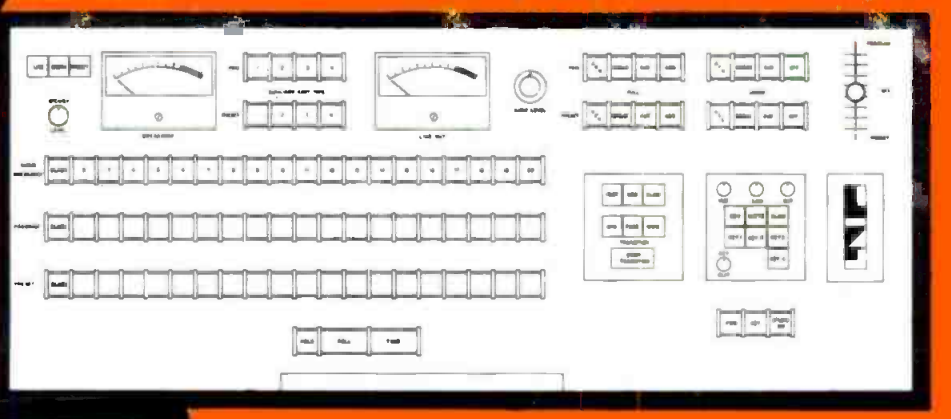

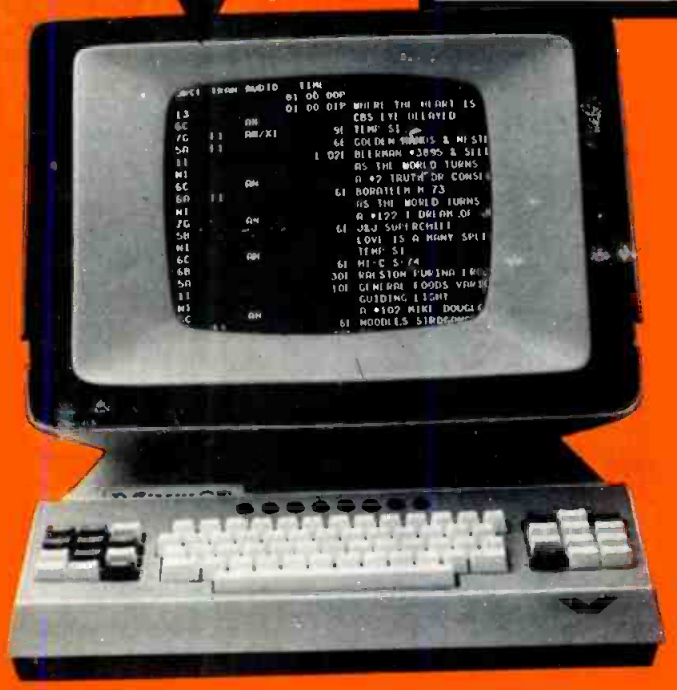

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