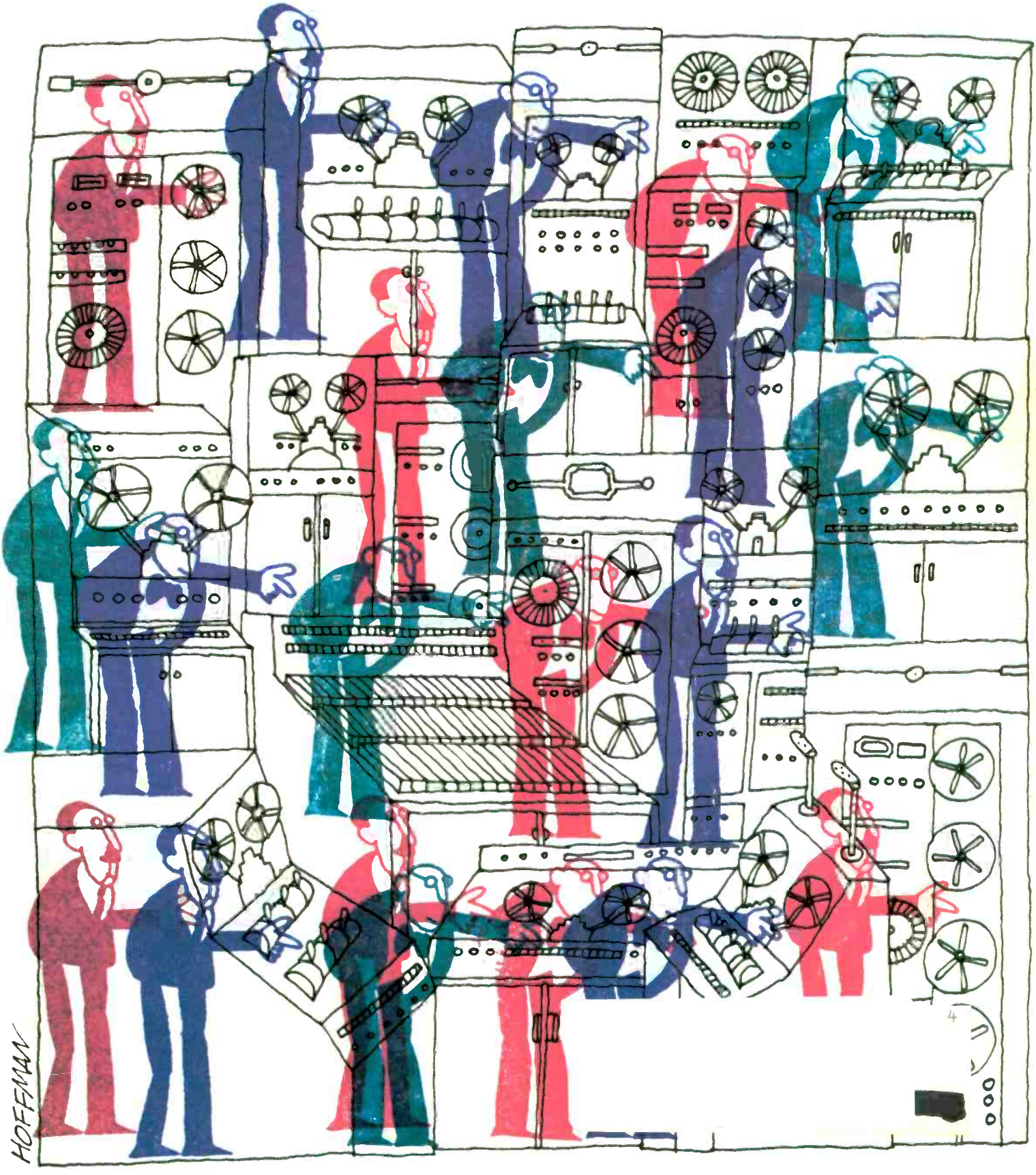
A MACTIER PUBLICATION SEPTEMBER 1970

BM/E

BROADCAST MANAGEMENT/ENGINEERING

Automation: Let pulses do the walking!



WRHM ●LONDON PHASE 4
WSDO Heritage Concert
Mozart: Symphony #18 (14)
Schumann: Manfred (complete)
Rylands, de la Torre,
Holt; BBC Chorus and
Royal Phil/Sir Thomas
Beecham (1:20)
WVFM ●TONY ALLEN SHOW
WOGO READERS THEATER
Children on their Birthdays;
a reading by the author,
Truman Capote (42)

8:00 P.M.

WBBI L BEACH BRETHERN
WCBH ●Stereophonic So. Calif.
Strauss: Suite from Der
Rosen Kavalier; Dorati/
Minneapolis
Schumann: Piano Conc in
A min; Arthur Rubenstein,
Piano; Josef Krips/RCA
Victor Sym Orch
WMET ●FRANK MARTIN
WOST ROMANTIC APPROACH
WPOL H'WOOD PRESBYTERIAN
WRHM Werth Listening To
w/Paul Werth
WUTE SERENADE TO STARS
WOGO EVENING SYMPHONY
Chabrier: Marche joyeuse;
Morel/Orch Royal Opera
House, Convent Garden (4)
Saint-Saens: Cello Conc
#1 in A min; Rostropovich,
cello; Sargent/Philharmonia
Orchestra (18)
Saint-Saens: Organ Sym #3
in C min; Maurice Du-
rufle, organ; Pretre/Paris
Conc Orch (38)
Debussy: La Mer; Boulez/
New Philharmonia Orch
(24)

9:00 P.M.

