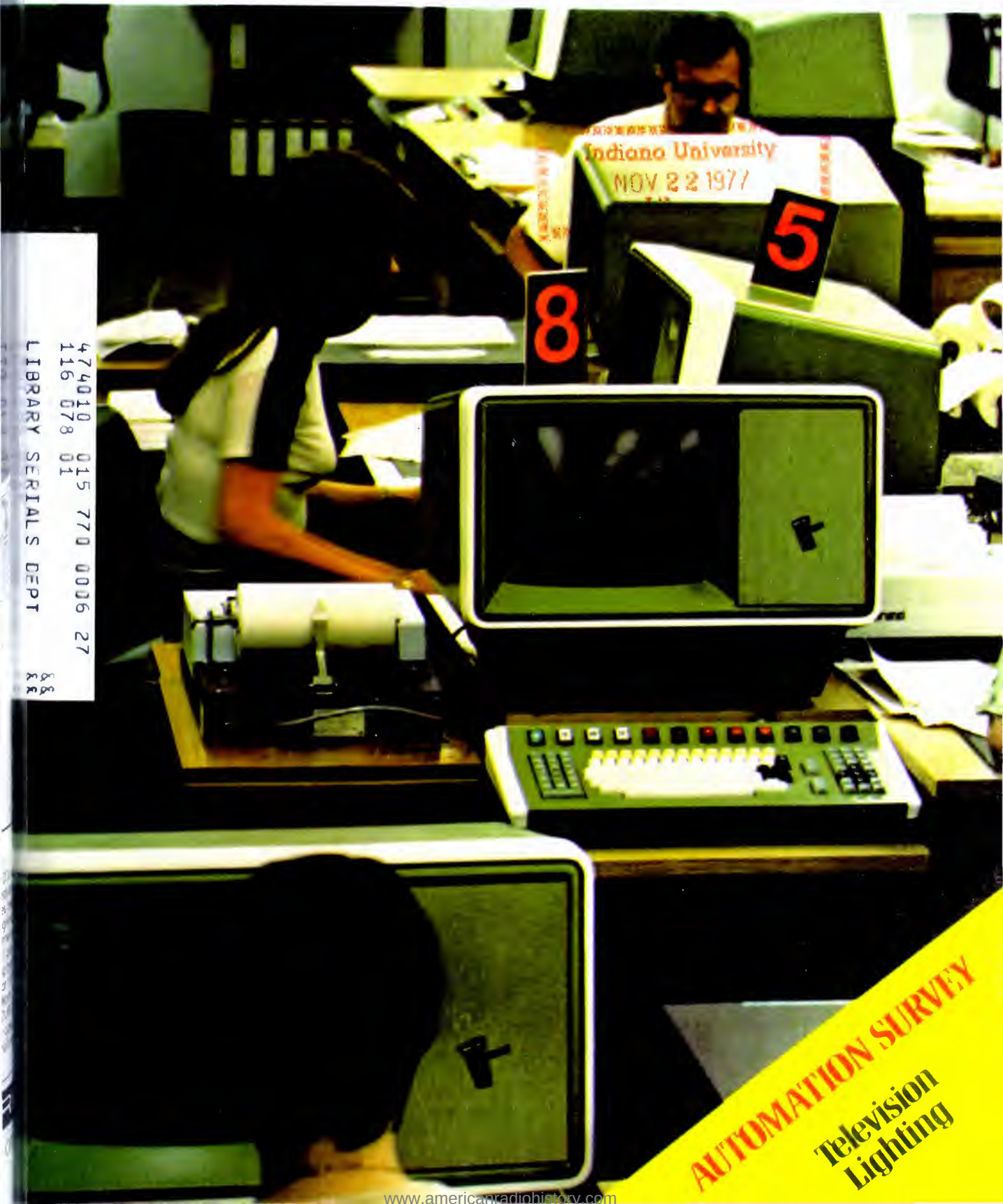


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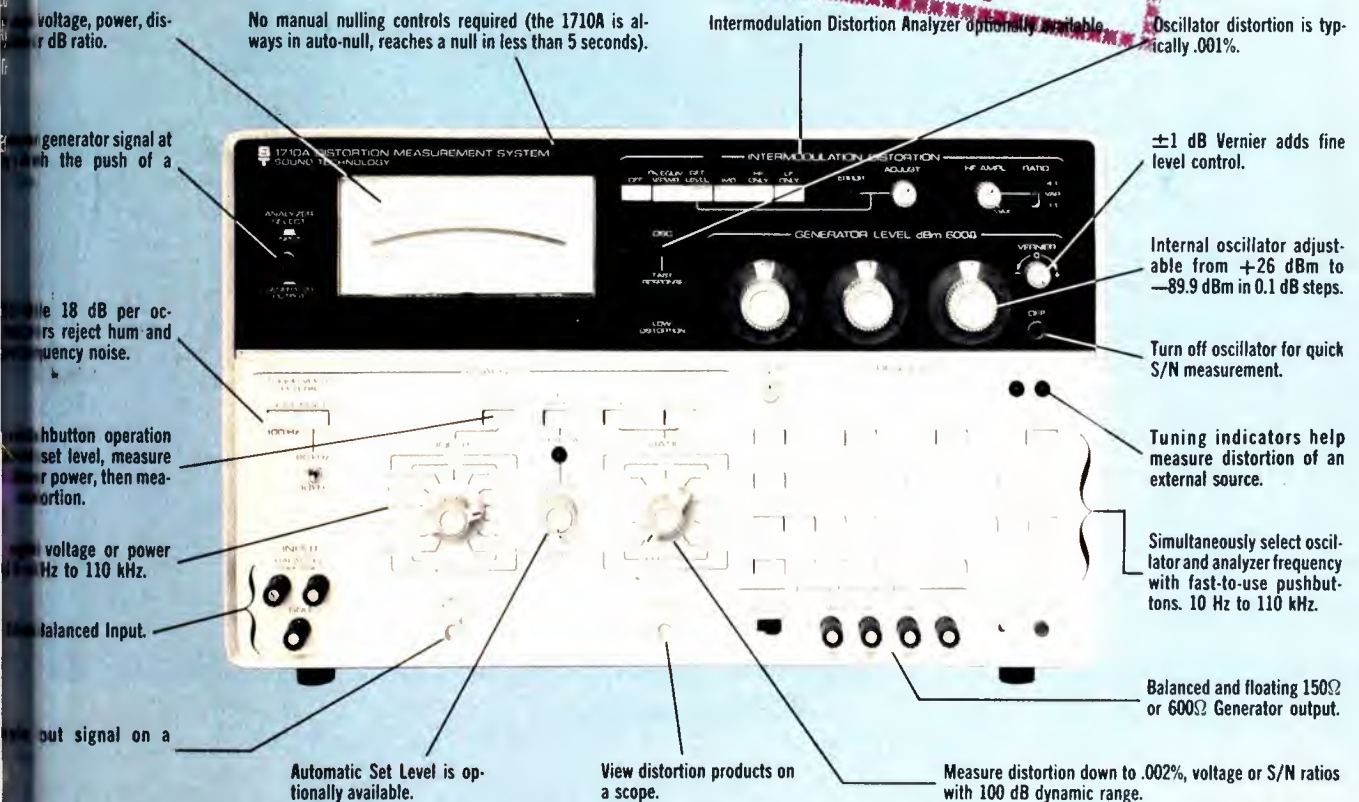
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BROADCASTENGINEERING

The journal of the broadcast-communications industry



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About the cover

Our cover photo this month was taken in the newsroom Radio Free Europe's facility Munich. The article explaining RFE's switch to automation begins on page 22. [Photo courtesy of Megadata].

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People in the News
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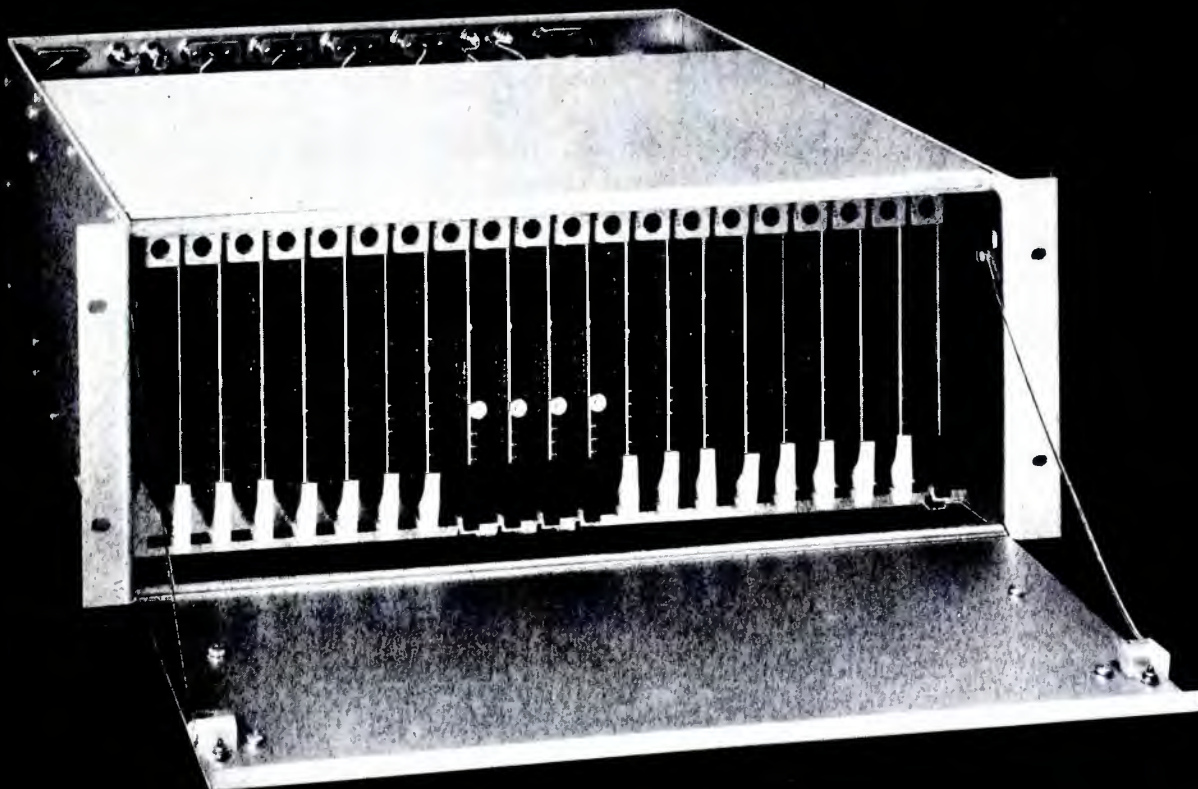
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November, 1977/By Howard T. Head and Harold L. Kasse

New FCC Chairman Has Engineering Background!

The new chairman of the FCC is Charles D. Ferris. Ferris is a Democrat and succeeds Richard E. Wiley whose term expired June 30. Wiley is entering private law practice.

Although the installation of a new FCC chairman is not a matter of especial interest to broadcast engineers, Chairman Ferris comes with an unusual background. He holds a degree in physics, has had practical experience as a research physicist, and has taught science and engineering at Harvard University. All of this is in addition to a law degree, experience in legal practice, and service as general counsel to the Speaker of the House of Representatives.

Chairman Ferris' appointment comes at a time when the Commission is faced not only with increasingly complex technical problems, but increasingly intricate judgments involving interrelationships between engineering and non-engineering matters. We extend the new chairman our best wishes and pledge every effort to do whatever we can to assure a successful tenure.

Commission Rules on AM Antenna Current Distribution

In a case involving a proposal for a new AM directional antenna in New England, the Commission has dealt with a challenge to the traditional assumption of sinusoidal current distribution in an AM transmitting antenna. This classical assumption is almost invariably employed, assuming wavelength along the radiator equal to wavelength in free space. It is known that this current distribution is only approximated in actual practice, but it is the exceptional instance where these assumptions do not yield satisfactory results.

One of the parties to the New England case had proposed the use of the current distribution given by Hallen's integral equation. The Commission pointed out that this method is also an approximation at

continued on page

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goes ahead for hours so station personnel can easily make changes, updates, and special event actions. Another exclusive 7000 Series feature is that the display provides PEP

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multi-processing techniques for increased reliability and system throughput, with

separate program busses for music and voice track operational flexibility, are indicative of the design advantages of this new system. All told,

the 7000 Series brings sequential programming unique flexibility, through the most advanced design concepts and component devices available in a system today. Another

first for Cetec Schafer in its 20-year history of automation leadership. And another reason to talk to Cetec Broadcast Group; Jampro, Schafer, Sparta.



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DIRECT CURRENT FROM D. C.

continued from page 4

that several other equally close approximations find occasional use. The Commission concluded by approving the use of the sinusoidal current distribution assumptions in this particular instance.

One of the more unusual features of the Commission's order is the fact that it dealt with the technical merits of a dispute of this type. The Commission rarely injects itself into the merits of such disagreements, relying instead on the judgments of engineering experts for opposing parties.

Commission Reaffirms Withdrawal of UHF TV Channels 70-83 For New Translator Service

The Commission has denied a petition by the Council for UHF Broadcasting (CUB) to restore UHF channels 70-83 for assignment to new television translators. These channels were withdrawn from translator service when the upper portion of the UHF television broadcast band was reassigned to the land mobile services although existing translators have been permitted to continue operation on the basis of non-interference to land mobile operation in this band.

CUB had asked for the restoration of channels 70-83 because of existing and expected future congestion not only on channels 55-69 which are preferred for new UHF television translators, but also on channels 14-54 where translator operation is permitted if higher channels are not available. However, the Commission concluded that most translator assignments could be made on channels 14-69 and expressed concern over possible future interference to land mobile operation in the frequencies above channel 69.

Short Circuits

The requirement for an AM modulation monitor type-approved for the maximum modulation to be encountered (up to 125% positive) has been extended to March 1, 1978...Your friendly RI will soon be carrying with him a paint chip to make sure the color of the paint on your tower is truly International Orange...Unattended operation of FM translators is now permitted, the same as TV...All commercial radiotelegraph operators certificates issued after January 1, 1978 must bear the photograph of the holder...Part 17 of the Commission's Rules governing painting, lighting and marking of radio and television towers has gone metric, with dimensions and requirements being stated in the metric system.

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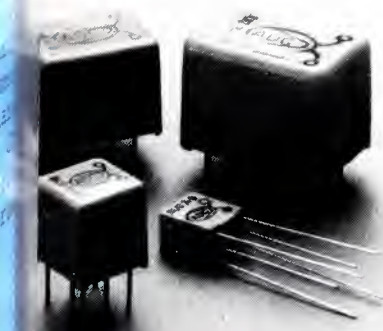
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Compare these editing advantages with existing equipment, and consider the added creative capabilities you get with the Sony Broadcast BVE-500A.

1. BIDIREX control. The big news in the BVE-500A is BIDIREX: two self-return search dials that take the place of ordinary pushbutton search controls. Many control instructions have been built into these BIDIREX dials to allow an operator to shuttle tape in forward and reverse direction at various speeds.

BIDIREX eliminates mode selection error. And it gives Sony U-matic editing a true "film" feeling ordinary editing systems can't match.

2. Decision Prompter. The new BVE-500A uses lamps to prompt the operator to the mode and progress of all editing decisions.

Function lamps blink until the edit commands are made, then go automatically to "steady on." Even in a busy newsroom, with many interruptions, an operator can tell at a

glance the status of his last instruction as the BVE-500A prompts him for the next command.

3. Automatic Entry. The BVE-500A saves valuable time with a feature that automatically enters the "IN" point when the preview button is engaged.

If the operator has already selected an "IN" point, this auto mode has no effect; the editor may preview without disturbing his pre-selected "IN" point.

4. New Full Time Counter. The BVE-500A counts control track pulses from -79 minutes through 0 to +79 minutes. An operator need not concern himself with the count when he initiates an editing sequence.

5. Short Pre-Roll. When used with external sync, pre-roll is reduced from five seconds to three seconds, a further time-saving advantage.

6. Cue Control. The BVE-500A features built-in cue record and erase. This 1kHz tone is recorded on Audio 1, and is useful for both auto control systems and pre-cueing the tape to air.

These are just a few of the new BVE-500A features.

Others include auto shut-off, external interface of control logic, manual edit capability, and more. You can see them all in action when you ask for a demonstration of this versatile new editing control unit. To do that, just contact your nearest Sony Broadcast office.

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SMPTE working group agrees on Type C helical format

First drafts of the proposed One Inch Type C Helical format have been ratified by a SMPTE working group meeting recently in San Francisco.

The working group, including the major networks, commercial and institutional users, and a European Broadcasting Union representative, met September 7th and 8th to continue progress on the agreement in principle announced July 7th on One-Inch Non-segmented Helical Video Recording.

Following a full day of discussions between manufacturers' experts, who finalized details of format specifications, the SMPTE group reviewed and ratified those elements of the proposals that could be agreed upon. The new format will be identified as specifications for One Inch Type C Helical Video Tape Recordings for 525-line, 60-field NTSC Television Systems.

The Type C format

Specifications on a Type A format and Type B format, which will not interchange with Type C recordings, are presently being prepared by other SMPTE working groups.

The proposed Type C format for 525-60 provides for

recording exactly one field of video during scanner revolution. The recording of each field divided into two parts, the video track and the track. The video track contains all active picture and the interval starting with line 16 and ending line 5. Thus, VITS and VIRS are retained. The video track has a 10 line vertical-interval signal gap. The sync track contains the 10 lines of the vertical-interval not recorded on the video track, plus an adequate overlap.

For those users not requiring the information contained in the sync track, the format allows omission of this track. However, no other information shall be recorded in the area allotted for the sync track when the sync track is not recorded.

Six head tip locations

The rotating scanner drum has six head locations. This scanner design provides for separate record and erase heads for both the video and sync tracks. In addition, it provides for optical features such as video and sync confidence heads and an automatic tracking head. When a particular head is used, a dummy head tip will be provided in its place to minimize velocity errors.