WBBI SOVERIGN GRACE

WFMX ●
WHOF Se
WMAX SA
WNAC ●J
WPFK MUS
WRHM THE
w/R
Conc
serm
of the
from th
host of

hosted t
WVFM FEAT MU
WSDO Great Mus
Verdi, Brau
Arias
Puccini: Dor
excerpts fro

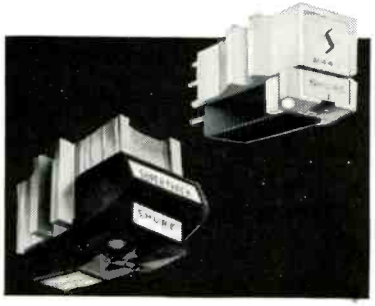
10:00

WBCA ●BILL HANDS
WHOF PENTACOST M
WNOB ●PRIMARIL FS
WNX NEWS
10:20 The Young
w/Scott O'Neil a
WSDO Portraits in Southe
Russell Oberlin an
tenor
10:15 Musical Round
Moussorgsky: Pictur
Exhibition (34)
WTBT REFLECTIONS
WVFM ●Feat Ramsey Leade

11:00 P.M.

WSDO Evening Concert
Haydn: Symphony #23
Delius: Hassan (29)
WTBT ●Stereo Tips and Bits of
WUSC ROCK CLASSICS

Just for the record...



More FM and AM radio stations have standardized on *Shure M44 series cartridges* than any other, because of their unique combination of good sound, ruggedness, and inexpensive price. Stylus change takes only seconds. They are well suited to back-cueing. Wide choice of tracking weights from ¾ gram to 5 grams. For "high fidelity" FM stations, the *Shure V-15 Type II Improved* cartridge delivers superlative reproduction — *regardless of the level at which the record is cut.* Send for the Shure "Guide To The Conversion Of Monophonic Broadcast Facilities For Stereo Records." Shure Brothers Inc., 222 Hartrey Avenue, Evanston, Ill. 60204.

SHURE

Circle 100 on Reader Service Card

At KTAR-FM Phoenix, the office parties are so dull you can hear the champagne bubble!

But On The Air . . . Wow!

Be it someone's birthday, Christmas, the 4th of July, Marcie's engagement or New Years, the office parties at KTAR-FM are deadly dull.

Because from 8 PM until 6 AM the only ones at the station are the janitor, the remarkable Schafer Automation System and an engineer who handles AM, network switching and merely keeps his eye on the FM operation.

Yet KTAR-FM, which features the very popular Hit Parade '70 sound 24 hours each day, comes on so "live" that the station gets many phone calls asking if there are openings for disc jockeys.

Although KTAR-FM has been on the air with the Schafer Broadcast Automation System and Hit Parade '70 programming for just a few months, it is number 8 in ratings out of 31 stations in the booming Phoenix-Mesa-Scottsdale market.

KTAR operations manager, Jack Kelly sums it up quite simply . . . "Schafer automation gives us a better quality sound at a lower cost with greater reliability and that adds up to profit."

The KTAR story is *must* reading for anyone in FM—or AM—radio. It's yours for the asking. Just mail the coupon.

schafer

Schafer Electronics, 9119 De Soto Avenue,
Chatsworth, California 91311 (213) 882-2000
A division of Applied Magnetics Corporation

Send me the amazing KTAR-FM success story (please print)

name

station job title

address

city state zip

Circle 101 on Reader Service Card

SEPTEMBER 1970/VOLUME 6/NUMBER 9

BM/E

BROADCAST MANAGEMENT/ ENGINEERING

Editor:
JAMES A. LIPPKE

Associate Editor:
THOMAS R. HASKETT

Assistant Editor:
THOMAS E. WHYATT

Art Director:
KAREN WEINSTEIN

Editorial Director:
GEORGE ROSTKY

Production Manager:
ARLINE G. JACOBS

Production Assistant:
ROSALIND LEIFER

Research and Circulation Manager:
IRENE CHERVIN

President:
RALPH E. RICHARDSON

This month's cover: Will you need to have your complex operations automated in the 70s? Artist Sandy Hoffman shows one way to avoid the move to digital pulse control—but if you can't go everywhere at once, why not let your pulses do the walking?

6 Broadcast Industry News

14 Interpreting the FCC Rules and Regulations
Ownership Reports

22 Digital TV Switching Made Easy
You'll have to know digital to make it through the 70s, and this basic course on video switching with digital control pulses can start you off.

SPECIAL SECTION: AUTOMATION

26 Automation: Let Pulses Do The Work
A typical automation system using digital control pulses —look for VTRs that make their own decisions; cameras that adjust for light level and color intensity; transmitters run by minicomputers . . . and that's just the beginning.

29 WOHI: Fully Automated Talk Station
This small-town radio maintains separate AM and FM programming, both automated, and has enough time left over for lots of extras, like more public-affairs activities.

32 Integrated Circuits for Low-Cost Automation
It costs less than $3000 and your own chief engineer can install it: Maybe this is the control unit that will form the basis of your automation system.