The linear tape speed is nominally 244 millimeters per second (9.61 ips).

continued on page

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The video signal is recorded using the high-band technique. The audio signals are recorded using conventional bias recording techniques. The control track is recorded using saturation recording techniques.

In addition to the 525-60 NTSC agreement, a preliminary format for the 625-line, 50-field PAL and SECAM color systems was also prepared for ultimate consideration by the EBU.

The working group plans to complete various tests and measurements prior to the next meeting.

Roizen elected RTS Fellow

The Royal Television Society in England recently elected Joseph Roizen, president of Telegen, to the status of Fellow.

Roizen is only the third American to be so honored in the 50-year history of the world's oldest television society. The citation, read by John Ware, current chairman of the RTS, reviewed Roizen's technical developments in the field of videotape editing and color TV recording as well as his many contributions to the Society in the area of symposium lectures and journal articles.

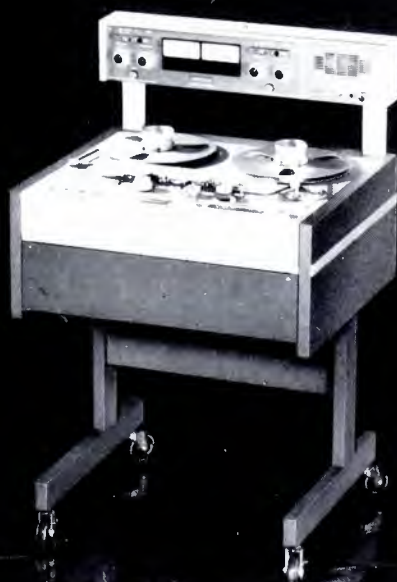
The award was presented at a Society's dinner held September 13 at the Arts Club on Dover Street in London.



Joe Roizen (center) receives the citation from John Ware, RTS council chairman, as Donna Foster Roizen watches.

continued on page

Studer introduces the A80/RC
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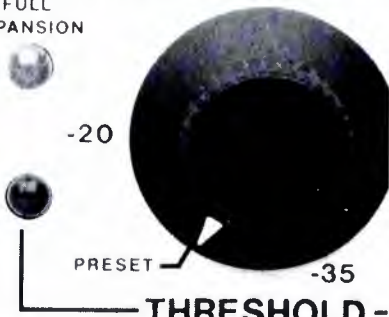
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industry news

continued from page 12

Court rules FCC regulations impose government censorship

A federal appellate court ruled September 15 that Section 399(b) of the Communications Act and the FCC's implementing rules impose government censorship and therefore are unconstitutional.

The section and accompanying rules required noncommercial educational broadcast stations receiving federal assistance to retain, and make available on request, recordings of all public affairs programs broadcast.

The U.S. Court of Appeals for the District of Columbia found the Act and the FCC regulations to be based on an objective of governmental review that is, in effect, government censorship.

The court also determined these provisions could not constitutionally be imposed on noncommercial stations when there was similar regulation for commercial stations.

Since implementation of the rules covering Section 399, several noncommercial educational stations had sought judicial review, contending the Act and FCC rules impinged on their freedom of expression in direct violation of the First Amendment.

The FCC had argued that the purpose of the statute was to "taxpayers, who provide the bulk of the financial support for these stations, as a means for reviewing the station's performance."

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Exclusive Philips design and performance, the LDK 11 outperforms "mini" and "micro" ENG-Only cameras. It is lightweight, battery powered, totally portable and operates for ENG; with full production control either remotely or at the backpack. Yet the LDK-11 features the Philips picture-determining features that go into our most advanced studio cameras.

The LDK-11 includes many unique features for difficult production and ENG applications. Here are just a few:

standing low-light performance; 12 dB additional gain to match

specific requirements down to 8 ft candles.

- Bias-lit Plumbicon™ tubes for lowest lag.
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news briefs

Television seminar/workshop

Imero Fiorentino Associates announce that its seventh regional television lighting and staging seminar/workshop will be held Jan. 23 through 25, 1978 at Loyola Marymount University, Los Angeles, Calif. The company's experienced staff of lighting and production specialists will provide authoritative instruction covering the spectrum of current techniques to improve picture quality for both broadcast and non-broadcast television operations. The firm is currently accepting reservations. Further information can be obtained from the education division, Imero Fiorentino Associates, 10 West 66th Street, New York, NY 10023, (212) 787-3050.

Moseley Associates sold

Flow General Inc. has acquired Moseley Associates Inc., manufacturer of specialized equipment for the radio and TV broadcast industry and other industrial communications. John Moseley, who founded Moseley Associates in 1961, will remain with the company; no personnel changes are planned. Flow General Inc. is a diversified corporation engaged in the manufacture and sale of various products.

Session on microprocessors slated

Worcester Polytechnic Institute will sponsor an all-day executive briefing session on "The Microprocessor Revolution: Impact and Outlook for Business and Industry" on November 30 at WPI in Worcester, Mass. The session will be the first of its kind, designed especially to meet the information needs of senior management, whether computer experts or not. A second session will be held December 7 at the Copley Plaza Hotel in Boston. For more information, call (617) 738-5021.

Edmonds elected ATEA president

Calvin R. Edmonds, Data Test Corp., has been elected president of the newly formed Automatic Test Equipment Association (ATEA). The association, organized in May 1977 to serve the needs of both the manufacturer and user of automatic test equipment, is currently working out the details of its organization. The first full membership meeting is scheduled for Los Angeles in early March 1978.

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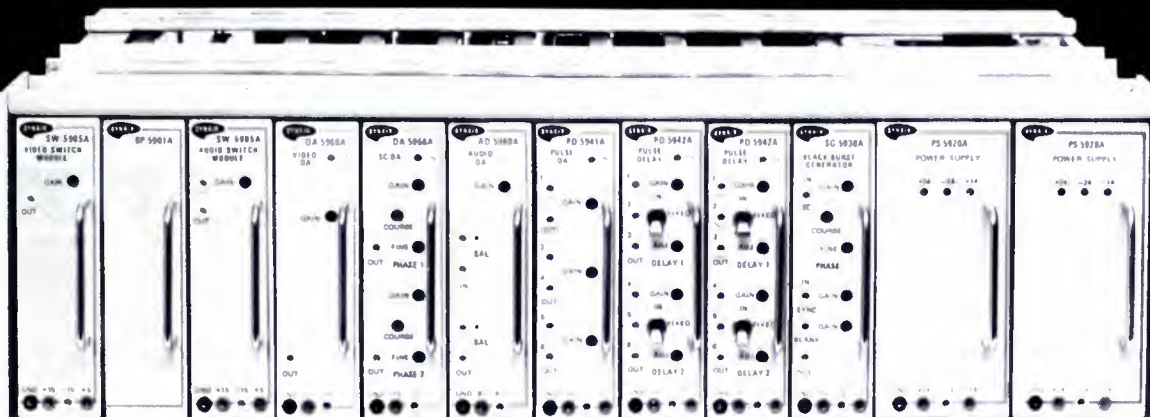
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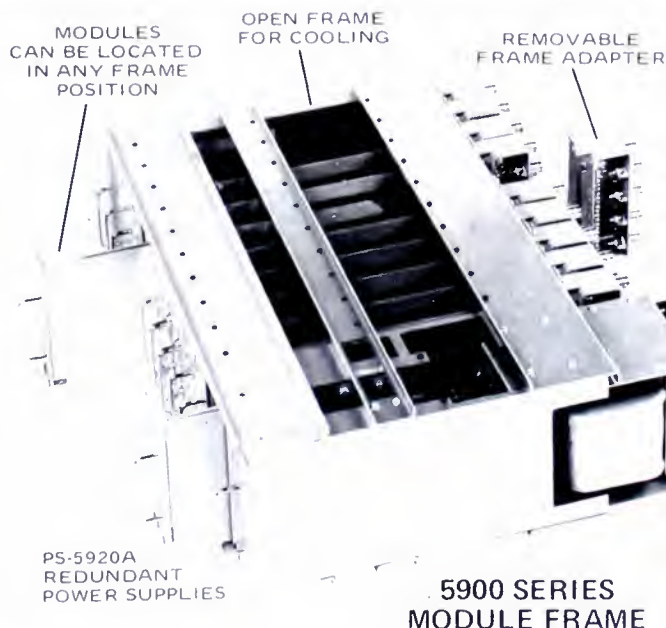
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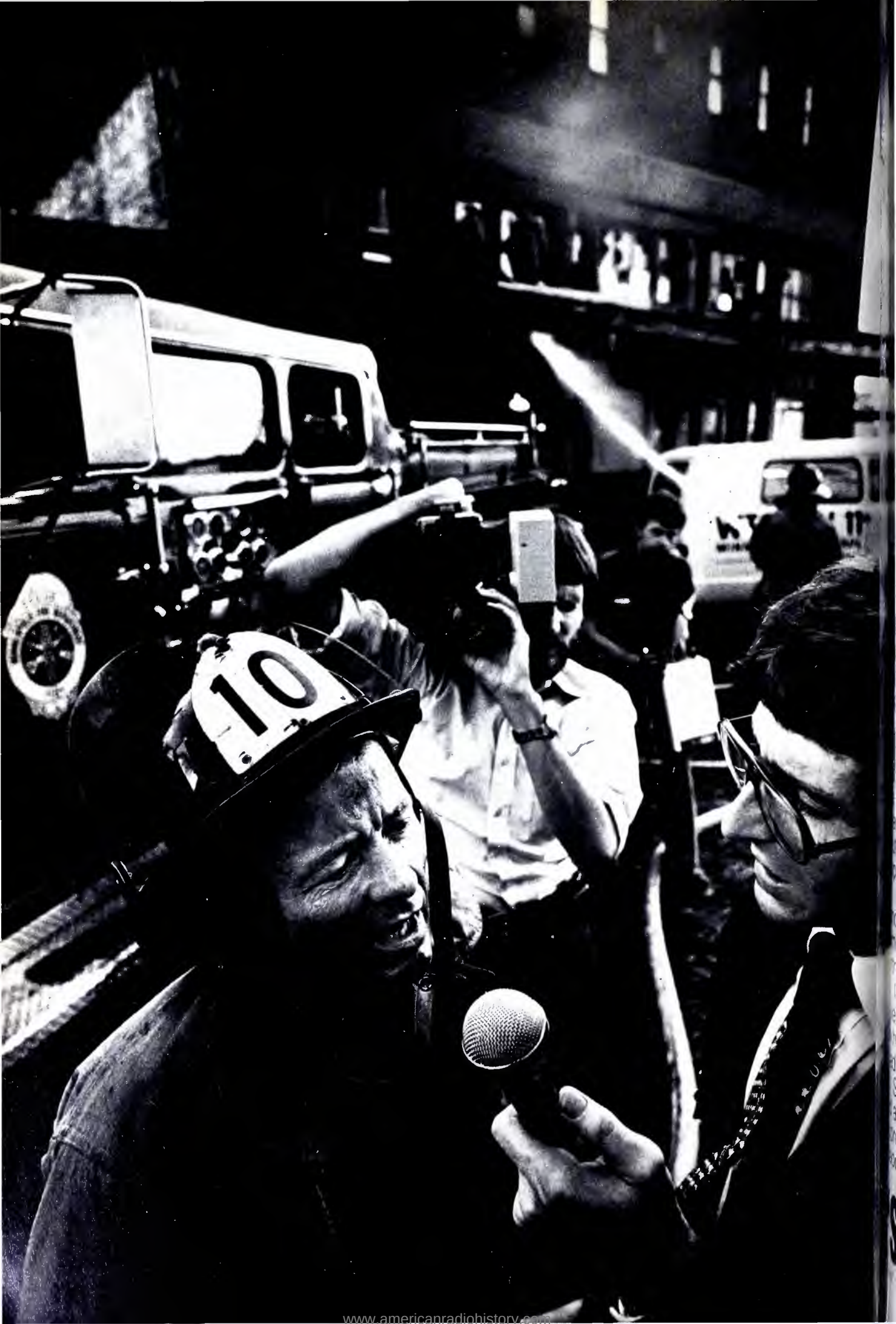
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- PD-5942A, 1 looping in, 6 out, Regenerative Pulse Delay DA
- SG-5930A, 3 looping in (sync, blanking, sub carrier), 2 out, Blackburst Generator
- SW-5905A, 5 in (looping or terminating), 1 out, solid state remote control vertical interval Video Switcher, available in 5x1, 10x1, 5x5 configurations
- SW-5985A, 5 in (looping or terminating), 1 out, solid-state remote control Audio Switcher, available in 5x1, 10x1, 5x5 configurations

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New SBE re-certification procedures proposed

By Jim Wulliman

Chairman, SBE Certification Board, and
Manager of Engineering, WTMJ, Milwaukee

At the present time there are more than 1400 broadcast engineers from across the U.S. and from many foreign countries who have been certified by the Society of Broadcast Engineers. Because of their engineering background, the majority of these engineers qualified for certification under the "Grandfather Provision."

SBE certification is awarded for a period of five years, after which re-certification by the board is necessary. This re-certification is not automatic; the board feels that the continuing education of broadcast engineers is necessary to maintain their competence in the state of the art and that all engineers must continue their professional development in an industry that is changing at a phenomenal rate.

In order to be re-certified, all engineers must accumulate a certain number of professional credits each five years or they must take and pass a certification examination. At the present time the values of professional credits for re-certification have not been finalized, but the following is a draft of the proposed re-certification procedures.

In order to be re-certified without examination a candidate must accumulate 25 professional credits each five years. These credits may be earned by the following:

- Employment as a full-time manager or supervisor, or at a decision-making level in broadcast engineering, or as a consultant or equivalent. Two credits per year.
- Successful completion of an accredited broadcast engineering course, either as a student or as a teacher. One credit per 10 contact hours (1 CEU—Continuing Education Unit). Teaching a course is worth 2 credits per 10 contact hours if the individual is not a full-time teacher.
- Presentation of a significant paper or talk on a broadcast engineering subject before a national or regional engineering meeting or conference. Two credits per paper.
- Publication of a technical article in a national broadcast periodical. Three credits per article.
- Active participation as an elected or appointed officer or committee member in the SBE or other professional society, either at the local or national level. Two credits per group per year.
- Attendance at local, regional or national SBE meetings and other technical conferences and seminars. Three-tenths credit per local meeting; 1 credit per day for attending conferences, seminars and workshops of one or more full day's duration.
- Any other activity approved by the certification board. Credits as evaluated by the certification board. (Please write to the board for a ruling.)
- Home study courses, as determined by the certification board. (Please write to the board for a credit ruling.)

Exams

The first round of SBE Certification examination has been given by those chapters having candidates whom the certification board had ruled eligible to a particular level of test. Also taking the exam each of these chapters were several previously certified members who were participating in a "control group." This group's tests were graded and the profiles of the results were then used to evaluate the candidate's examinations.

The SBE was unable to arrange for non-member members not affiliated with local chapters to participate in the first series of certification examinations. Tentative plans call for the second round examinations to be administered in April or May next year.

Since the goal of the certification board is to constantly improve the examinations and to insure that the questions are representative of the "real world" of broadcast engineering with an emphasis on the ability to solve problems rather than on memorization of answers, there will be several changes and improvements in our program.

Certification changes

The earlier-planned levels of Associate Broadcast Engineer (no experience requirement) and Broadcast Engineer (five to ten years experience) have been revised and combined. The new classes of certification will be: Broadcast Engineer—Radio, and Broadcast Engineer—Television.

The two Senior levels will be kept as they are: Senior Broadcast Engineer—Radio, and Senior Broadcast Engineer—Television.

The examinations will be different for each class and all exams will undergo periodic revisions. In some cases, several versions may be used simultaneously.

It should be noted that certification is determined both by the candidate's experience and by his passing the examination. An applicant for certification at the Broadcast Engineer level must have five years of suitable experience, as determined by the certification board from the information supplied on the application. For Senior Broadcast Engineers, the requirement is 10 years of responsible broadcast engineering experience.

Candidates should keep in mind that the board relies on the application information in making evaluations, so applicants should provide complete experience and achievement data. In the past we have received a number of applications listing only station call and length of employment of the candidate. Obviously, such a lack of information delays the processing of these applications.

All those wishing to take one of the spring exams please write to the Certification Secretary at the national office as soon as possible for a copy of the complete program and application forms. Included in the list of SBE chapters, a list of suggested study materials and sample exam questions for each level.

The address is: Certification Secretary, Society of Broadcast Engineers, Inc., P.O. Box 50844, Indianapolis, IN 46250.



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For More Details Circle (17) on Reply Card



Radio Free Europe automates their newsroom

By Barry Griffiths*

Video display unit (VDU) text-editing systems are just beginning to catch the interest of Europe's broadcasting media. One of the first radio stations to install terminals to handle news and feature processing was Radio Free Europe/Radio Liberty, the American

station broadcasting from Munich to the Soviet Union and the communist countries of Eastern Europe. The switchover is attracting considerable attention from West Germany's state radio networks.

The RFE/RL news operation is a complicated involving a massive input of material which has to

continued on page

*Assistant News Director, Radio Free Europe

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Radio Free Europe

continued from page 22

processed for news desks broadcasting in 23 different languages. It needed text-editing terminals of unusual versatility, including some in cyrillic for its Russian editors. These requirements stumped several West German computer firms, with one estimating it would take three years to produce a VDU system capable of the job. But a U.S. firm, MEGADATA of Bohemia, New York, computerized the RFE/RL operation partially within three months and totally within six months, a feat which the technical director of the West German news agency had said would be impossible.

The station broadcasts to Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and the many different nationalities of the Soviet Union. It is one of the main sources of information in these countries outside of official, party-line media. Its role has been magnified since the signing of the European Security Conference Helsinki accord) have been active in the Soviet Union, Poland, Czechoslovakia, and Romania, and depend upon such western radio to get their message across. President Carter's decision to increase the transmission power of RFE/RL and the Voice of America provoked loud, almost daily complaints.

News is chief product

RFE/RL considers news the heart of its broadcast. Officials at the station say the conversion to VDUs produced a marked increase in the speed and efficiency of its news operation.

The station compiles its news broadcasts from the output of four western news agencies: United Press International, Reuters, and the West German and French agencies. RFE/RL also uses correspondent material from the U.S. and Western Europe, plus nine communist news agencies, as well as monitoring more than 100 Soviet and East European radio stations. This material, more than a million words a day, is processed by a central newsroom into English-language and Russian-language news files that

continued on page 23

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Radio Free Europe

continued from page 24

transmitted to the language broadcasters on internal teletype system.

Enter the computer

Feeding all this raw information into a small computer system was the first problem. The next was insuring there would be no interruption in the 'round-the-clock' flow of news to the men at the microphone.

The inflow is handled by a concentrator which stores, for 24 hours, the files of the western agencies and the RFE/RL correspondents, delivering individual items to any terminal in the system at the touch of a button. At 9,600 words a minute, it's almost instantaneous. In addition, monitors transcribe material from East European radio broadcast work terminals which have been set apart from the main system, feeding their output into the concentrator storage as if they were a separate news agency. Through the concentrator, this output is available to all editing terminals for processing.

Breakdown protection

The solution for preventing a system breakdown was unique. The English-language news file is processed on a system of several slave terminals and two master terminals, rather than one. (The master, which controls the slave terminals and the copy flow to the internal teletype system, was duplicated because it was the weak link.) Two masters were programmed into the system, each controlling the slaves and output lines, and in communication with each other. If one fails, the other can run the entire system. And if both fail, a slave terminal can be converted into a master.

Another master terminal is used in a second four-slave system producing news and features on a Cyrillic teletype net servicing 17 desks broadcasting to the Soviet Union in Russian, Ukrainian, Latvian, Georgian, Uzbek, and other languages of the Soviet nationalities. This system has the only text-editing

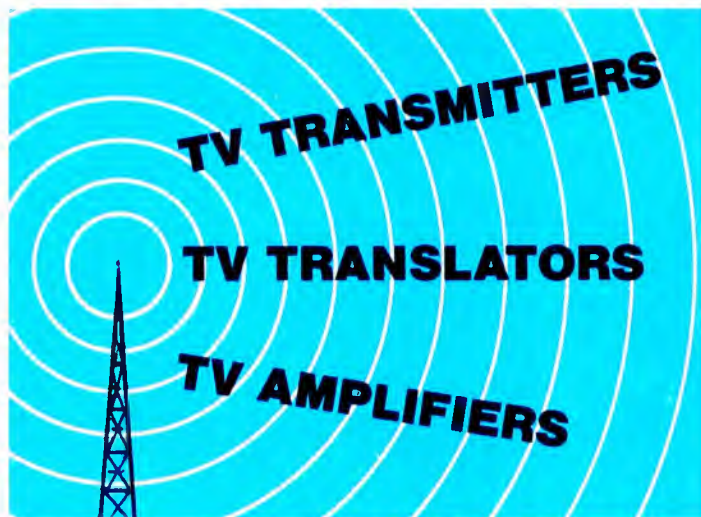
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Your planning guide to a better sound

A detailed black and white illustration of a stack of vintage electronic components. The stack includes several units with various knobs, switches, and meters, likely representing different stages of a hi-fi system or various models of a single product line. A reel-to-reel tape deck is visible on the left side of the stack. In the foreground, a manual or brochure is laid out, featuring a technical drawing of a component and some text. The overall style is that of a mid-20th-century advertisement.

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Radio Free Europe

continued from page 26

terminals in the West using cyrillic letters (learned drawn on graph sheets by RL staffers and reproduced on a video screen by MEGADATA engineers). In too, a separate terminal feeds Russian-language monitoring of Soviet radio broadcasts directly into teletype network.

English-language news backgrounders aimed at evening radio newsreel shows are produced by a separate unit working with three slaves and one master. This unit, which produces about 4,000 words of feature programming a day, did not exist before switchover to VDUs. It was not possible for teletype operators to consistently move its output in time to meet programming deadlines. Now its entire production can be transmitted to the programmers in less than 15 minutes.

Chief benefit is speed

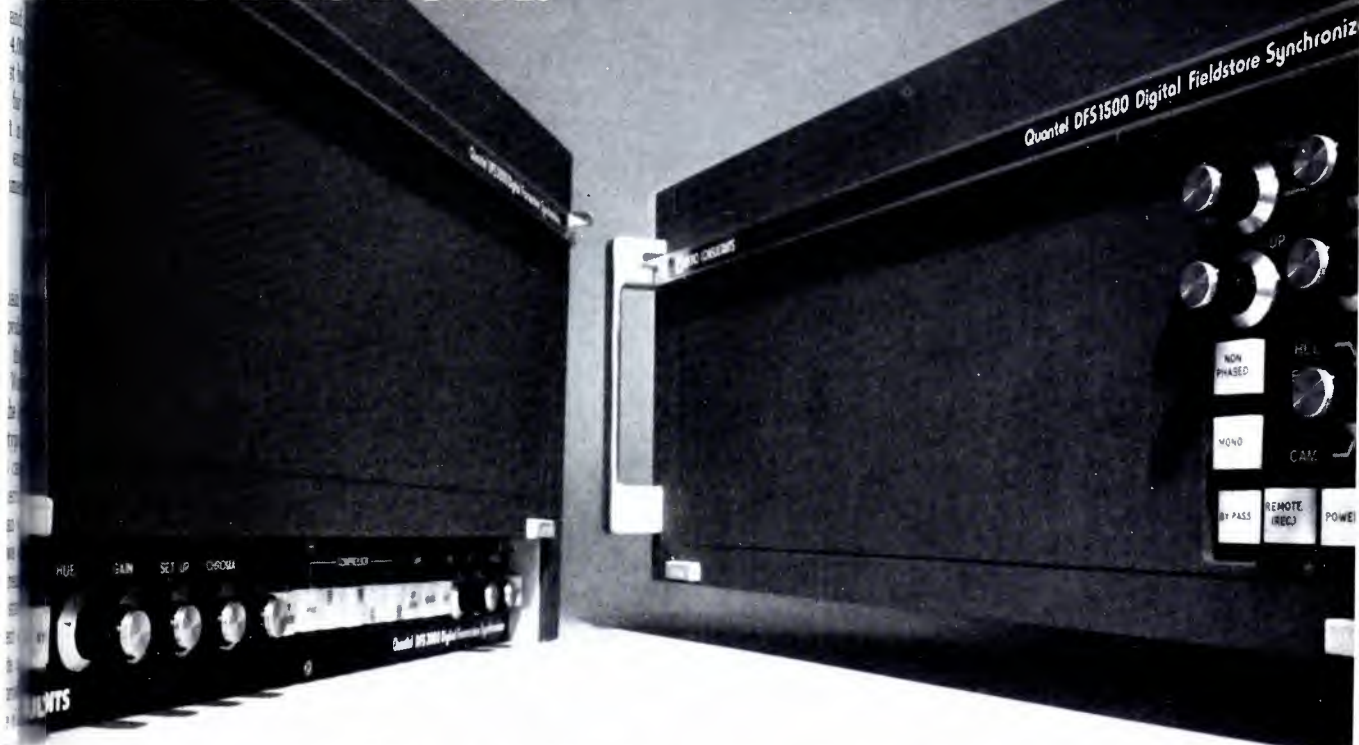
Speed and accuracy have been the main benefits from the VDU switchover for RFE/RL. Providing news and feature programming material for the vast tastes of an audience stretching from Warsaw to Bucharest to Vladivostok had strained to the limits the capacity of its old 100-word-a-minute teletype system. The introduction of the VDUs tripled this capacity to 300-words-a-minute. Roundups of American and European press editorials, for example, can be moved to programmers doing press review shows within a matter of minutes. A 30-word bulletin reaches newscasters in six seconds. It is now standard in some RFE/RL newsrooms that any urgent message moved on the teletype during a 10-minute newscast goes into the newscast. And the copy the broadcast receives is clean, easily readable, and free of the sort of errors which used to be made by teletype operators and typists getting things out in a hurry.

With the English and Russian VDUs feeding directly into the internal teletype lines, RFE/RL was able to reduce its teletype and typing staff by 17 and eliminate from its central newsroom bulky and noisy teletype transmitters. Officials at the station say the reduction of noise level in a newsroom, which still has teletype and telex printers for incoming agencies, is remarkable.

RFE/RL says the switchover presented no training or operation problems. While the sophisticated terminals have won high praise for their text-editing capability, their operation was kept as simple as possible. There is, for instance, only one computer involved in the process: a teletype line designating the station's newsmen were able to operate the system competently after only a day's training, and after two weeks many were inventing additional things for the VDUs to do.

Some of these inventions were still being incorporated into the system by MEGADATA long after installation. There was a problem with the headline listing which the central newsroom issues to broadcasting newsrooms at 15 minutes before each hour. The teletype girls who use to shout "headline" at forgetful deskmen about 20 minutes before the headlines were sorely missed. So MEGADATA built a beep into the master terminal which begins beeping at 15 minutes to the hour and keeps on beeping until a deskman presses a button which brings the headline format onto his screen. RFE/RL newsmen ruefully describe it as a diabolical device. And it doesn't go downstairs for coffee!

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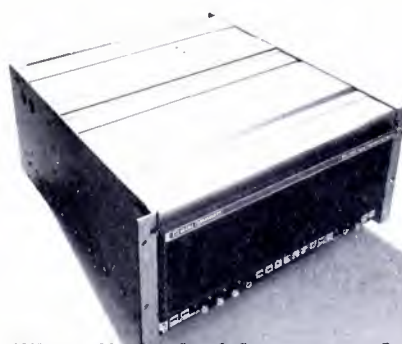
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The digital video people



For Demonstration Only Circle (26) On Reply Card
For Literature Only Circle (27) On Reply Card

New systems put automation on the front burner again

By Ron Merrell

The results of our latest survey indicate that interest in automation is picking up again, but the old problem of operator errors is still detracting from automation's acceptance.

There probably was a time when a low-key, low-budget station decided to do something about their DJ overhead. And back in those long-forgotten days an engineer probably was charged with the responsibility of solving the problem.

The enterprising engineer hauled in a moderately-priced automatic changer turntable, hit the reject button, and let the platters fall (ouch!) in sequence. Of course, it wouldn't be long before he realized that two of these turntables could be sequenced. Once wired into the system, everyone could walk away from the control room until it was ID or ad time. (If you read our Blue Bananas column, you can see how this kind of operation would have been wide open to humorous possibilities.) But was it automation?

Not so long ago

In the early 1970s, radio program automation was the hot topic at the NAB equipment exhibitions. If we believed all we heard, it would only be a matter of time until all stations were automated. A few years later, automation program equipment control systems began to show up here and there on the classified ad pages under "used equipment."

The problem then, as it is now, was not that the automation equipment could not perform. Rather, it was that owners and engineers had not anticipated how this equipment would affect all aspects of their operation and their air sound. After all, there are big differences in individual approaches to operating classical, MOR, C&W, Top 40, and mixed formats.

When the subject of radio automation surfaces today, there is some confusion as to what is meant by saying a station is automated. Suppose, for example, we are using a multiple-deck cart machine. Depending upon the make and model,

it can be plugged up with music, IDs, promos, and ads...and they will run as ordered. The machine will automatically play each of these carts, or it can be punched into standby while the DJ reads an ad or interjects the sort of chatter that makes him popular. Is this automation? And what of limited-number random select?

What about the station that uses two triple decks plus single-play carts? While as many as six out of every ten entries will automatically play, most engineers would not consider this to be automation. So, for the sake of this article, we're going to sidestep the mini-automation level.

You must mean programming

Even now, when we talk of automation, most radio people assume we're talking about program automation. They've seen the station down the street automate programming; they've seen the program automation ads, read program automation articles, and maybe even sat in on convention program-automation sessions.

Meanwhile, if we talk about automation with the television side of the industry, automation would mean something quite different. The invasion in television has settled mainly around traffic and billing. However, a number of stations have opted for machines that automatically sequence IDs, promos, and ads. Switching is a new way to go, logging is not.

Because of the nature of their differences in needs and programming, TV has leaned on the data processing side, while at many stations, radio has accepted automated programming as a way of life.

Among the early attractive features of automation was that as it smoothed out and simplified the

operation, it also would eliminate some staff personnel. Automation was supposed to give the remaining engineers and operators more to spend on creative efforts, some engineers and many operators translated this into job satisfaction. Another problem was that enough people anticipated what would do to those DJs who survive the initial stages of program automation. In fact, many became bored with their new role. After all, it was possible to purchase taped programs and special station IDs. What was the DJ going to do? Push buttons while the station lost its personality?

Shortly, of course, it was proven that there was nothing so terribly unique about program-automation equipment. DJs could operate it, engineers could deal with it. In any way, if everything had to be done with carts and reels, how was it going to get there? If it wasn't syndicated tape, who would make the transfers? And wouldn't this bring even more equipment to be maintained or repaired? At least it would surely place heavier demands on existing recording equipment.

While AM stations were wrestling with carts, FM stations were turning away from discs and starting to record tapes and getting into reel-to-reel syndicated tapes. Even here, the system could be wired to play the program reel, automatically interrupted by ads, promos, and IDs on a cart machine. This approach did not require any program creativity on the part of the local station. Of course, the programmed tapes had to be on target. Despite the chance, this approach grew in popularity.

In the last 18 months, there has been a new surge of interest in radio program automation. Systems are being offered now that can store and play more than 100 carts in addition to controlling reel-to-reel machines. In fact, automation equipment manufacturers have been busy designing systems that can handle almost any format challenge or length of broadcast day requirements.

Industry survey

In 1971 and 1974, **Broadcast Engineering** checked the pulse of the radio broadcast industry and detected considerable interest in automated programming. This summer **BE** undertook its third automation survey.

In all three surveys, operators

continued on page



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Terminal Drive
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*Patent applied for.

**Stanton is even making special turntables for this purpose.

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Automation

continued from page 30

errors surface as a major problem. And this has remained a nagging problem because we still have not worked out daily duties and responsibilities that satisfy the needs of the operator. As with any form of automation, radio can't avoid garbage in, garbage out. The equipment will do the job...but will disenchant operators or weekend part-timers do theirs?

Some of the newer systems can handle the toughest format assignments, but they still must be plugged up with carts and tapes. Those carts must be recorded and programmed into the system. So what we have is a human problem. We've been so tied to making certain the equipment would solve our format problems that we've neglected the key link.

Of all stations responding to our survey (who listed themselves as automated in AM, FM, or AM/FM), 17% said they had no major problems. However, 42% reported operator-related problems. Only about 8% said they are having format problems.

In the top-50 and top-100 market stations, it's the combination stations that report the highest incidence of operator errors. The problem is also evident at stations below the top-100 markets. Below the top-100 markets, however, FM stations report the lowest incidence of operator problems.

On the engineering side, FM also checks in with the fewest problems, while AM stations (depending upon market size) vary between 8% to 12%.

Automated formats

According to our latest survey, of those stations which automate programming (41% of all stations reporting), Easy Listening is the most often automated format at 60%. Country & Western is 53.5% automated, with Top 40 and MOR running a close third and fourth. On the other end, close to 30% of all classical stations automate their programming. Hard Rock is the lowest of all automated music formats with a penetration of only 20%.

Some approaches to formats have yet to lend themselves to automation. But don't bet that some day we won't have a machine coded in such a way that the operator can punch up anything in the entire library for immediate play. He'll play his keyboard and inject comments. (Oper-

ating on the same principle system could be designed for that would hold all coded news for immediate recall.) At the this year, at least one manufacturer offered a CRT terminal that would read out upcoming program schedules, IDs, promos, and ads. Another system will show you upcoming items as event numbers on readouts.

Automate everything?

Programming has been in spotlight from the beginning, and still overshadows logging, accounting, and availabilities. Of the logging is the second area where automation is earning its v. Accounting and billing are a distant third, while traffic is automated only 6% of all stations committing automation. In all cases, the FM combination is, according to survey, the best prospect for automation.

How about ATS?

At the beginning of this article I looked at mini-automated station operations. Well, just how much could be operated automatically the station? Practically everything. And now we can add automated transmission systems (ATS). plugged ATS in to our 1977 survey to get an idea of station interest. About 31% of the stations responding say they intend to purchase ATS equipment in late 1977 or 1978.

What about the future?

Prospects for radio automation, whether it be programming, logging, traffic, or equipment control, are good. They aren't so good that stations will totally automate. the prospects, especially for AM/FM combinations, have never been better. However, many stations never delete their personality. A mixed-format approach to programming, while others will say they can't afford the investment.

The latest systems have made much progress in format compatibility that both management and engineering now have clearly defined choices over a broad range of capabilities. For the present, radio will continue to equate automation with programming. But the future holds much more.

Meanwhile, a subject that should be held up for closer inspection is operator errors. What is needed is a series of meetings between users and manufacturers. With any luck one of the professional associations will provide the platform for airing the problem and, hopefully, getting something accomplished.

20 20

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Figure 1 Back light on dark hair.



Figure 2 Back light on blond hair—light flare.

No short cuts - no formulae - lighting is painstaking work

By E. Carlton Winckler*

Every professional television lighting director knows that a major hazard of venturing out of his office is confronting the student or beginner who asks, "What is the proper ratio between key light and back light?"

When flustered by such apparitions the poor pro is likely to stammer something about preferring "1½ to 1, or 2 to 1" in self defense. In reality, however, he never uses any such formula, because a specific formula doesn't exist.

In Figures 1 and 2 the ratio of key light to back light is exactly the same, although there are apparent differences. This demonstrates why formulae in lighting couldn't work even if they existed.

These photographs also illustrate why it is not practical to make a fixed lighting setup in a studio and move different subjects and programs into the lighted area without making adjustments.

Each subject or picture component is unique and individual, requiring special consideration, and is, in effect, a separate challenge to the lighting designer. This constant challenge is what makes the lighting profession so absorbing and fascinating.