34 How to Automate TV Traffic
Use an automatic typewriter—get accurate logs and schedules faster; large-scale correspondence looks better and takes up less of your secretary's time.

36 Computerized Accounting for Cable Systems: How can it help you?
Billing and marketing, management and accounting, they all can be streamlined by a good data-service bureau.

44 Broadcast Equipment

48 Sale of the Month

52 New Literature

53 Names in the News

54 Crosstalk

60 Editorial
Learn Digital

Mactier Publishing Corp.
820 Second Ave., New York, N.Y. 10017, 212 661-0450

Also publishers of:
BROADCAST EQUIPMENT BUYERS GUIDE
EEE
ELECTRO-PROCUREMENT

BPA

BM/E, Broadcast Management/Engineering, is published monthly by Mactier Publishing Corp. All notices pertaining to undeliverable mail or subscriptions should be addressed to 820 Second Ave., New York, N.Y. 10017.

BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities. These facilities include AM, FM, and TV broadcast stations; CATV systems; ETV stations, networks and studios; audio and video recording studios; consultants, etc. Subscription prices to others: $15.00 one year, $25.00 two years.

Copyright © 1970 by Mactier Publishing Corp., New York City.
Controlled Circulation postage paid at Duluth, Minn.

HELICAL SCAN VTR PROCESSOR SYSTEM

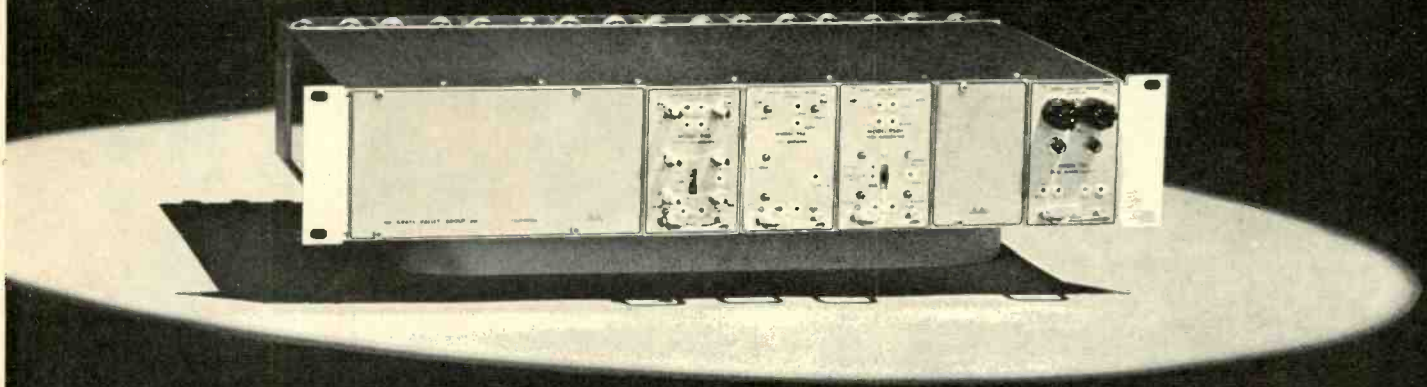
940H PROCESSING SYSTEMS RELIABLY REPLACE ALL SYNC AND BLANKING PULSES MISSING DURING THE PERIOD OF THE HELICAL SCAN (SLANT TRACK) VTR DROPOUT. BY INSERTING STANDARD PULSES INTO THE VIDEO SIGNAL, DUBS TO OTHER HELICAL SCAN OR QUADRUPLEX MACHINES CAN BE MADE. IN ADDITION, SYNCHRONIZING PULSES AVAILABLE FROM THE 950H SYNC GENERATOR CAN BE USED TO DRIVE CAMERAS AND SPECIAL EFFECTS SYSTEMS FOR TITLE INSERTION, ETC.

FOUR SYSTEMS ARE AVAILABLE, ONE FOR MONOCHROME AND THREE FOR COLOR. MODEL 940H-4 COLOR SYSTEM EMPLOYS A MODEL 955 COLOR LOCK AND COUNTER TO PROVIDE THE USER WITH A COMPLETE COLOR SYNC GENERATOR SYSTEM WHEN PROCESSING IS NOT REQUIRED.

ALL MODELS EMPLOY THE SAME TYPE MOUNTING FRAME. THE MONOCHROME VERSION (940H-1) CAN BE CONVERTED TO COLOR AT ANY TIME BY INSERTION OF A 955, 962, OR 956 MODULE

MODEL 940H-1 (Monochrome)	$1,390
MODEL 940H-2 (Color w/Burst Amplifier)	$1,580
MODEL 940H-3 (Color w/Color Lock)	$1,830
MODEL 940H-4 (Color w/Complete Color Sync Gen)	$2,065
AGC OPTION (MODEL 906) FOR ANY SYSTEM	$500

GVG PROCESSORS CARRY A TWO YEAR WARRANTY AND ARE AVAILABLE ON A 30-DAY TRIAL.



THE GRASS VALLEY GROUP, INC.

FOR ADDITIONAL INFORMATION CONTACT GRAVCO SALES, INC.