Lighting is an art and not a mechanical exercise; and, like the arts of painting, music and sculpture, it takes a great deal of technical skill and hard work, along with planning and imagination, to transform the artist's concept and inspiration into reality.

In lighting, just as in the other arts, a fine product takes time to achieve. There must be time to understand the subject or setting to be lighted, the mood or feeling that must be achieved, the action, the colors, the space—not to mention the requirements of the cameras to be used.

Lighting should first begin as a picture in the mind of the lighting artist, who must then work back to find the luminaires that will be

required. He then must calculate their ideal position. In essence there is no short cut in the creative process: each step must be followed through in an orderly mental or physical pattern.

The television industry has many efficient lighting men who wade through these complex areas and have their project set up and completely lighted while the camera crew is still looking for the line charts. But their hastily made masterpieces, in all probability, do nothing to enhance the program because they overlook the values which good lighting contributes to visual communication.

It is impossible for these values to be there unless the lighting artist takes the time to provide them. What are these values?

One of the most important functions of lighting is the "center of interest": the brightest area in the composition that automatically attracts and holds the eye without viewer violation. Next, there is

continued on page

*Senior Production Consultant,
Imero Fiorentino Associates, Inc.

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oes practically without saying that the company responsible for the leading reference cassette tapes should offer the finest available pancake product for cassette dupes. And with 1/4" bulk tape for high speed duplication in industrial A/V use, you get the same high performance tape found in our Dynamic cassette, with its low noise and high output characteristics, and broad dynamic range and low distortion.

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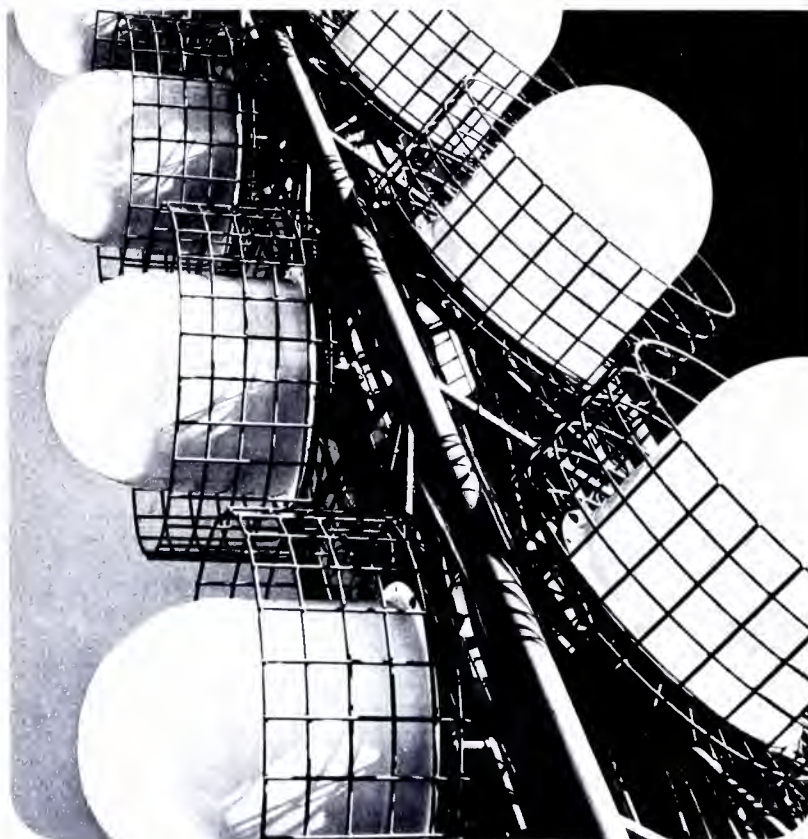
Problem areas will notice significant reduction of ghosting

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For complete information about the Harris circularly polarized TV antenna, write Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.



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Lighting

continued from page 34



Figure 3 Center of interest is correct; lighting is not flat.

orderly selection and indication of the relative importances of composition of elements—careful separation and modeling without apparent emphasis (which, if noticeable, defeats effective communication).

There is a great deal more lighting than simple illumination of visual elements. In fact, illuminating elements for the camera (or the eye) is the easy part of lighting. The more difficult part—the part that makes lighting an art—is the creation, control and placement of shadows.



Figure 4 Flat lighting—dull picture.

Inexpert lighting has a random multiplicity of shadows or no shadows at all, and both are equally

continued on page

TeleMation Announces First-Half Earnings

(SALT LAKE CITY, UTAH)—TeleMation, Inc., reported first-half profit of \$257,000, or 25 cents per share, on revenues of \$4,709,000. This compares to a loss of \$536,000, or 52 cents per share, on revenues of \$4,754,000 for the first half of 1976.

Results for the three-month period ended June 30, 1977 were a net profit of \$213,000, or 21 cents per share, on revenues of \$2,414,000 compared to the loss of \$314,000, or 30 cents per share, on revenues of \$2,339,000 for the three-month period ended June 30, 1976.

The above figures are after extraordinary credits resulting from reduction of taxes by use of a tax loss carry-forward. Profits before the extraordinary credits were \$144,000, or 14 cents per share, for the first half and \$120,000 or 12 cents per share, for the second quarter.

W. Paul Warnock, president of the video equipment manufacturing and television production company, said that the return to profitability in the first half of 1977 was due to the substantially improved performance of the hardware portion of the company's business. "TeleMation Productions, our television production studio in Chicago, continues profitable as in recent years," he stated.

He attributed the improvement in the company's hardware business to a continuing strong demand for the company's principal products and to extensive action taken at year-end 1976 to bring the company's expense level into line with revenues. Mr. Warnock pointed out that backlog at June 30 was \$1.7 million compared to \$2.1 million at December 31, 1976. "The return of our hardware business to profitability has been very gratifying to us at TeleMation. The dedicated efforts of all our employees have made it possible," he said.

TeleMation, Inc. A Salt Lake City based manufacturer of professional television equipment, maintains offices in San Francisco; Minneapolis, Danbury, Connecticut; Washington, D.C.; and London. TeleMation also operates a television commercial production division in Chicago.



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Lighting

continued from page 38

desirable. A carefully constructed shadow pattern is what gives a picture strength, meaning, separation and depth, and such shadow patterns are never accidental.

A multiplicity of meaningless shadows is called "dirty light" and is attributable to the fact that every light source casts a shadow. The basic problem usually is due to too many sources, sources in the wrong place, or attempts to "wash out" unwanted shadows with additional

light sources (usually resulting in more shadows).

The skilled artist designs his shadow pattern through the placement and control of the main sources. He works diligently with the director for subject and camera placement, and the designer for composition space where unavoidable yet unwanted shadows are cast unseen by the camera.

As mentioned earlier, every light source casts a shadow, so the art lies in hiding the ones you don't want the camera to see and accenting the ones that contribute to



Figure 5 Complex shadows (double nose shadow).

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the visual message. This is accomplished by careful analysis of the relationship between luminaire placement, subject movement and camera angles. Conversely, shadowless pictures are quick, easy and effective—indicating complete frustration in controlling the shadow patterns or a definite lack of lighting skill. It is always apparent that insufficient time has been spent on the project.

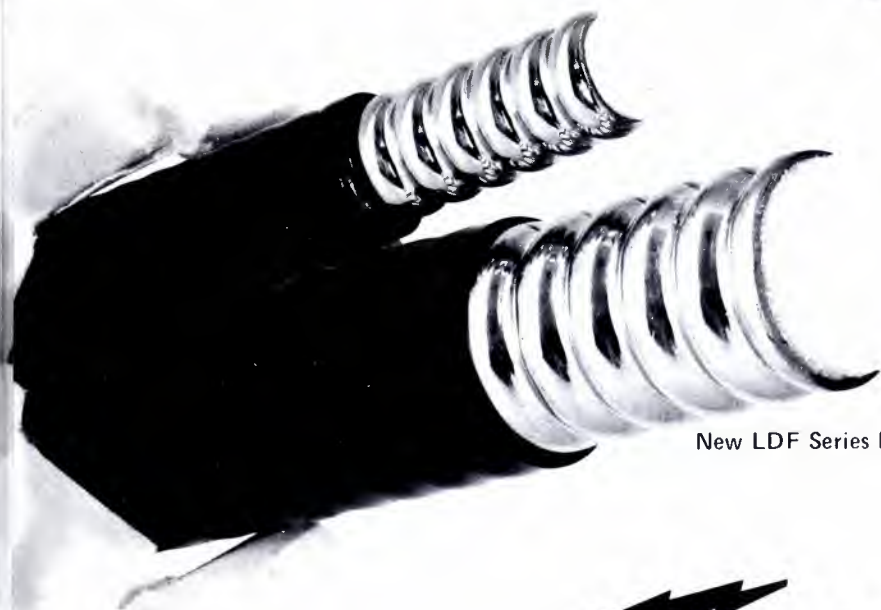
General lighting practice is to first focus the luminaires at full intensity to make it practical to select the specific area of coverage, a hot spot or the need for feathering. Second, it is important to work out the requisite "balancing," which involves adjustment of intensity relationships that cause the properly planned picture to emerge from the flare. The balancing process is another one that requires time and cannot be rushed. Balancing may be done partly through light meter measurement, partly by eye and experience, or it may be done almost entirely by observing the camera image on the control room monitor.

Of course, before any of the steps can be contemplated, the lighting man must learn his trade, learn which luminaire has sufficient control to allow shadow placement, learn intensities, diffusion and flexibility; and learn to differentiate between fact and myth in the extensive lore of lighting.

One very important and positive thing a lighting man with less than complete expertise can do toward growth in his chosen field is to learn to ask, "Why?" This question, asked with an open mind when approaching each new lighting problem, will bring out the fallacies in formulae and how it is that short cuts never seem to work out.

Practical experience shows that thinking the job through logically and then following each step in painstaking manner is actually quicker as well as surer because when you do it right you won't have to do it over.

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For More Details Circle (38) on Reply Card

Microcomputer controls traffic for KEZK

By Noel Moss

One of the most tedious jobs in broadcasting is performed by the traffic department. The task of producing a complete and accurate program log can take hours, to say nothing of organizing the commercial inventory, as well as producing availability sheets and account lists. This repetitive work causes fatigue which, in turn, reduces efficiency.

The purpose of this article is to describe how KEZK is implementing an in-house computerized traffic system based on one of the new microcomputers currently on the market.



Figure 1 The author is shown at the operating position of the computer system. From top to bottom the equipment is as follows: switching panel, Altair 8800 computer, mini floppy disc drive, digital cassette drives, video monitor, and keyboard. The system power supply (not in photo) is in the bottom of the rack.

While surveying the available word-processing systems one very important factor became evident: most commercial machines required the system operator to conform to the machine. Meanwhile, we had already decided that our system had to conform to the user.

To implement this approach, a high-level language called BASIC was chosen. BASIC was originally developed at Dartmouth University and is a highly conversational computer language. The ability of BASIC to manipulate strings of alphanumeric data was also a deciding factor in its choice. Some of the commands and error statements are summarized in Table 1.

System description

After considerable thought, we began to configure our system. An Altair 8800A microcomputer was selected for the mainframe. This machine uses the popular Intel 8080A microprocessor chip which is an 8-bit parallel processor capable of addressing up to 65 kilobytes of random access memory (RAM). Each byte, a computer term, consists of 8 binary bits in this system. All ASCII characters can be represented in this format, thus compatibility is maintained with the outside world. (ASCII stands for American Standard Code for Information Interchange and is a widely used code for data communications.)

The system's main memory is 32 kilobytes of static RAM. It is built on four 4K boards and one 16K board with the first 6K reserved for the BASIC interpreter; 512 bytes are reserved in the high end of memory for the resident link program that controls the video display. The remaining 26 kilobytes are used for active program storage and execution.

System I/O (input/output) is usually done on a keyboard printer, but we built a video display to save on paper costs and wear and tear on the printing mechanism. This reserves the printer for finished



Figure 2 This is an operator's eye of the keyboard and CRT. The board layout includes an auxiliary numeric pad on the right which controls cursor positioning and scrolling through the computer memory. This feature allows the operator directly examine and edit the memory contents. The Dataphone on the left is used to tie the system into Market for access to ARB data. The CRT is used by the operator at all times except when finished hardcopy is produced.



Figure 3 This is the DECwriter printer used for hardcopy for finished logs. It also allows the system to handle special forms and mail labels when the computer is used in an automatic typewriter mode.

hard copy only. Our printer is a DECwriter II, manufactured by Digital Equipment Corporation. The initial cost was several hundred dollars more than a teletype, but the DECwriter is a much quieter machine and has very few moving parts. The printer is interfaced to the computer at RS-232 levels which also allows it to be used as a terminal on a commercial data communications network. An auxiliary keyboard was added to the system to allow the printer to be remotely located from the computer.

continued on page

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2. 2-watt, 2GHz video transmitter, the FV-2MF, that can operate from two 12V batteries.

3. A high-gain, low-noise preamp, the 60576 for the receiver end.

The beauty of the transmitter/amplifier combination is that it can take 20 watts anywhere. It's as lightweight as our

portable, of course, when it has twenty watts of output. And you can use the new package as a relay station for the portable. (The 60515 amplifier requires only one to two watts drive.)

Our units take up only mounting spaces in a standard ENG rack (that's 19 inches). And because they need only 24 volts, they'll be anywhere you can bring

or find two regular 12V batteries. An important point: the combination accepts either negative or

positive ground power, making it adaptable to a wider range of vehicular power systems. (Consider the other way to get 20 watts of power: a big remote unit, interconnecting cable, a big RF head, a big motor generator.) You can also use 110VAC if you have it.

The FV-2MF has other advantages. Like our mini-portable, it's frequency-agile. And when you're transmitting a signal through a tricky downtown path challenged by high-rises, you can move the aural sub-carrier from the top of the baseband to 4.83 MHz, assuring that your audio will arrive at the other end. It's a remote-controlled function.

With the audio in the normal position, you get the higher-quality video you need for studio transmission.

The 60515 amplifier, despite its high-power output, needs only low drive power. It's a high-quality bipolar device, with gold-to-gold transistor bonding to prevent metal migration and softening over years of use.

The preamplifier, used at the receiver, is a new high-gain, low-noise device with excellent selectivity (channel filtering). And it can be pressurized—for use at a location remote from the receiver.

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```
THIS IS A SAMPLE
ELPMAS A SI SIHT
THIS IS THE ORIGINAL SENTENCE: 'THIS IS A SAMPLE'

THIS IS THE SENTENCE REVERSED: 'ELPMAS A SI SIHT'

THESE ARE THE ORIGINAL WORDS: THIS      IS      A      SAMPLE

THIS IS THE SENTENCE BROKEN INTO ITS ASCII EQUIVALENT:
I= 84      H= 72      I= 73      S= 83
= 32      I= 73      S= 83      = 32
A= 65      = 32      S= 83      A= 65
H= 72      F= 80      L= 76      E= 69

OK
```

Figure 4 This is an example of string manipulation by BASIC. The original inputted string is printed followed by the reversed string after it has been processed by the computer. The original string is also shown broken down into its ASCII values.

```
THE COMPLETE ENTRY IS
47      AMALGAMATED WIDGET      1A-1      60      CM

THE ACCOUNT NUMBER IS 47

THE CLIENT NAME IS AMALGAMATED WIDGET

THE PRIORITY CODE IS 1A-1

THE SPOT LENGTH IS 60

THE CLASSIFICATION IS CM
```

Figure 5 This shows how the computer can take apart an inventory entry to extract any data it may need for sorting and merging.

```
CLIENT NAME? AMALGAMATED WIDGET
ACCOUNT NUMBER? 47
PRIORITY OR TIMES? 6A-10A 3P-7P
NUMBER OF SPOTS 6A-10A? 12
NUMBER OF SPOTS 3P-7P? 8
SPOT LENGTH? 60
CLASSIFICATION (CM PSA POL)? CM
BROADCAST WEEK TO START? 30
BROADCAST WEEK TO END? 36
DAYS TO RUN IN WEEK 30 ? 5
DAYS TO RUN IN WEEK 31 ? 5
DAYS TO RUN IN WEEK 32 ? 4
DAYS TO RUN IN WEEK 33 ? 6
DAYS TO RUN IN WEEK 34 ? 5
DAYS TO RUN IN WEEK 35 ? 5
DAYS TO RUN IN WEEK 36 ? 6
THE AMALGAMATED WIDGET SPOT WILL RUN ON THE FOLLOWING SCHEDULE
WEEK 30      12 SPOTS 6A-10A TO RUN ON 5 DAYS
WEEK 30      8 SPOTS 3P-7P TO RUN ON 5 DAYS
WEEK 31      12 SPOTS 6A-10A TO RUN ON 5 DAYS
WEEK 31      8 SPOTS 3P-7P TO RUN ON 5 DAYS
WEEK 32      12 SPOTS 6A-10A TO RUN ON 4 DAYS
WEEK 32      8 SPOTS 3P-7P TO RUN ON 4 DAYS
WEEK 33      12 SPOTS 6A-10A TO RUN ON 6 DAYS
WEEK 33      8 SPOTS 3P-7P TO RUN ON 6 DAYS
WEEK 34      12 SPOTS 6A-10A TO RUN ON 5 DAYS
WEEK 34      8 SPOTS 3P-7P TO RUN ON 5 DAYS
WEEK 35      12 SPOTS 6A-10A TO RUN ON 5 DAYS
WEEK 35      8 SPOTS 3P-7P TO RUN ON 5 DAYS
WEEK 36      12 SPOTS 6A-10A TO RUN ON 6 DAYS
WEEK 36      8 SPOTS 3P-7P TO RUN ON 6 DAYS
ANOTHER ENTRY? NO
ENTER NEXT TRAFFIC OPERATION
? UPDATE INVENTORY
WORKING
```

Figure 6 An example of the dialog between the computer and the system operator when data is being placed in the inventory files. The printing after the ? is the operator's answer to the computer's question.

interfaced a standard Cherry board to the system and located directly in front of the video display.

The composite video output a Processor Technology VI video card is displayed on a 17" Conrac monitor. We selected VDM-1 video module for several reasons. It is capable of displaying 16 lines of 64 characters per line. The display can be black on white or white on black or any combination of the two, and it has nine key-selectable scrolling speeds ranging from about one character per second to 2000 lines per second. A blinking cursor is optional and the entire display is under software control. The module simply plugs into the computer mainframe.

Data storage

Mass data storage is being accomplished by two methods: cassette and floppy disc. The cassette method has evolved into separate subsystems. First we used a slow 300 baud FSK technique since this is the method used by the BASIC interpreter. All of our preliminary development programs have been saved using this method. It works by converting the parallel data from the processor bus into a serial form and then feeding the data into a modem for recording on a standard audiocassette machine. The playback procedure demodulates the FSK signal from the cassette and converts the serial data back into parallel form.

The second tape cassette system is a true digital recording method. Specially modified cassette decks manufactured by Phil Deck are connected to a Digital Group cassette controller which provides software control of all motion functions and data encoding and decoding. This system operates at a speed of 5 ips and writes 1600 reversals per inch, yielding a rate of 6400 baud. This gives a storage capacity of about 250 bytes per 30-minute cassette. Because of this tremendous amount of bulk storage, the digital recording method is a natural choice for storing commercial inventory and other large data bases.

One other peripheral device we are using is a mini floppy system. A floppy disc is simply a flexible rotating magnetic disc the size of a 45 rpm record. Read and write functions are accomplished by moving a magnetic head across the disc as it rotates.

size of a mini floppy disc is added to about 90 kilobytes, but the access time is on the order of seconds instead of minutes with a cassette. Consequently, the disc is better for setting up files for data manipulation. The disc drive is available by Shugart Associates and the controller is from North Star Computers.

Using the system

As mentioned earlier that BASIC is a friendly conversational high-level language. We are presently using version 2 of 8K BASIC supplied by MITS, Inc., which makes it a fair computer. Let's take a look at what it can do. We will ask BASIC to add two and the dialog would look like this:

?2+2 4 OK

The computer answers and then returns OK to signify it is ready for another command. Print commands allow any numerical data or string information to be printed or displayed. For example: PRINT 3*7^2 gives 147 OK to be printed. Similarly, the command: PRINT "The Quick Brown Fox" causes The Quick Brown Fox OK to be printed. Numeric or string variables may be used as well.

Additional features of BASIC that are available include the TAB and PRINT commands which are identical to the tab and space on a typewriter. The PEEK and POKE commands let you directly examine the contents of memory access without the use of matrices. The ASC command returns the ASCII value of a string which is very useful when alphabetizing file entries. Direct I/O commands include INPUT and INP, which let the user enter data into a program as it is executing, and OUT which outputs data to a specified I/O port.

Basic manipulations

Now we'll see how BASIC can manipulate strings. A string is a sequence of alphanumeric characters. "4000 bits" is a string. The \$, RIGHT\$, and MID\$ commands allow the user to take strings and manipulate the data contained in the string, and then assemble the string in any desired manner, as shown in Figure 4. A typical example is the following sample commercial inventory entry

continued on page 48

TABLE 1

COMMANDS IN MITS 8K BASIC

END	FOR	NEXT	DATA
INPUT	DIM	READ	LET
GOTO	RUN	IF	RESTORE
GOSUB	RETURN	REM	STOP
OUT	ON	NULL	WAIT
DEF	POKE	PRINT	CONT
LIST	CLEAR	CLOAD	SAVE
NEW	TAB	TO	FN
SFC	THEN	NOT	STEP
+	-	*	/
=	AND	OR	>
ABS	<	SGN	INT
POS	USR	FRE	INF
EXP	SOR	RND	LOG
ATN	COS	SIN	TAN
VAL	PEEK	LEN	STR\$
RIGHT\$	ASC	CHR\$	LEFT\$
	MID\$		

OK

ERROR MESSAGES IN MITS 8K BASIC

NF	SN	RG	OD
FC	UV	OM	US
BS	DD	/O	ID
TM	OS	LS	ST
CN	UF		

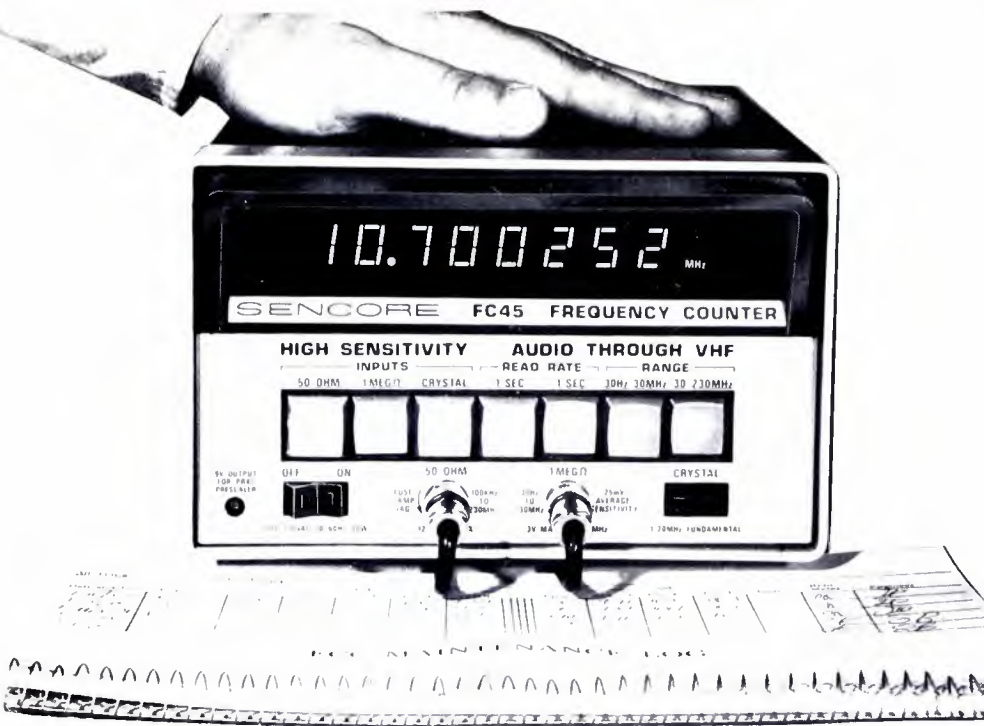
OK

TABLE 2

APPROXIMATE EQUIPMENT EXPENDITURES FOR THE KEZK SYSTEM

Mainframe	\$539
Serial Interface	140
Parallel Interface	150
FSK Cassette Modem	140
Static Memory (4 boards)	600
16K Static Memory	700
VDM-1 Video Module	180
DECWRITER II	1500
Digital Cassette	400
Mini Floppy Disc	650
Monitor (used)	40
8K Basic (2 copies)	90
Keyboard with interface	110
Keyboard Cabinet	35
External System Power Supply	100
TOTAL	\$5374

NOTE: All computer assemblies and interface cards and storage peripherals were purchased as kits.



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It's also super-handly around the studio for maintaining recorders and cart machines, VTRs, sync generators, and cameras. Extremely high 25 millivolt average sensitivity across the entire frequency range allows you to troubleshoot by "sniffing" frequencies with the exclusive PL207 "Snoop Loop", all without direct circuit connections that may cause frequency change and loading.

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____ PR47 600 MHz Prescaler \$125.
____ PA202 Power Adapter for PR47.. \$9.95.
____ PL207 "Snoop Loop"..... \$9.95.
☐ I WANT TO TRY IT. Have my nearest Sencore distributor bring the FC45 to me.
☐ SEND FULL SPECIFICATIONS.

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COMPANY: _____
STREET: _____
CITY: _____
STATE: _____ ZIP: _____
PHONE: _____

For More Details Circle (40) on Reply Card

Microcomputer

continued from page 47

as it might be entered by a clerk:

47 Amalgamated Widget
TAP 1 60 CM

If we consider this entire entry string, we can first separate the name of the advertiser as follows:

LET A\$ = "47 Amalgamated Widget"
Tap 1 60 CM"
NAME\$ = MID\$ (A\$, 12, 18)

We have now created a substring called NAME\$ which is equal to "Amalgamated Widget." In the same fashion the product code, account number (47), spot length (60), priority (TAP 1), and whether the spot is a commercial or a PS, whatever can be extracted from the original string as shown in Figure 6.

Once the computer has broken down the inventory entry into strings it can proceed to automatically sort and place the spot in the future inventory or on a final log.

Integrating the system into station operations

First we must assume that the system is up and that it is an inventory available for about a week. The traffic clerk comes in at 8:30 am and instructs the computer to verify what spots ran the previous day. The machine has the previous day's log in its memory and asks the clerk to enter the list from the program log discrepancy sheet. These entries are compared against the log in memory and the system prints out a listing of spots that were aired for billing purposes. It also notes which spots must be made good.

At this point the clerk may want to update the inventory files. The spots which are to be made good are re-entered. Next, the sales contracts are entered and sample data entry might contain various number codes, the spot name, and any pertinent scheduling information.

Suppose the sales contract calls for 12 spots per week between 7 am and eight spots per week between 3-7 pm for broadcast weeks 30 through 36. A typical dialog that would take place between the computer and the traffic clerk appears in Figure 6. The computer would automatically place the spots in inventory files on disc. When all sales contracts are entered:

continued on page 48

BROADCAST ENGINEER



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Microcomputer

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been entered, the machine would begin a merging routine where it would attempt to sort and place the new entries into the existing inventory with regard to competing advertisers and too-frequent repetition. It would also take into account the priority codes and any spot that could not be placed would be printed out. Sometimes it might be necessary to have human intervention to make a decision on spot placement in case of a conflict. Remember: A computer is not infallible.

When the disc files are completed the system rewrites them on the inventory cassettes for long-term storage.

It's now 3 pm and the system has spent the past few hours juggling inventory files. It's time to print out tomorrow's log. The traffic clerk enters the current date into the system and the computer displays which inventory cassette to load. Another merging routine begins as the computer combines the contents of the inventory file with the log format. After a few minutes the

finished log is printed. Now that one day of inventory has been cleared out of the system, the computer opens a new file for another day 13 weeks in the future.

System costs

Most people talk about computer time costing X number of dollars per minute or per second. With a small in-house system such as ours, that argument becomes non-existent because the machinery is owned outright by the station. If it currently takes your traffic clerk eight hours to get the work done and the computer reduces the time to four or five hours, the system is justified. A system configured like ours can be brought in for about \$5,000 in hardware expense. Table 2 itemizes our approximate equipment expenditures. Labor costs can't really be added to the systems total if the work is done in-house because the engineering salary would have been paid whether or not the decision was made to build the system.

The other costs involved are incurred in developing the software necessary to perform the traffic functions. There are a few routes that can be followed here. Hiring a professional programming house is

very expensive. One alternative is to develop the programs in-house. This involves one or more staff people becoming skilled at programming and it's a very time-consuming option. The approach we took was to hire a computer science major from a local college and turn him loose on the system. Some very innovative programs have been developed this way because our programmer hasn't been conditioned to believe that small computers are slow or lack the capacity to do the work.

In the distant future we plan to integrate the traffic system directly with the bookkeeping functions that are still manual. If the system proves to be flexible enough and reliable, it will eventually generate invoices and affidavits with minimal human involvement.

Acknowledgments

Most of the credit for the concept of the system goes to William Clark, general manager at KEZK. The software development has been due to the efforts of Mark Kuntz, a senior at Southern Illinois University at Edwardsville. I want to thank Lou Elkins of Gate Electronics in St. Louis for his patience while we debugged our hardware in conjunction with his Altair system.

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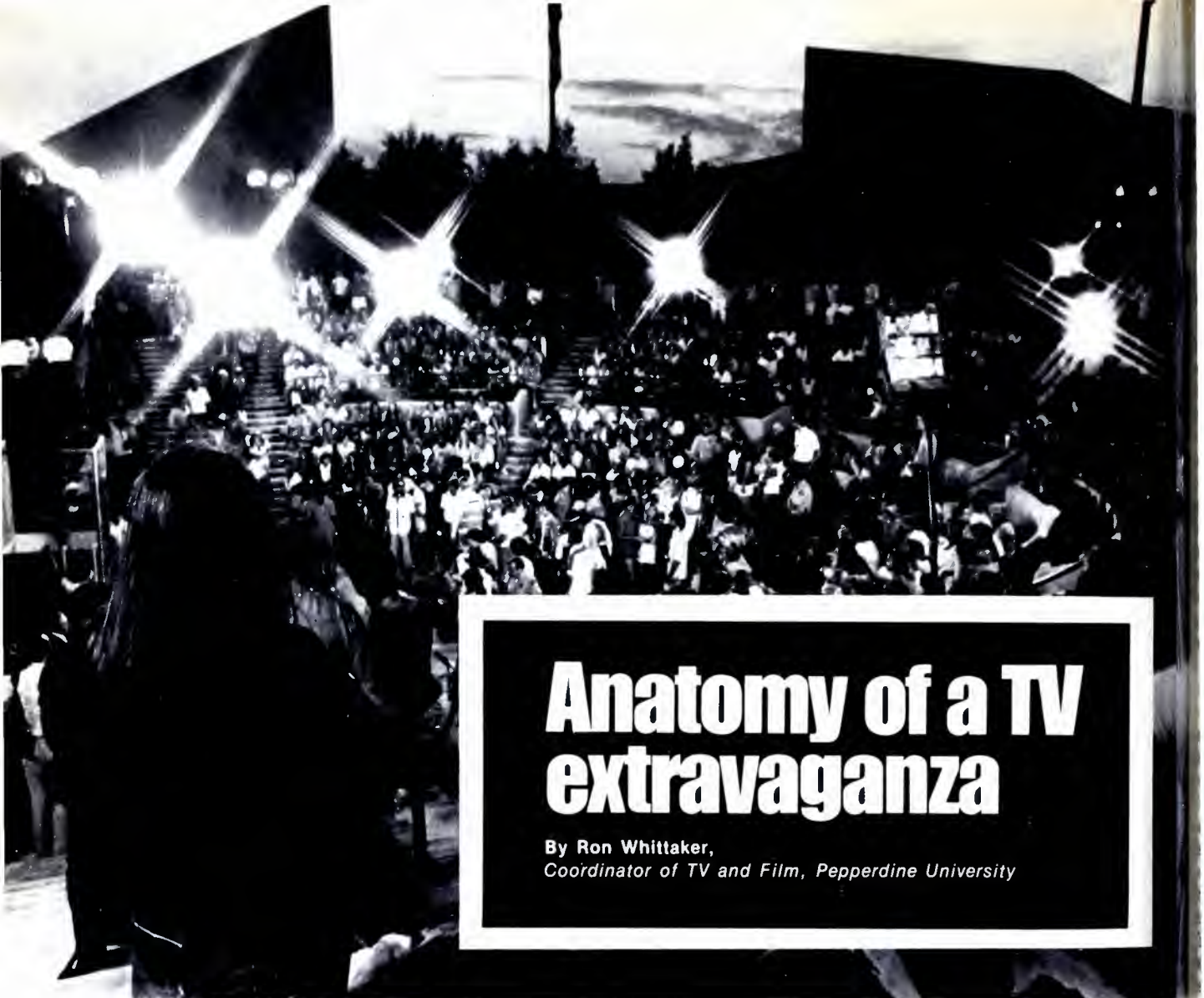
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Anatomy of a TV extravaganza

By Ron Whittaker,
Coordinator of TV and Film, Pepperdine University

A total of 40,000 watts of light were needed to light up the baseball throw in the Pepperdine amphitheater. Since available power would not handle the TV equipment and lights, a 45kW gasoline-powered generator was used for lighting.



A large folk lift provides an elevated shooting position for one of the PC-70's. This particular camera shot was important in providing a reliable "cover shot" during the swimming competition. [Photos by author]



Howard Cosell interviews team captain Jimmy Walker of *Good Times*. Pe Marshall of *Laverne & Shirley* is on the left. Two RCA TK-76 cameras were used on this location to move into areas which were inaccessible to the three floor position cameras. Directional Sennheiser mikes were used on each TK-76.

How do you prepare for a 30-hour extravaganza TV special featuring 30 top stars from the three commercial networks? Answer: very thoroughly.

You start months in advance planning for power, production equipment, and personnel, as well as making decisions on camera and van locations.

When you finish building your camera rigs, transforms, etc. several days in advance, and you set up and check your camera two days before the actual event.

In the case of the Battle of the Network Stars, '77, four sites had to be recovered on the mountainside near Pepperdine University campus in Pebble Beach, Calif.: the beach, the amphitheater, the pool and the track. At these areas nine events were featured: swimming, rowing, bowling, golf, baseball, the obstacle course, the relay, football and the tug-of-war.

In all, 10 cameras were used, including the one in the Goodyear blimp. Portable cameras were used extensively to get into areas inaccessible to the fixed cameras.

Two production companies commanded facilities: Trans American Video and Hollywood Video. The special was produced by Trans World International in association with ABC-TV.

The two-day production was mastered on 2-inch videotape. In all, 10 machines were used. The majority of the "production" actually took place in the post-production phase.

Emphasis on post-production decisions

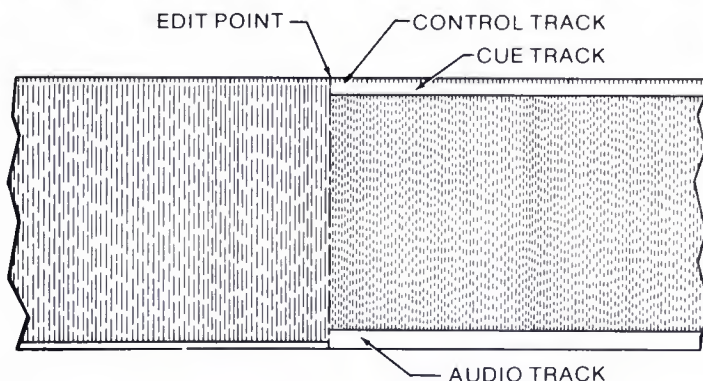
A relatively new technique was used to aid the important post-production phase. A small van with four color monitors, a color camera and two 3/4-inch recorders were used to create an overall "record" of post-production decisions.

One of the four clustered monitors displayed the line-out of the video camera. Two others had the video from the two "iso" (isolated) cameras, which were being recorded on each tape independent of the camera line out. The fourth monitor displayed SMPTE time code, full frame.

A color TV camera focused on the four monitors fed a signal to the 3/4-inch tape machine. In the post-production phase the director could view the 3/4-inch cassette containing the "quad-split" record of the video sources. By using the SMPTE code designations he could

continued on page 54

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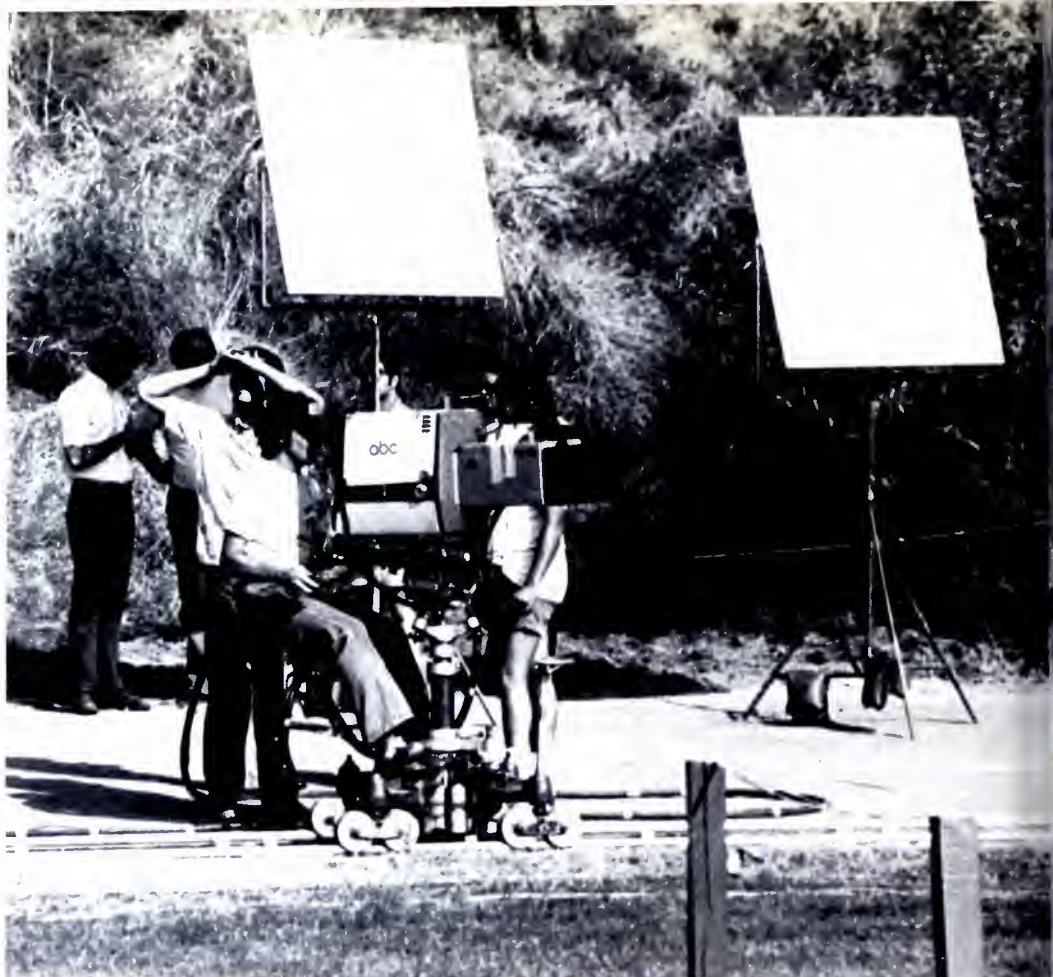
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London, W13 9LH, England ■ 01-579 3447

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TV extravaganza

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Since this camera was shooting into the sun, two large reflectors were used to help fill in objectionable shadows during taping at the obstacle course. Note also the track at the base of the camera dolly which will enable the camera to move with the contestants.



Split Second Time Machine

The Telrex/Magnecord 7400 features a grid of 524 magnetic rings, a precision capstan revolving at 1,800 rpm, and a DC servo drive some 400 times per second. So accurate the National Weather and the Environmental Services selected Telrex/Magnecord 7400 for all others to record meteorological displays. Of course, broadcasters also favor the 1400 for the rugged stability of the die cast main frame, DTL logic and exceptionally clean electronic. Compare our speed, specs, and price. We invite you to make a split second decision.

*At 7½ ips, adjustable $\pm 1\%$ to compensate for tape thickness and mechanical wear.

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BROADCAST ENGINEERING

stitute video from either of the cameras into the final production.

Since the address track is part of three simultaneous 2-inch recordings, it became simply a matter of feeding time code information into the computer editor during post-production.

Time code, of course, can be used to locate audio as well as video. It can be juggled in any way desired to provide the best presentation. For example, the video from a particular sports event can be held into the subsequent description of the event by the contestant involved. The sequence of all recorded audio and video becomes a matter of what will work best, where, and at what time in the production.