6515 Sunset Blvd.
LOS ANGELES, CALIF.
(213) 462-6618

Station Plaza East
GREAT NECK, N.Y.
(516) 487-1311

131 [illegible]
ARLINGTON HEIGHTS, ILL.
(312) 394-1344

[illegible] Metrocrest Drive
DALLAS, TEXAS
(214) 352-2475

1644 Tullie Circle, N.E.
ATLANTA, GEORGIA
(404) 634-0521

Circle 102 on Reader Service Card

BROADCAST INDUSTRY NEWS

New FCC line-up will strengthen Burch lead

The new man on the Federal Communications Commission is an old friend of Chairman Dean Burch, having served as an aide to both Burch and President Nixon since 1960.

Sherman Unger will move into the seat vacated by Robert Wells, and Wells will move into a full seven-year term, replacing Kenneth Cox. Unger inherits only the eleven months remaining in the old Wells seat. However, he has a good chance at beginning a full term of his own next year.

Both appointments are subject to Senate confirmation. Expected opposition comes from Black Efforts for Soul in Television. BEST has long sought the naming of a black man to the FCC and is asking the senate to deny Unger in favor of a black commissioner.

Unger, a Republican from Cincinnati, has been general counsel of the Department of Housing and Urban Development. Wells is a Kansas Republican.

Now it's Cartridge Color from Avco

Stealing the limelight, from CBS-EVR and Sony-Philips videocartridge plans during July and August, was Cartrivision from the Avco Corporation. Avco's subsidiary, Cartridge Television Inc., announced it would manufacture and market the first U.S. mass-produced home cartridge color television system. Built to sell in the $800-$900 range, the combination receiver-recorder-playback unit was the hit of the Consumer Electronics Show, June 28—July 1.

By displaying cartridges for rent with such titles as "I am Curious Yellow," and the "Art of Marriage," Cartrivision made a point—entertainment and educational self-improvement courses in the privacy of your own home at your convenience.

Blank tape cartridges can also be purchased for recording off-the-air (simply by setting an automatic timer) or for making home video tape recordings. A b & w TV camera is part of the system.

Cartridges will be sold in 15-minute, 30-minute, one-hour, and two-hour formats, blank or pre-recorded. The company says hundreds of pre-recorded, full-length movies will be available for rental at as little as $3.00. Full length features are expected to sell for $24.98—the price of a two-hour blank cartridge.

Momentum for the Cartrivision system built up during the summer when V-P Sam Gelfman announced programming agreements with United Artists, British Lion Films and its own subsidiary, Embassy.

In the educational area, Cartrivision will convert the McGraw Hill library to tape and will produce its own special programs covering home repairs, gardening, child care and the like. Existing films on these topics are not geared for individualized viewing, Gelfman said.

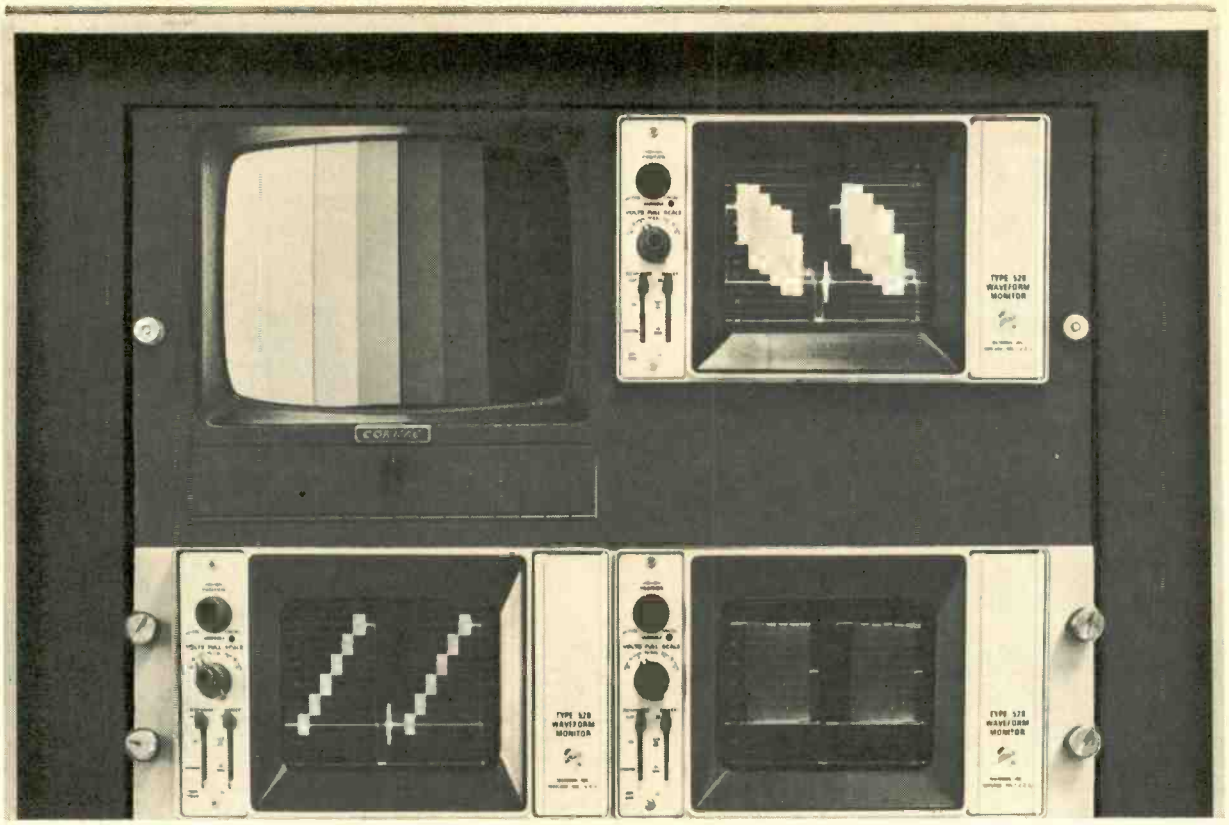
Avco announced that the Admiral Corporation would also produce and distribute the Cartrivision system.