In post-production, audio can be
continued on page 56



moving camera shot was important in covering both the boating competition and the obstacle course. When the picture was taken the track for the camera dolly had been assembled and the zoom lens was being attached to the EC-70 camera.



All pre-production preparation relates to hardware. Here a make-up artist applies lip liner to Suzanne Somers of *Three's Company*. There are a number of important differences between "street make-up" and make-up suitable for television.

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TV extravaganza

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"sweetened" (cheering or laughter added) and names, titles and credits can be added.

Post-production also enables

colorizing (color correction) and digital frame storage effects, such as freeze frame and video compression and enlargement.

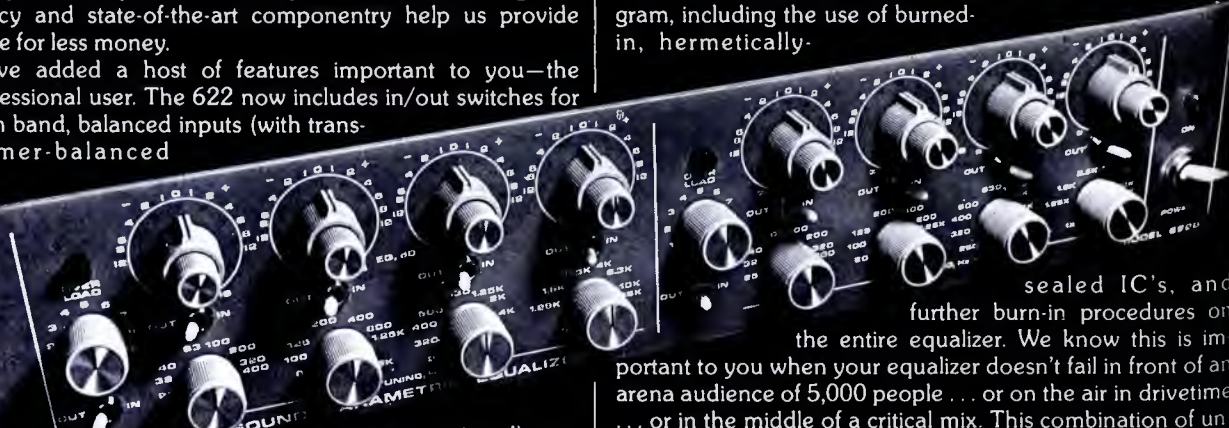
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...ile control room for one of the
...te units for *Battle of the Network*
...tains 23 video monitors. Video
...Dick Schirle checks out one of
...feeds prior to production. The
...for the two-hour special was
...hodman.

...was used for one of the Hitachi
...meras to get a worm's-eye view of
...ycle course competition. This was
...0 cameras used to cover this
...ttle of the Network Stars.



...port equipment and personnel
...nce this production took place
...e a rather large campus area,
...munication was a major con-
...r. A few dozen VHF walkie-
...les were needed to coordinate
...rsonnel for crowd control. In
...tion, a separate RF "wireless
...ne" communication system was
...e to keep in touch with crew
...mbers. Cameramen used their
...gnal PL system.

...ghly directional Sennheiser 415
...815 mikes were used on stands
...on cameras to pick up back-
...nd audio (such as the cheer-
...ers from each of the three
...etworks).

...he event took place at night and
...quired artificial light. The base-
...hthrow (hit the target and a star
...an opposing network falls into
...old water bath) was held at the
...perdine amphitheater. To illumi-
...n this area 40,000 watts of light
...e needed. (See photo.) Since this
...ch power was not readily avail-
... in the area, a 45 kW gasoline-
...ered generator was brought in.
...television vans and equipment
...d the existing power sources.

...umerous additional production
...ple were hired to cope with the
...nitude of the event. Fortunately,
...e was a readily available supply
...n manpower (and womanpower) in
...form of university students from
...perdine's Radio and TV Division.
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radio workshop

Radio automation: beast or beauty?

By Peter Burk

Automation has been with us for over a decade now. The systems have changed...solid state amplifiers replacing tubes and microprocessors replacing relay logic...but one important link in the system hasn't changed: **the man/machine interface.**

No matter how simple or how sophisticated the system is, a good marriage between the operators and the hardware is essential. Let's look at both sides of the interface separately and try to find ways to improve the relationship.

The people side of the system is somehow overlooked at many stations. The boss calls a meeting and announces that a model 2001 automation system is on its way. Half of the staff trembles in fear of being replaced by a button. That's not exactly the way to start the honeymoon.

No creative person is going to sit

back and watch a piece of machinery take over without at least putting up a fight. Not only is he expected to tolerate it, he's expected to learn how to run it!

If these people are shown that the system merely relieves the operator of the **mundane** chores, it should be apparent that the opportunity for creative expression is actually increased. Of course, one of the reasons for automating is to maintain tighter control of the format. If an announcer's idea of creative expression is to wander from the format, he's certain to find an automation system rather restrictive.

Every operator's shift should include ample opportunity for creative expression. An announcer who has a flair for writing can be given copy assignments to be written during his shift. Maybe part of the production load can be shifted to an evening or overnight operator.

Combination automation

A common application for automation is an FM jointly operated with an AM station. If the AM announcers are to tend to the FM system, a new set of problems crops up. It wasn't so bad a few years ago when most FMs were considered orphans, but now there's a

good chance that the automated is beating the AM in the ratings! a bit much to expect an announcer to do a good job running his own competition.

When this problem is encountered the options are limited: somehow make the announcers feel a part of both operations, or split the system completely. You just can't create a competitive atmosphere between two facilities and expect any amount of cooperation at the same time.

Pilot error

Listening to some automated salesmen, you might conclude that the boss' four year old could run the system flawlessly. Thank goodness for child labor laws...we're spared the agony of finding out! Instead we go down to the bus depot, pick out a likely looking candidate, promise him 47 dollars a week, give him a "Stereo Rock" tee shirt, and turn him loose in the radio station.

Breaking new people into the business is a noble effort, but somebody must train these people. Frequently, the chief engineer, most familiar with the system, should provide a thorough and in-depth training program for the operators.

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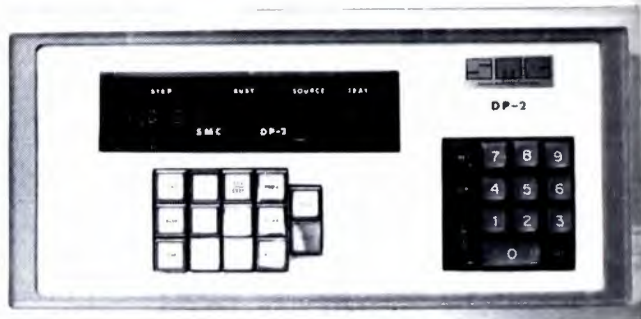
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will too often, memos about how to handle problems go up on the bulletin board **after** the problem occurs. This can be solved by preparing a comprehensive operating manual **before** trouble starts. Keep the language simple. As long as your calculator has more buttons than theirs, you don't need anything else to convince everyone you're an electronic genius. That guy who just got off the bus is going to have to read and understand enough to be able to get himself out of trouble when things go wrong.

Fire drills

As possible, conduct hands-on training for all operators. Take the automation system off line and allow one operator to practice handling simulated failures. Simulate tape breaks, cartridge jams and programming errors. If you've kept good records of past failures, you'll know what to concentrate on. And don't overlook power failures. Every operator must be familiar with the shut-up procedure when the lights come back on.

Feedback

In order for you to keep the system free of bugs, you need lots of feedback from the people who live with the system day in and day out. Encourage the operators to make suggestions and spell out trouble spots. Maintain a discrepancy log that includes operator errors as well as machine failures. If the same operator error keeps showing up with several operators, it's possible that the problem can be "engineered" out of the system.

People-oriented hardware

So far, we've talked mostly about how to get people to work with the machine. Now let's see if we can make the machine to bend a little, too! One of the primary functions of an automation system is to relieve people of tedious, mundane chores. Our equipment isn't as smart as a human, but it is certainly more persistent and a lot less likely to forget to do what it's told. Our job is to capitalize on these assets to minimize our human frailties.

Analyze the way you're utilizing your automation equipment now. Are you fully exploiting the capabilities of the equipment? Or are you a slave to the machine? You should be using the built-in capabilities of the system to **reduce** human errors. The errors that are occurring in your system can be broken down into three basic types:

Forgetting errors Unaware of condition errors Inappropriate action errors

"Forgetting" errors are almost always time related. The operator forgets to take transmitter readings, or forgets to load the next newscast cart, or forgets to change the program sequence for a different day-part. The number of forgetting errors can be reduced by generating reminders from the automation system.

Strictly time-related functions can be set up for an alarm to sound at pre-selected intervals, with the reset for the alarm located near the

point where the action must be taken. For instance, if transmitter readings are to be taken every two hours, the alarm should sound on every even hour, and the reset for the alarm should be located at the transmitter control point.

Another common operator error has to do with newscasts, weather reports and other program events that are time related. If the material is put on a cartridge, there is a risk that the cart won't be changed and the same event will be repeated. If time announcements are included, the result is embarrassing.

continued on page 60

Beaucart 4D.



When we first introduced our four-slot Beaucart® 4D cart machine, it was, frankly, with some trepidation. Sure, our 4D had enough product advantages to knock the standard three-slot machine right out of the running. But could we counter the headstart they had on us, we wondered?

Well, we needn't have worried at all. Our 4D, with its individual tape drive motor for each slot, has become a runaway best seller. Broadcasters have been quick to recognize that the single motor and shaft of a three-deck machine make operating specs impossible to maintain from slot to slot. And the 4D's 25% extra capacity means that three slots are still on-the-air if one machine is down for service.

There's a lot more to the Beaucart 4D story. Built-in recorders, stereo, fast forward, and on and on. For the whole picture, write today for Bulletin 102 or call us at (203) 288-7731. We're the Broadcast Products Division, UMC Electronics Co., 460 Sackett Point Road, North Haven, Connecticut 06473.

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Figure 1 Outboard relay on cart machine provides warning that all cuts have been played and disables machine until cart is replaced.

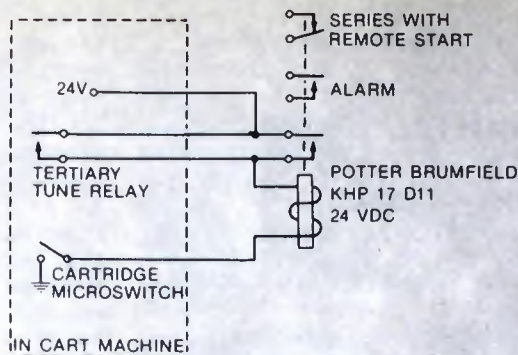


Figure 1 shows a simple solution that allows for several consecutive newscasts (or whatever) to be on one cartridge, yet precludes possibility of the first cut being played again. To use the system, announcer records a tertiary following the last cut. When the cut is played by the system, a warning light comes on, reminding operator to change the cartridge. Just to be certain, the start line of the machine is also inhibited so that even if the operator ignores the alarm, the 1:30 newscasts will play at 4:30. Removing the cartridge resets the alarm.

"Forgetting" errors also can be reduced by trying to establish patterns that become almost automatic. For infrequent procedures, a check list is a good idea.

Ignorance is not bliss

"Unaware of condition" errors probably account for many of the operator errors that your station tallies. Actually, this type of error usually is chalked up to a technical failure. Let's face it...there are many possible equipment failures that the question isn't whether the system will fail, but **when**. Through good preventive maintenance, we attempt to reduce the number of failures, but sooner or later something is bound to happen. How quickly the operator responds to the failure determines whether the incident is a minor inconvenience or a major disaster.

Condition alarms are a big help here. Try to plan the system so that alarms alert the operator **before** the condition becomes obvious on the air. If possible with your system, alert the operator if the **next** source to run is not ready. The extra few minutes or even seconds might be enough to cram another cartridge into the slot.

A carrier alarm is a good idea, but it's a little like locking the barn after the horse has escaped. **Corporate alarms that signal problems which may lead to a loss of carrier.** Transmitter temperature, exhaust air flow and RF drive are good examples.

A "loss of audio" alarm is also a good idea. Make sure that the time constant is long enough to prevent false trips.

The carrier alarm and loss of audio alarm should be distinctive and different, with visual indications that are clearly labeled. Too often an inexperienced operator will assume that when the sound stops the transmitter is off the air. Valuable time is wasted while he tries to tune on a perfectly content transmitter.

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of two rows of three switches each. Error can further be reduced by labeling the sources in the system according to their function and using that nomenclature anywhere the source appears. You'll still have to use numbers since the automation system is organized by numbers, but a descriptive label along with the number helps reduce confusion. A cart machine that is always used for newscasts might be labeled "NEWS-2." Another might be "ID-3" or "SPOT-4."

It's worth the effort

Any automation system is capable of playing the hits as long as everything is working properly. **The difference between a good system and a mediocre one is the way errors and failures are handled.** No matter what make or model your automation system is, the way **you** put it to work in **your** station will make it a beast or a beauty.

We can't possibly cover all specific situations in the **Workshop**, but hopefully, we've stimulated some thinking along the right lines. Readers are encouraged to use the **Station-to-Station** column to share ideas, offer solutions, or pose new questions about this, and other subjects discussed in the **Workshop**. □

POTOMAC INSTRUMENTS

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Every move a picture

"Inappropriate action" errors frequently follow an event that is out of the ordinary. That's an euphemistic way of saying that people get busy when disaster strikes. This type of error plagues every technical industry, so perhaps we can learn something from other fields where considerable research has been done to reduce this type of error.

In aviation, for example, switches and knobs that must be located close to each other are shaped differently. We don't have to carry this to an extreme, but in most situations the engineer picks out his favorite style of pushbutton and uses it for everything from doorbells to transmitter controls. It wouldn't be too tough to use round switches to start functions and square for stop, for instance.

Lower priority functions should be physically smaller switches to lessen confusion. Use a logical and consistent system for direction of control movement, too. **Up is always**

Panel layouts for automation remote control should be planned very carefully to reduce confusion. If you are controlling two rows of three machines, the switches should be arranged in the same configuration

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people in the news

Lyle O. Keys, an original founder and long-time president of TeleMation Inc. has left that company to start a new firm, Utah Scientific Inc. Keys began his television career as a sales engineer for Allen B. DuMont Laboratories in 1952, moving to KUTV, Salt Lake City in 1957 as director of engineering. TeleMation formed by Keys and KUTV's owners. The new company will design and manufacture television broadcast products for sale to broadcast, industrial, government and teleproduction users worldwide.

Thomas R. Meyer, product manager/applications engineer for TeleMation since 1972, has been appointed product manager at Dynair Electronics Inc. Prior to joining TeleMation, he was a communications facilities consultant for Hubert Wilke Inc. and product manager/systems engineer for RCA Corporation.

Wallace Anderson has been appointed customer service manager at TeleMation. Anderson's responsibilities will include service, parts and training on products manufactured and sold by the company. At any time, day or night, customers will be able to call (800) 972-8340 to contact Anderson.



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DUCART

Jack M. Ducart, a veteran of more than 20 years in the broadcast industry, has joined Ramko Research Corp. as general sales and marketing manager. Ducart previously held similar positions with McMartin Industries and Moseley Associates.

E. Carlton Winckler, Sr., of Imero Fiorentini Associates, has been awarded the Progress Medal by the Society of Motion Picture and Television Engineers (SMPTE) for 1977. The award was presented October 17 in recognition of Winckler's outstanding career since the early 1930s as a lighting consultant to both theatrical and television productions.

Also receiving SMPTE special awards for 1977 were **Renville McMann, Jr.**, president of Thomson-CSF Laboratories, the David Sarnoff Gold Medal; **William Offenhauser, Jr.**, a pioneer in the development of many standards for 16mm sound films and author of 16 mm Sound Motion Pictures, the John Grierson International Gold Medal Award; and **John D. Low**, vice president and director of development of Digital Video Systems, the Agfa-Gevaert Gold Medal Award.

New fellows recently elected to SMPTE include the following: **Jack Bush**, director of film, ABC News; **D. Ettore De Cinque**, technical director, Tecnospa Rome, who designed and installed the first demand drive processor with spring-centered rollers in Italy; **Edward Graham, Jr.**, chief engineer, WGTV, Univ.

BROADCAST ENGINEERING

of Georgia; **Julian D. Hopkinson**, technical manager, Pacific region, Motion Picture Products, Inc.; **John Jurgens**, executive vice president and vice president for engineering, Cinema Products Corporation; **John D. Lowry**, vice president and director of development, Digital Video Systems; **Herbert L. Rees**, assistant vice president and director of corporate technical affairs, Eastman Kodak Company.

Corporate manager of advertising and sales promotion at Sola Basic Industries, **Alan Vierthaler** will be responsible for all of the advertising, sales promotion and trade show activities at the corporate level, as well as coordinating the activities of the above operating units.

Marketing director at the time products division of Fairchild Camera and Instrument Corporation is **Charles Jacoby**. Jacoby, who has been in charge of radio game marketing activities since 1976, is responsible for marketing the company's digital watches, clocks and related consumer products.

Ray Gold, formerly with TM Programming, joins Electron Systems, a division of Automation Electronics Inc., as eastern regional sales manager for the Ehome office. □

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This is the official column of the American Society of TV Cameramen (ASTVC). The ASTVC can be contacted by writing to: P.O. Box 296, Sparkill, NY 10976 (914) 359-5985.

Take 1...A Camera is a Camera is a Camera [Not so!]

Lest there be any assumptions that what follows is a technical comparison of the video broadcast cameras currently on the market, stop right there. What we are about to elaborate on is the relative tasks assumed each working day by the TV cameraman vis-a-vis his film

counterpart (the "Hollywood" type).

For the purpose of our scenario, let us assume that we are about to critique a dramatic production "shot" in a typical network studio and a similar production "shot" on film *a la Hollywood*. We will balance the "handicap" further by assuming that the film type (as director of photography) is operating the camera himself, and not utilizing his ever-available camera assistants.

To begin, the film type usually

selects his camera, either personally-owned, rented for the production, or drawn from the studio equipment room. He might prefer ARRI 35BL, a Frezzolini 16mm camera, or maybe the CP-16R, etc., etc. The TV counterpart uses the video equipment that comes with the studio, lens included. This might be RCA, Sony, IVC, Ampex, or whatever you have. This is not to say that any of the aforementioned cameras do not do an excellent job, but it is to say that the assigned cameraman makes no decision as to what equipment he will be using.

Next, it is the practice in Hollywood for the director to run through upcoming scenes with the director of photography (cameraman) for purposes of angles, lighting, dramatic import, etc., etc. The cameraman is a partner to the final decisions. How does our TV cameraman make out in this process? What, if any latitude is he allowed in order to be creative?

Finally, the encumbrances: no matter how many cable-men might be assigned, and no matter how well they perform, a cable is a cable; and, it is one less factor that the film cameraman has to be concerned with. Now, if for some special reason the performers require the attachments of video prompters, then you find that even the so-called "balanced" cameraman presents problems that, once again, your film counterpart does not have to contend with. Your TV cameraman not only has to support the additional weight of the video monitor, but is now also hampered with the harness and mirror assembly that goes with the video prompter. An ideal working arrangement? Not at all! Your cameraman has now become part moving-man.

It is a wonder, and a compliment to their skill and endurance, that the TV cameraman performs as well as he does, given the handicaps that never were a part of the Hollywood film scene.

Take 2...Inserts

Gerry Gander was re-assigned from North-East regional director to director, Schools Liaison Group. He will be moving to the west coast this winter.

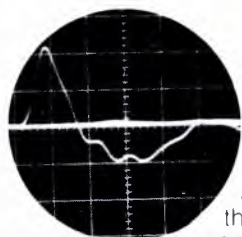
Janet Doka was named as executive assistant and associate director, special activities.

Newly appointed North-West regional rep is Anthony St. John, now associated with KRON-TV.

Fade to Black....

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The price won't overload you, either.

*Outdoor test with Tektronix scope, set for 10V/division vertical, 0.1 μ sec/div horizontal. 22 cal. starter's pistol mounted 15 cm from MD 421 measured pressure of 111,000 dynes/cm² (175 dB SPL). Smooth, rounded scope trace indicates total lack of distortion.

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Probing the problem of down digitals

By Christopher B. Downing, Overland Park, Kansas

Digital devices are now found in increasing frequency in nearly every piece of broadcast equipment: tape machines, audio boards, master clocks, remote controls, transmitters of every description, modular monitors, antenna monitors and BS monitors. In spite of an incredible reliability, a little misbehaving chip will occasionally malfunction internally.

Often something is wrong inside the chip, the entire piece of equipment malfunctions. Using a logic probe sheet, an engineer can tell what is supposed to happen, but an indicating device is needed to show what is actually happening.

You can poke a probe from a meter around and see if a particular point in the circuit reads 5 volts or .35 volts, but you'll be using several ounces of meter and be getting a lot more accuracy than you need. The best way to service digital logic is with a logic level probe. After all, we only want to know if a device is on, off or somewhere in between (where it shouldn't be). We're not interested in whether the high-state voltage is 4.91 volts.

You could buy a logic level probe, but you'd be carrying around about thirty dollars worth of probe you don't need. It's easy to build a reliable logic level probe for less than five dollars.

The probe schematic shows how to build it. The probe will draw less than 30 ma from a five volt power supply (the power source is usually a good source while probing), and indicates "high", "low" and "pulse" logic states. The probe impedance is limited to 10k by the input resistor, and you can set your own level references

just by rearranging the voltage divider.

Because some offset voltage from the comparator inputs will appear on the probe, don't try testing micro-power CMOS IC's, or you'll end up with a whole bunch of bad ones instead of just one.

The sample logic potential appears across a 10k input resistor and is applied to the inverting input of comparator "A" and the non-inverting inputs of comparators "B" and "D". If the sample voltage exceeds the 4.0 volts from the resistor dividing network which appears on the non-inverting input of comparator "A", the comparator turns off. In the off state, the output sinks to ground, causing current to flow (via a limiting resistor) through the high-state light-emitting diode.

If the sample voltage does not exceed the voltage on the non-inverting input, the comparator stays on and no current flows through the LED. If the sample voltage on the non-inverting input of comparator "B" is less than the 1.0 volts on the inverting input, the comparator is off, sinking the output to ground and causing the low-state LED to light.

A slow-speed pulse train is indicated when the low and high-state LEDs light alternately. At high speeds, though, a more definite indication of the presence of a pulse train may be helpful. Comparators "C" and "D" comprise the pulse detection and display circuitry. Comparator "D" is on whenever the sample voltage on the non-inverting input exceeds the 1.0 volt reference. When the comparator is on, the output is above ground, allowing the 1 mfd. capacitor to charge.

continued on page 66

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Here's the most advanced three deck on the market. It's our up-dated 5300A with plug-in decks for unsurpassed accessibility; and a new internal mechanical design which insures very stable and accurate deck and capstan positioning independent of front panel reference. And note the run lights next to each deck.



All leads to the deck go through this plug-in connector. There is nothing to disconnect to remove the deck.

More features? A premium, direct drive hysteresis synchronous motor; reliable low voltage, solid-state solenoid switching, the superb Phase Lok III head bracket, FET muting, active cue tone filters and rear panel LED service aids. It's all there in the new Spotmaster 5300A for mono or stereo.

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The largest-selling omni-directional mike in broadcast. \$49—2 for \$96, 3 for \$141

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NAB Hub Adptr \$11



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broadcast consultants corporation
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For More Details Circle (61) on Reply Card

station-to-station

continued from page 65

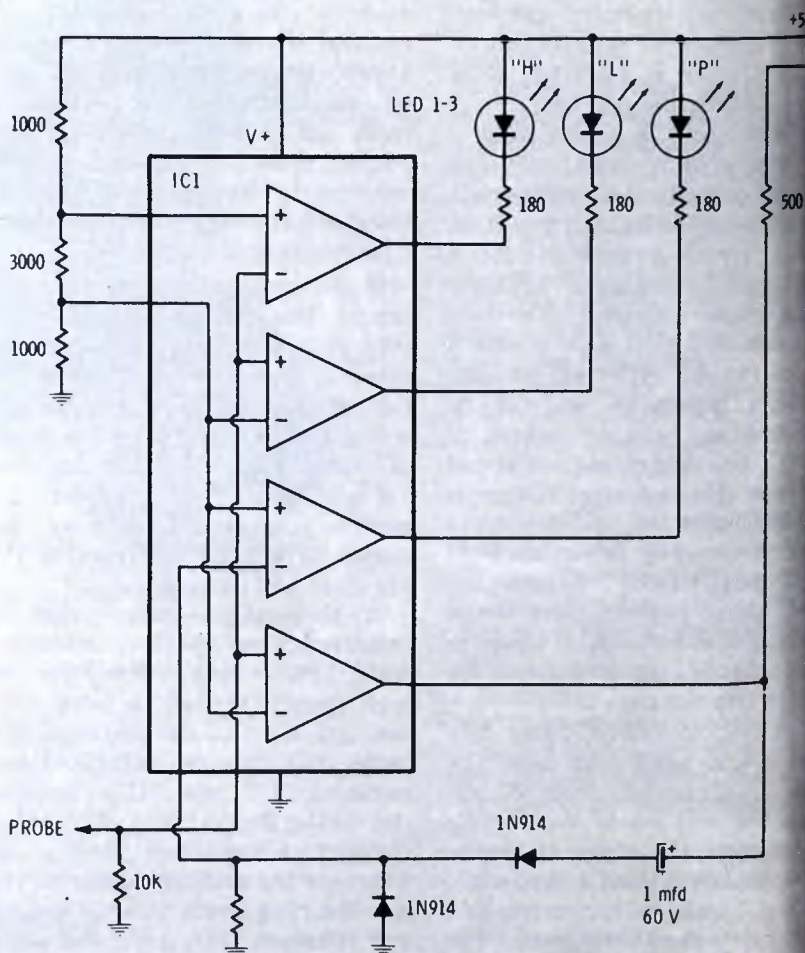
citor to charge through a 500 ohm resistor, a diode and the 1000 ohm resistor at the inverting input of comparator "C". As the capacitor charges, the charging current appears on the inverting input of comparator "C" and turns the comparator off when the reference level (1.0 volts) on its non-inverting input is exceeded.

When the comparator is off, the output sinks to ground and the pulse-state LED lights. As the sample voltage on the non-inverting input of comparator "D" drops to logic "0", the comparator turns off, sinking the output to ground. The 1 mfd. capacitor is discharged through a second diode. The two diodes are necessary to keep the negative discharge pulse from the capacitor off of the comparator input. When the input is driven

negative, the comparator does many things.

I was particularly generous my reference levels, allowing at each end of a five-volt scale you like your indications a tighter, change the resistor in the dividing network. Some pieces of equipment may use a potential of 3.6 volts, but if the power supply for the probe is 3.6 volts the indications will still be accurate (just not as bright!).

National Semiconductor manufactured the quad comparator bought from Radio Shack (and quick), and it will take up to 36 volts on the inputs before the input transistors in the IC start to blow. If you really worry about hitting some negative potential ruining the IC, put a diode in series with the probe input and reverse the voltage divider to compensate for the forward voltage drop. Reversing the power supply leads will definitely cause trouble, so



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2.5-375



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16-240
" f/1.7
2.5-190



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1" f/2.1
18-200
" f/1.7
14-150



20X
1" f/2
17-340



10X
1" f/2
17-170



ENG
3x f/1.8
10-100



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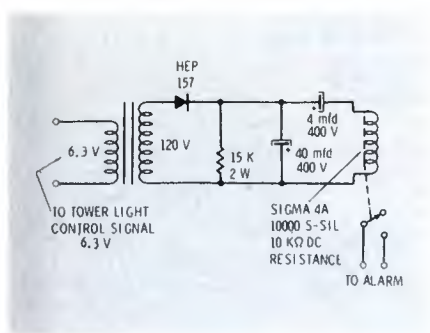
emergency protection might be in order in that respect, also.

I built my logic level probe on perfboard and cased it up in a penlight flashlight case. I don't worry much about damaging the probe because it only cost about \$3.50!

Tower light alarm circuit

By Robert Wittmer, Detroit, Michigan

Here is a tower light alarm circuit that is simple and works. Some relays may be more sensitive than others, in that case, some resistance can be paralleled across the relay to



decrease the energized time if necessary. The alarm indicates tower lights on or off: T on $\approx$ 3 sec. and T off $\approx$ 2 sec.

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BASKETBALL REMOTE SPECIAL—\$499

Portability plus mixer Shure-M67, Telex CS-90 Sports-caster headset, Sennheiser shotgun and combo omni directional mike-system, all complete with Shure AC60 carrycase. Package regularly list value \$671. Individually, M-67—\$169, CS90—\$104, Shotgun plus omni-combo—\$209, Carrycase—\$29.

SENNHEISER SHOTGUN MKE-802, \$159



Common power (K2U) module buys you the opportunity to add an additional omni directional head (ME-20) for only \$50 more. Shotgun plus omni head—\$209.

THREE CHANNEL CONSOLE—\$524



Production or Newstroom Microtrak microphone with 4 mike inputs, 3—high level inputs, turntable preamp, headphone amp, cue circuit with built in cue speaker. \$524. Mounted in portable travel case—\$555. Stereo version \$695, in travel case \$755. Prices are cash with order and expire 12/31/75.

david green
broadcast
consultants corporation
703-777-8660
Leesburg, Virginia 22075

For More Details Circle (63) on Reply Card

More Details Circle (62) on Reply Card

The national office has received many requests for the Chapter Kit of Starting Material from various areas throughout the country, and a number of these areas have already scheduled first meetings. The membership of SBE is continuing to grow as new projects to benefit members are being planned for the coming year.

CHAPTER REPORTS

Chapters 1, 2 and 22—New York

The Regional Convention and Equipment Show, held by Chapters 1, 2 and 22 September 30 in Syracuse, was the largest, and most successful, equipment show ever. The attendance was excellent, as SBE national president, Robert

Wehrman, spoke with many members about their concerns and expectations.

Chapter 9—Phoenix, Arizona

Chapter 9 met September 22 an interesting program by Baumann of BCD, Inc. There was a general discussion of radio stations licensing for input to the national office in determining the official SBE position. An update on the fall convention was presented.

Chapter 16—Seattle, Washington

Chapter 16 kicked-off the 1976 year September 14. The chair presented certificates for Completion as Senior Broadcast Engineer. Jack Shawcraft also led a discussion on the University of Wisconsin's digital technology course and played some samples of the course's videotape lessons. A discussion of FCC docket #20817 dealing with proposed licensing changes followed.

Chapter 25—Indianapolis, Indiana

The September 29 meeting took place in the Indiana University School of Nursing's new television studio, which is equipped with the latest of Strand Century lighting systems. Strand Century presented a program on television lighting, including a demonstration that was interesting and informative.

Chapter 28—Milwaukee, Wisconsin

Matt Siukola, Ph.D., one of the world's leading authorities in the field of antenna design, spoke at the kick-off meeting September 20. Siukola spoke on Circular Polarization—FM and TV Antennas. His presentation covered the most recent work done in the field.

Chapter 40—San Francisco Bay Area

Chapter 40 met September 21 at Mt. Sutro Tower Transmission Facility, San Francisco's newest and most obvious landmark. The meeting began with a slide presentation by Harry Jacobs, resident engineer at Sutro, and continued with tours of some of the individual station facilities located at the site.

Forming Chapter—Los Angeles, California

The first meeting, held September 21 at KCET-TV, was attended by interested engineers. They discussed ideas for programs, meeting locations and attendance. If interested in membership, contact Douglas B. Howland, 1122 E. Chase Drive, Glendale, CA 91205, phone (213) 245-7708.

ITC's ESL-IV

AUTOMATIC, ONE-STEP TAPE ERASER AND SPLICE LOCATER



\$495

Now you can erase cartridge tape and locate the splice in the same operation automatically — without chance for human error. Simply insert your cartridge and press the start button. There's nothing else to actuate or hold down. When the splice is located, the machine automatically releases the cartridge — fully erased!

The ITC ESL-IV Series machine is super-fast (25-29 IPS), but gentle with tapes in NAB size A cartridges. It is super-quiet, super-rugged and ITC engineered to outlast and outperform any other eraser or splice locator made. Pays for itself in time saved and consistent results. All this and our famous 2-year warranty plus a 30 day money-back guarantee of satisfaction.

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For More Details Circle (66) on Reply Card
 November, 1977

from blue bananas to sag tails

David and Goliath
 The AM-FM combine I work for used to broadcast the summer men's basketball league games, until the sponsors lost interest.

During the summer of 1976, we had one game a week on tap, and I was engineering at the studio. We used a Marti remote transmitter for the broadcast, since the games were played on an outdoor court at a tavern not too far from the station.

On this one particular evening, I came into the control room about a half-hour before the pre-game show was to air, and switched on the Marti monitor, which we have wired through the intercom in our Gates board. You can imagine my surprise when I heard cryptic messages crackle from the speaker: "Yeah, Vince, we'll bring the Shure mixer over to the Hilton, but you and Frank go down to the convention and stand by to fire up the video."