Avco also announced that a 128,000-square-foot plant in San Jose, Calif. was being readied for the manufacture of cartridges and tape decks. Units are expected to be available in early 1971.

If the momentum has swung to Avco, it is by no means yet a winner in the race for the consumer-education market. Philips will be saying more this fall, and the Nord Mende super 8-mm film cartridge system (which uses a flying spot scanner) backed by Springer Publications of Germany will make a debut in the USA in October. You can expect, then, to hear of still another giant TV set manufacturer and software supplier entering the competition.

Also in October, at the upcoming AES Convention, a 12-minute video disc concept from Telefunken will be described. And prior to that it's expected that Ampex will announce a cartridge VTR, on September 2.

Continued on page 8



COMPACT, SOLID-STATE

waveform monitor

from TEKTRONIX

The Tektronix 528 Waveform Monitor is ideally suited for monitoring waveforms from camera outputs, video system output lines, transmitter video input lines, closed-circuit TV systems and educational TV systems. This compact instrument requires only 5¼ inches vertical and 8½ inches horizontal mounting space. Low power consumption (48 watts) and long-term reliability are achieved by using all solid-state circuitry.

Either of two video inputs, selectable from the front panel, may be viewed on the 8 x 10-cm screen. The video signal being displayed is provided at a rear-panel connector for viewing on a picture monitor.

Calibrated, 1-volt and 4-volt full scale deflection factors provide convenient displays of typical video and sync signal levels. A variable control provides uncalibrated full scale deflection factors from 0.25 volts to 4.0 volts. FLAT, IRE, CHROMA, and DIFF GAIN vertical amplifier response positions permit rapid observation and measurement of waveform characteristics. A slow-acting DC Restorer maintains a constant back porch level despite changes in signal amplitude, APL or color burst and may be turned off when not needed. This switch and other infrequently used operating controls are conveniently located behind a front-panel hinged door.

Sweep modes are: 2 V SWEEP (two field), 2 V MAG SWEEP (expanded two field), 2 H SWEEP (two line) and 1 μs/div SWEEP (calibrated sweep with accuracy within 3%). Internal or external sync is selectable. Provision is made for YRGB and RGB displays. Nominal 1-volt drive for picture monitor is provided on rear panel.

This lightweight waveform monitor converts to a portable unit for field service applications by simply adding an optional protective cabinet. An optional Rack Adapter permits side-by-side mounting of two 528's.

Your Tektronix Field Engineer will demonstrate the 528 on your premises at your convenience. Please call him, or write Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005.

528 Waveform Monitor	$890
528 Mod 147B (with protective cabinet for out-of-rack applications)	$920
Rack Adapter for mounting two 528's side-by-side (016-0115-02)	$ 95

U.S. Sales Prices FOB Beaverton, Oregon

Available Through Our New Leasing Plan

Tektronix, Inc.

committed to technical excellence

Circle 103 on Reader Service Card

Visual files under Chapter Eleven

Unable to meet obligations to unsecured creditors, Visual Electronics Corporation and a wholly-owned subsidiary, Visual Electronics Laboratories, have filed for an arrangement under Chapter Eleven of the Bankruptcy Act.

Financing from John T. Maguire & Company will help keep Visual operating at—due to substantial cost reductions—an anticipated profitable level. Also, President James B. Tharpe reports, Visual will try to reconcile matters with D.C. Heath & Co. and Heath's parent company Raytheon. Heath has elected to rescind its 1969 sale of Visual Educom Inc. to Visual for 15-year promissory notes.

Cable franchising—New York has big plans

If it works in New York City, it'll work anywhere—or that's what many local city hall observers are thinking as they watch Mayor John Lindsay's cable TV franchising plan develop.

The big policy change is a proposal to allow competitive bidding for service to all boroughs except Manhattan. Until now, the city has accepted no competitive bids, preferring to negotiate with just a few selected applicants.

As for Manhattan, the city has agreed to a 20-year contract for TelePrompTer and Manhattan Cable TV, whose franchises expire soon.

Terms of this package: Franchise owners can't own stock in other city cable systems, in a TV network or in local radio, TV or newspapers; the companies would have to expand from 12-channel service to 17 by July 1971 and 24 within three years—and would provide customers with converters allowing reception of all channels from both systems; two of the five channels to be added immediately would be for city use, two for the public and one for the company.