After the initial shock wore off, I checked the logbook for the remote transmitter, and to my dismay learned that we shared the frequency with NBC in New York, about 55 miles to our north. I phoned NBC, and was told that the frequency was being used to coordinate operations for the Democratic National Convention. The response was "No Way!" when I asked if they would be done with the frequency by 9 pm, our game time.

I called the executive vice-president of our station and relayed the situation to him, the board's intercom continuing to blare in my ear such profundities as "Wait till Carter comes down, and I'll give you a cue to fire up...." He promised to take care of the matter, as I sweated out the five minutes remaining before air time.

It came to a happy conclusion, at least for us. The VP called NBC and quoted the FCC rules which state that licensees using remote pick-ups for program continuity take priority over those who are using the frequency for dispatch.

Believe it or not, NBC relinquished the frequency, and our game was broadcast. As near as I can tell, so was candidate Carter. Steven L. Lebetkin, Oceanport, New Jersey.

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For More Details Circle (68) on Reply Card

new products

Reproducer

The 750 Series Reproducer from International Tapetronics Corporation is designed and built for broadcasters, and is suited for use in program automation systems.

Among its many features are: precision milled 1/2-inch thick aluminum deck; straight-line tape threading; three-point micro-adjustable head (height, zenith, and true center-pivot azimuth); solid-state optical tape break sensor; and professional +8 dBm output with 10 dB headroom.

Audio output is rated at +18 dBm before clipping, into 600-ohm load. Unbalanced (600-ohm transformers optional). Distortion: 0.5% maximum total RMS amplifier distortion at +8 dBm output level from 50 Hz to 15,000 Hz.

All operating mode indicators and controls are remote-controlled. Standard with all 750s are rack mounting, NAB reel, NAB hub adapters, and technical manual.

The 750 Reproducer is priced at \$1190.00 in its most popular configura-

tion: 1/2-track stereophonic 2-channel, 7 1/2 ips.

For More Details Circle (95) on Reply Card

Mike preamplifier/limiter

The model 1400 in-line microphone preamplifier/limiter from Systems may be used to boost out microphones for driving gain mixers, to boost mike output to line level, or to buffer microphone level lines; all due to its continually variable gain.

Because of the built-in limiter, the 1400 can be used to prevent drive of individual mike or inputs while maintaining high average levels. According to RTS, 1400 has a fast rise time with overshoot, even with 20 dB limiting applied.

The unit's low output impedance enables it to drive microphone cables of 1000 feet or longer with significant loss of high frequency. This also improves the S/N ratio by keeping the signal well above the noise level, RTS reports.

INTRODUCING VEC-1200 & VEC-2000

VELOCITY ERROR CORRECTOR



- A self contained unit.
- Plug compatible with the VR-1200 & VR-2000 VTR's.
- Improves interchange playback signal of standard & non-standard recordings.
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Tel: (213) 843-6674. Telex: 69-6279.

For More Details Circle (69) on Reply Card

distortion is less than 0.05% THD
al. Frequency response: -0.5 dB
0 Hz; -0.25 dB at 20 kHz.
alent input noise: -127 dB ref
V, 150-ohms source.

For More Details Circle (96) on Reply Card

Mass feed audio DA

Ramko Research model DA-
Audio Distribution Amplifier
eed up to 30 600-ohm loads
aneously with complete isola-
The stereo version will handle
60 loads.

Frequency response is ± 0.75 dB
10 Hz to 20 kHz. The output
is +27 dBm. There are three
ns to choose from: a table top
" rack mount mono unit, and
" rack mount stereo unit.
The range from \$145 to \$240.

Installation, run the single
aced output of the DA-X30
and the areas to be served and
to this line any place desired.

For More Details Circle (97) on Reply Card

Error corrector

is introducing a new Velocity
Corrector. The self-contained
plug compatible with VR-1200
R-2000 VTRs.

Improves the interchange play-
signal of standard and non-
rd recordings. It also has a
able automatic or manual first
correction.

For further information, contact
Myster Magnetics Corporation.

For More Details Circle (98) on Reply Card

Liplock audio pitch control

LL-7 Liplock pitch control by
ergerence Corporation produces
ible audio from videocassette

tape when it is moving from 1/10
speed up to three times play speed
during fast and slow ECS-1B Joystick
editor operation.

This new development utilizes a
microprocessor to sample and re-
shape the monitor audio output
during the edit point selection
process.

This plug-in accessory eliminates
the high-speed "Donald Duck effect"
and permits the operator to locate
audio cues quickly at fast Joystick
speeds. Then the audio hole be-
tween two sounds can be accurately

located at slow Joystick speed by
eliminating low speed rumble.

For More Details Circle (99) on Reply Card

Laser ENG link

American Laser Systems has de-
veloped a line-of-sight infrared opti-
cal carrier (model 761) that can
send audio and TV composite video
signals up to a half mile.

Broadcast applications include in-
terface with remote equipment. No
cables need to be layed. The unit can
continued on page 72

ARS-1000



Specifically designed for automated systems

Otari, Japan's leading producer of
professional recorders, announces
the ARS-1000 Automated Radio
Station Reproducer. This new
machine is based on the successful
MX-5050 professional recorder,
with several components modified
to meet the special needs of the
automated broadcaster for
consistent quality and greater
reliability under heavy duty
continuous operating conditions.

Compare these features:
2500 hours MTBF; 7½ or 3¾ ips;
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head assembly for minimum RFI
and improved S/N; optional 25 Hz
sensor; improved low frequency
response for reliable 25 Hz sensing;
+4dB 600 ohm output; improved
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MX-5050 service centers (mech-
anical parts are interchangeable);
one year parts and labor warranty.

If you're considering automa-
tion, ask your automated system
supplier for full details on the ARS-
1000 or call Otari.

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and the rest of a color video production facility
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2-Sony VO3800 Portable Cassette Vtrs., RCA
Production Switcher with special effects gener-
ator; 2-Ampex VP7900 Vtrs., Sony 2850 Vir., Ampex
VR-1000, CVS 504A TBC, TRI-EAS Editing deck
Elektronix 146 Sync Generators, Tektronix 529
Waveform Monitor, Tektronix 520 Vectorscope, 2-ADS
Distribution Switchers; Conrac 19" Color Monitor, 3
" 9" B/W Monitors, TASCOM Model 10 Audio
Mixer, other equipment too numerous to mention.
Equipment is in excellent condition and presently
being used in producing industrial and broadcast program-
ing.

For information concerning the acquisition of this on-
going business, including client list, please contact
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Vix Forge Executive Mall, 656 East Swedestford Road
Building #5, Wayne, PA 19087 (215) 293-9600

For More Details Circle (70) on Reply Card

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93200 St. Denis, France
Canada: Telak Electronics, Ltd., Scarborough, Ontario

For More Details Circle (72) on Reply Card

new products

continued from page 71

be used on a tripod, or placed on a window ledge.

The system also can be used as a repeater to transmit greater distances and in the duplex mode. Permits supervisory video and audio to be transmitted to the cameraman at the remote site.

According to American Laser, the signals are of studio quality and NTSC color compatible. The 761 will operate on 1 volt (p-p) composite video signals from TV cameras, VTRs, or demodulated microwave basebands. No license is required. The company reports that the system is affected only by extremely dense fog.

For More Details Circle (100) on Reply Card

Video L-C delay lines

A complete line of passive video L-C delay lines in 75 ohms is being marketed by Allen Avionics. The units are manufactured with toggle and rotary switches, as well as terminals for strappable delay variations.

The series contains 10 variable delay units. The lowest delay is from 0 to 10.5 nanoseconds in .5-nanosecond steps. The longest delay available is from 0 to 2,075 nanoseconds in 25-nanosecond steps. All units feature amplitude flatness to 5.5 MHz, low insertion loss and low signal distortion.

For More Details Circle (101) on Reply Card

Videocassette tape timer

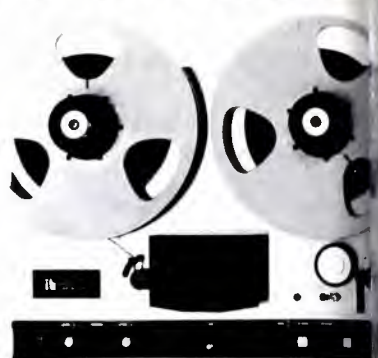
The Artists' Engineering model 300 Autosearch Timer, which displays videocassette tape time in minutes and seconds, interfaces directly with Sony Type 2850 and 2850A videocassette recorders and independently keeps time for both machines. Installation requires no modification and can be done in a few minutes.

Features include: independent record and playback displays; display freeze for logging program on the

IMPORTANT CORRECTION NOTICE

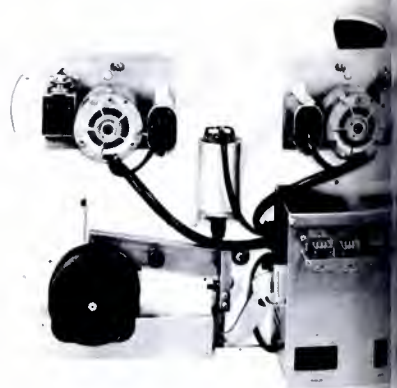
The price of ITC's 750 Series Reproducer was **incorrect** in ITC's ad on page 54 in September, 1977 *Broadcast Engineering*. The correct price for this unit is \$1190.

Profession



ITC's 750 Series Reproducer 1/2 Track Stereo \$1190

- Fully serviceable in the equipment rack.
- Straight-line tape threading.
- Complete access to head and flip-top head cover.
- Professional +8 dBm output with 10 dB headroom.
- Safe tape handling provided with differential braking.
- Optional motion sensing/sensing memory.
- ITC's two year warranty.



For more information contact your automation company or call ITC collect at 309-828-1234

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TAPETRONICS
CORPORATION

2425 S. Main; Bloomington, Illinois

Marketed exclusively in Canada by
McCurdy Radio Industries, Ltd., Toronto

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For More Details Circle (73) on Reply Card

BROADCAST ENGINEER

display store for later retrieval; speed search to stored point; update while assemble record- and optional edit preview.

More Details Circle (102) on Reply Card

Deck sequencer

Meta-Matics, Inc. has introduced a vertical interval deck sequencer, the VISA 350, which provides a phonetic cassette convenience in being compatible with 3/4-inch tape decks. It also can control second switching for as many as 16 decks.

The VISA 360 automatically re-sets tones of proper time and position in the cue, preroll and stop positions; and in the play-head mode, automatically cues up to tapes simultaneously. Then, when the first designated tape is started manually or by automatic start the VISA plays all tapes or in sequence, switching between tapes in the vertical interval. The VISA 360 is available as a stand-alone or standard rack unit, connects to tape machines through their remote control jacks, and can be used with as few as one or as many as up to six.

More Details Circle (103) on Reply Card

25 kw FM final tube

General Electric has designed a Cermolox power tube, RCA 4695, specifically for use in high-gain, high-fidelity FM service. It provides 25 kw of useful power output at 20 dB and 80% overall plate efficiency with a plate supply of 10 kV.

The 4695 is rated for full input to

230 MHz. Its coaxial construction and thoriated-tungsten mesh filament minimize tube inductance and feed-through capacitance. Broad-band circuit cavities may be used. A total tube/cavity pressure drop of 2 inches of water is adequate to give the required 300 cfm cooling air flow. Prototype or production cavity assistance is available.

For More Details Circle (104) on Reply Card

Videotape sequencer

The Videomedia VMC-100 System is a professional approach to sequencing 3/4-inch videotape ma-

chines in a broadcast situation.

The system features: automatic re-cue or program segment advance; auto tape slack; full remote control of vertical-interval, audio-follow video switcher; pulse/re-start (allowing remote break to be made during any sequence of operation); remote status panel indicating which VTR is up; separate bridging switches for monitoring, cueing and engineering checks; and two-tone PLL system for tone cueing and indexing up/down counters.

The single system consists of two to six machines and by cascading

continued on page 74



HEADS NEED RELAPPING? SAVE TIME AND MONEY WITH HANDYLAP™

Magnetic Head Relapping Kit

New from Nortronics... everything you need to recontour worn heads yourself. Nortronics has translated professional relapping techniques into a simple process with step-by-step instructions that eliminates the need to send your worn heads out for relapping. HandyLap includes:

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HandyLap... another technical advance from Nortronics that helps you cut back the high cost of downtime while maintaining optimum equipment performance. Contact your local Nortronics distributor.

Recorder Care Division



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CATALOG

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PRECISION TOOLS & ALLOYS

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More Details Circle (77) on Reply Card

November, 1977

Beau Audio Heads.



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new products

continued from page 73

controllers and more machines, owner can have an indefinite minimum number of machines. system is expandable.

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Scope rack mount kit

B&K-Precision's RM-14 oscilloscope rack-mounting kit is designed to allow rack mounting of company's models 1474, 1471B or 1461.

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current is a true-rms measure-
over a frequency band of 50
10 kHz with an accuracy of
10% of reading + 35 counts) on
ranges except the 2 ampere
range.
distance range is 1 milliohm to
megohms with a midrange accu-
racy of $\pm(0.3\%$ of reading +
count). A new diode test measure-
capability measures forward
across diode junctions. This
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tem permits fast, accurate tape
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latches to grasp and remove
tape.

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Upper/lower case CRT terminals
Model 400D terminals are now
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The terminal has a 2000 charac-
ter memory and displays 20-line by
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memory and can be accessed in
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ters are written in a 7x10-dot matrix
or 8x12-dot field. Blinking charac-
ters, for accent purposes, are
available. The cursor is displayed
in the linking field.
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increase flexibility in tailoring the con-
figuration.

continued on page 76

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new products

continued from page 75

figuration to a particular application. They include the computer terminal, the desktop terminal without keyboard for serial applications, the C-Case conversion for use with free-standing monitors and keyboards, and R-Case rack-mountable controller.

Other options include 40-character line, double-height character export power and CR/LF optional RS232 data interface and RS232 video output for driving auxiliary monitors are standard.

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Logging recorder/reproducer Magnasync/Moviola Corporation is offering a 4-channel logging recorder/reproducer system incorporating several electronic advancements.

The TR-2004 offers the following features: "Simul-Scan" fail-safe system, square-wave bias technique, in-line vertical tape path, LED channel monitoring, and time multiplexing with high-speed search.

Other standard features include a lockable, plexiglas security door, automatic gain control, voice-operated control, dynamic tape motion control, heavy-duty motors, multi-channel monitoring, and full remote capability.

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Video equipment cart
 Rand H Products' Porta-Brace™ is a heavy-duty, adjustable piece of equipment cart. For studio or home use, the Grip has 16-inch spoked wheels, adjustable shelves and axle mounts, and padded bearing surfaces. The standard model, G-1, is compact. The Grip model G-2 has an extra shelf which nearly doubles carrying capacity. Both models are available with accessory cases, trimmable and light stand.

For More Details Circle (113) on Reply Card

Multi-track master recorder
 Cram Audio Corporation has introduced the Telefunken M 15A Multi-track Master Recorder. This machine, available in 8-, 16-, 24- and 32-track configurations, features clocked CMOS logic with Hall effect pushbuttons and solid-state timing throughout.

The indirect capstan drive system incorporates a brushless DC motor with its speed referenced to a quartz crystal oscillator. A mechanical servo system provides constant tape tension in all modes of operation, yet affords editing flexibility. Fast wind speeds are constantly speed variable, while a free LED timer accurately counts in minutes and seconds on a scale of zero.

The machines are available in 15 or 15/30 ips speed configurations and have a tape capacity of 60 inches, equivalent to 3300 feet of standard tape.

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