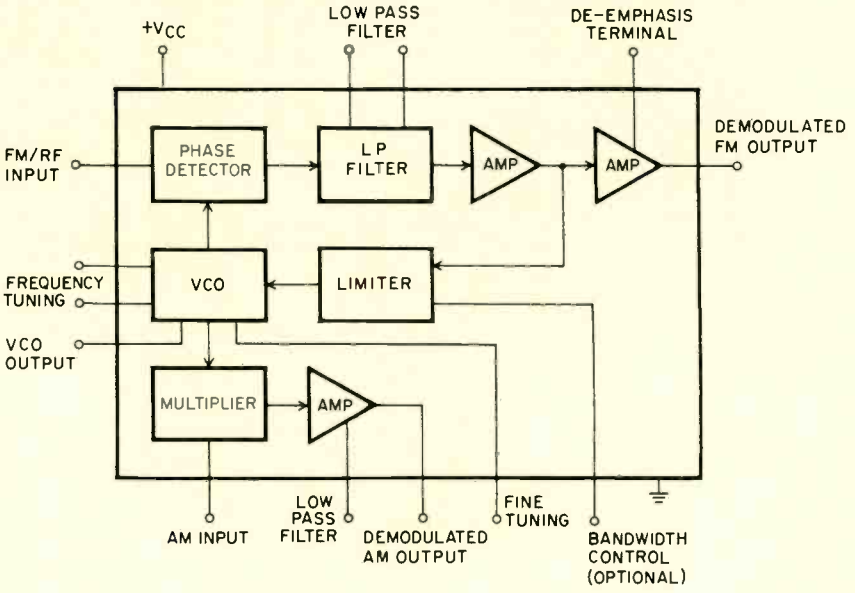
Along with other provisions is payment to the city of a five percent of gross from cable services and ten percent from other services. At the expiration of the 20-year contract period, the city would have the option of buying the systems; if better bids had been received, the companies would have to match those.

Now the question to be settled is whether the FCC will fight this virtual monopoly.

Look, Ma—no coils!

The usual hangup with ICs is that you can't integrate coils and variable capacitors because of their relatively large size. But three engineers at Signetics Corp. (Sunnyvale, Calif.) have developed a new IC that uses no coils, yet replaces most of the tuned circuits now used in an FM receiver. In the Phase-Locked Loop, inductor action is synthesized (see diagram) and the whole device is smaller than a house key. Invented by Hans Camenzind, Alan B. Grebene, and David Kleitman, the PLL can be used as a signal generator, tone encoder/decoder, and modulator/demodulator for AM, FM, and stereo FM. It can be programmed to lock on frequency, for automatic tuning, and can be used to decode pulses sent via telephone lines. This feature would enable a subscriber to call his home when away and turn on an oven to cook a roast.

One of several FM broadcast receivers built in the Signetics lab is only 1/3 the size of a comparable commercial receiver. The PLL replaced three tuned circuits, a discriminator, two conventional ICs, and two discrete transistors. A $6 version of PLL is expected to replace $20 worth of components in FM receivers.



Tape news

DuPont is developing a technique for duplicating video tape that is said to be 10 times faster than present methods. The DuPont system is direct tape-to-tape, using chromium-dioxide tape and a thermal transfer action. It is said to be different from the Memorex thermal-transfer and the conventional magnetic-transfer methods. In the DuPont system, blank chromium dioxide tape is heated to 130°C and brought into contact with the master, whereupon the magnetic pattern is instantly transferred. Duplication speed is theoretically limited only by equipment speed —perhaps 60 or 90 in/s being practical.

In our June news column (page eight), it was stated that 3M is working on a high-energy videotape which will permit duplication without the need for a mirror-image master. That was incorrect; the company is developing a *system* of high-speed videotape duplication which will *not* require a special mastering tape and mirror-image master VTR. This is not to be confused with the new high-energy ferric-oxide video tape which 3M demonstrated at the 1970 NAB convention. That new tape has 6 dB better signal-to-noise ratio than conventional Brand 400 3M video tape, thus making it ideal for those tape duplicating systems which *do* require a mirror-image intermediate tape. Introduction of the new 3M tape is planned for 1971.

Meanwhile Advent Corp. has begun marketing chromium dioxide audio tape, which has greater sensitivity (and thus greater dynamic range) above 1000 Hz. However, tape machines will require different bias and equalization settings to switch over from conventional iron-oxide to chromium dioxide tape. Some tape machines are planned which will have

switchable bias and equalization. The new tape will appear first in cassette format.

Another bullish CATV forecast

A report from Quantum Science Corporation gives one of the most optimistic predictions yet on the future of cable TV.

The company's *samson report* gives as reasons for its optimism the recent favorable attitude adopted by the FCC toward cable, the better reception of color programming on cable, added channel capacity, two-way capability, and the increasing sophistication of cable systems operators and equipment.

The report's predictions for 1980:

- Revenues will total close to $3 billion ($600 million from advertising, $2.2 billion from subscribers and $86 million from communications). No future is seen for pay-TV.
- Purchases will amount to about $1.5 billion ($300 million for program material, $604 million for equipment and cable, and $638 million for installation).
- Advertising will be done on local origination shows at rates lower than off-air (and with greater audience selectivity). FCC restrictions will limit income by limiting number of commercials.
- The average system will spend around $10,000 a month on programming, which will include packaged local origination fare as well as movie performance rights, wire services and reruns.
- More than a third of the installation costs will be for turnkeys; almost two-thirds of the construction business will go to independent contracting firms.
- Two-way systems revenue will come mainly from educational services ($12 million), rating polls ($4.5 million), security systems ($15 million), shopping services ($35 million) and others ($20 million). The report does not see much future for computer services, facsimile, mail, library or banking uses by cable.

IN BRIEF . . .

The National Industrial Television Association held its first general membership meeting August 6. The non-profit group aims to create "a forum for creative and technical ideas, and a central source of information" for men involved in business and industrial use of TV. To promote interest, NITA President Tom Hatcher, of Equitable Life, announced a two-day conference in Washington, D.C., November 10 and 11. And NITA has already signed up its first Corporate Sustaining Member, the Sony Corporation. For more information, write NITA at P.O. Box 228, East Orange, N.J.

Film and TV equipment, techniques and services from around the world will be on display at the Americana Hotel, New York, October 27—30. The event: an *International Film & TV Expo and Fair,* scheduled concurrently with the *International Film & TV Festival of New York.* Featured at *Expo* will be the latest in videotape and computerized film production, a buyers' and sellers' market and a field of producers, agencies and so forth from inside and outside of the U.S. Write Industrial Exhibitions, Inc., 121 West 45th Street, New York, New York 10036, for information on *Festival* or *Expo.*

The 20th Annual IEEE Broadcast Symposium will be held at the

WE DON'T PROPOSE TO MAKE YOU A BROADCAST

computer expert in 1 hour.

But we do promise—to your key engineering and management people—a fundamental understanding of computer technology and its application to television station operation and management. What it can do and what it can't. We'll tailor our basic computer seminar to fit your schedule. In your station. For an hour or a day. No one can touch Sarkes Tarzian, Inc. competance and experience in television automation by computer. We invite you to pick our brains. Call Russ Ide, collect, to arrange a date. AC 812/332-7251.

Sarkes Tarzian, Inc. Bloomington, Indiana

Circle 104 on Reader Service Card

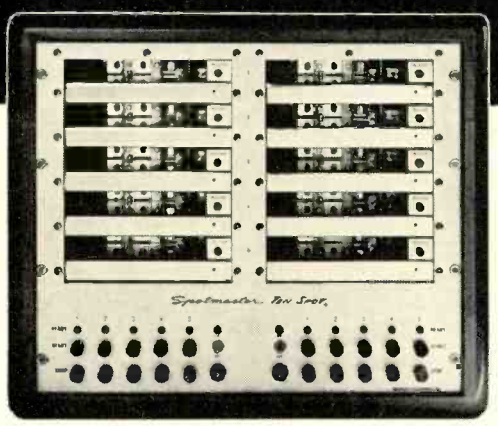
Washington Hilton, Washington, D.C., on September 24th and 25th. Registration will begin September 23rd for the program which will feature four technical sessions on cable TV, AM, FM and broadcast TV. Papers and luncheon speakers, hospitality suites and a poolside radio and TV colloquium will round out the session. For information, write or call Edward L. Shuey at Ampex, 7222 47th Street, Chevy Chase, Md., 20015; (301) 652-1881.

Proposed FCC rules would require broadcasters of telephone interviews to record and make available for review the programs, complete with a list of the names and addresses of persons whose conversations are aired. If there have been no complaints or inquiries after fifteen days, the lists can be destroyed and the recorded tapes re-used.

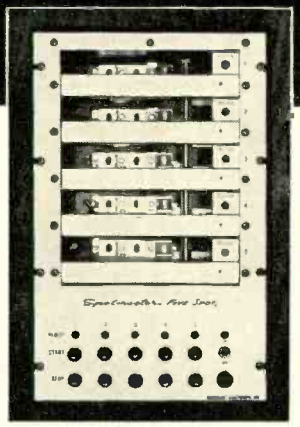
A quick look at other FCC activities: The Commission will now accept applications for uhf TV translators on Channel 21—69. . . . . Local stations are allowed to charge their regular commercial rates for political broadcasts responding to network programs—this was the FCC's answer to an inquiry from KARK-FM (Little Rock). . . . . Volume 15 of FCC reports is now available. It costs $6.00, from the Superintendent of Documents, U.S. Printing Office, Washington, D.C., 20402, and covers decisions and reports for the last three months of 1969. . . . . The period for compliance with TV tuning rules has been extended. As of now, 10% of all new TV receivers must be equipped with comparable systems for tuning vhf and uhf channels (probably with detent or pushbutton tuners) by July 1, 1970. The required percentage goes up to 40% on the same date in 1972, 70% in 1973 and, on July 1, 1974, the figure will be 100%.

Spotmaster

Multiple Cartridge Playback Units



Ten • Spot Model 610B



Five • Spot Model 605B

...bringing a new dimension to pushbutton broadcasting

Spotmaster Ten • Spot (holding 10 cartridges) and Five • Spot (holding five) will reproduce any NAB Type A or B cartridge instantly at the push of a button . . . at random or in sequence. They may be operated manually or incorporated into programmed automation systems, using one, two or three NAB standard electronic cueing tones.

The Ten • Spot is designed for 19″ rack mounting while the Five • Spot is available either in an attractive walnut-finished case or with a 19″ front panel containing a cartridge storage cubicle. Both are backed by Spotmaster's iron-clad full-year guarantee.

For further information about these and other Spotmaster cartridge tape units, call or write today. *Remember, Broadcast Electronics is the No. 1 designer/producer of broadcast quality cartridge tape equipment . . . worldwide!*

BROADCAST ELECTRONICS, INC.

8810 Brookville Road, Silver Spring, Maryland 20910; Area Code 301, 588-4983

Business notes: Applied Video Electronics, Inc., has been formed in Cleveland—G. Alfred Dodds is president of the new distributor/custom equipment design company. . . . . **Ampex** has won a $500,000 contract to supply its first vhf transmitter, a vhf antenna and two high-band VTRs to WSWP-TV, Channel 9—a Beckley, West Virginia, educational and informational station. . . . . Geoffrey M. Nathanson resigned from **Harriscope** to take over management of **G N Communications**, a Los Angeles-based company he formed to develop and market CATV communications services. . . . . The **Georgia Board of Education** approved a $350,000 expenditure for color origination equipment to be purchased by the Georgia Department of Educational Television Services. . . . . **Jerrold** is holding technical courses on operation and maintenance of its equipment. In June, the company gave a three-day ITFS seminar

(see photo). Over the rest of the summer, it is holding three-day courses around the nation on MATV and ITV. . . . . **Metromedia** decided a while ago to give away its unprofitable uhf station in San Francisco (KNEW-TV) to the

Continued on page 41

IN MAKING RECORDS STANTON IS THE STANDARD

Photographed at Capitol Records.

Whatever your requirements for recording and playback, Stanton's Series 681 cartridges are the calibration standard. And there is a 681 model engineered specifically for each of these critical applications.

The Stanton 681A—For Cutting Head Calibration

With Stanton's Model 681A, cutting heads can be accurately calibrated with the cartridge, for it has been primarily designed as a calibration standard in recording system checkouts for linearity and equalization. Frequency response is factory calibrated to the most rigid tolerances and the flattest possible response is assured for precise alignment of recording channels. Implicit in this kind of stability and constancy is a reliability factor unmatched by any other cartridge for this application.

The Stanton 681EE—For Critical Listening

In critical playback auditioning, whether a pre-production disc sample sounds too "dead" or "bright" is largely a matter of cartridge selection. Here too, Stanton provides the evaluation standard in its model 681EE. In this application, the Stanton 681EE offers the highest obtainable audio quality in the present state of the art. It is designed for low-distortion tracking with minimum stylus force, regardless of the recorded velocity or the distance of the groove from the disc center. High compliance, low mass and low pressure assure perfect safety even on irreplaceable records.

All Stanton Calibration Standard cartridges are guaranteed to meet the specifications with exacting limits. Their warranty comes packed with each unit —the calibration test results for that individual cartridge.

For complete information and specifications write Stanton Magnetics, Inc., Terminal Drive, Plainview, L.I., New York.

STANTON

Circle 105 on Reader Service Card

Circle 106 on Reader Service Card →

RCA
RCA

We can make such beautiful pictures together.

Cameras and video tape recorders have to work together.

So it's only logical they should be designed to the same high level of performance.

But RCA is the only maker who designs and builds both a camera and VTR as fine as the TK-44 color camera and the TR-70 tape recorder. They were made for each other.

Which is why they have a combination of features others are struggling to catch up to.

Like the camera's Chroma-Comp color control that lets you have your color any way you want it without affecting the gray scale. Or comb-and-core edge enhancement so you can make hard things hard and soft things soft.

Like the recorder's ability to capture all this detail on fifth-generation dubs you can hardly tell from masters. Like RCA's unique Chroma Amplitude and Velocity Error Corrector—CAVEC, to eliminate color banding.

The proof of all this is our picture and our specs, both of which we'll gladly show you.

So if your problem is getting a picture you and your viewers love, we've got a sweetheart of a solution. Twice.

RCA

INTERPRETING THE FCC RULES & REGULATIONS

Ownership Reports

The Federal Communications Commission requires that every broadcast licensee file, at specified times, an Ownership Report (FCC Form 323).

The purpose of the Report is to fully disclose ownership of the broadcast station. Complete data is required regarding officers and directors, stock transactions and the like. Many licensees have a difficult time understanding and complying with these Commission requirements. This article will explore and explain some of the more troublesome areas in the Ownership Report.

When should the report be filed?

First, Section 1.615 of the Commission's Rules requires that an Ownership Report must be filed *at the time the application for renewal of station license is required to be filed*—generally, every three years. In situations where licensees own more than one TV, FM or AM station, only *one* Ownership Report must be filed at three-year intervals. Thus Corporation X, owning an FM and AM in one market, and a TV and AM in another market, must file only one Ownership Report every three years. The information reflected in the Report will be data regarding individuals constituting Corporation X.

Second, in addition to the above, *within 30 days of the grant of a construction permit* the permittee must file an Ownership Report.

Third, *upon grant of a transfer or assignment of a station*, the new operator must file an Ownership Report with the Commission.

Fourth, and perhaps most significantly, an Ownership Report must also be filed by each licensee or permittee *within 30 days after any change occurs in the information required by the Ownership Report*. It is in this category that many broadcasters neglect their duties as Commission licensees. Often minor stock transfers or other changes in ownership are not properly reported or disclosed. The failure to report such changes is clearly contrary to the Rules and the offending licensee can be subjected to substantial fines.[1]

What data is required?

In the unusual situation where an individual or partnership is the licensee, the names and interests of the various parties must be fully disclosed on the Ownership Report. Because no shares of stock are involved, the Report is fairly uncomplicated.

More often, however, broadcast stations are owned by corporations. Limited liability and tax advantages usually dictate this commonly-accepted mode of ownership. In this case full disclosure of the individuals who constitute the corporate licensee is required.

The name, residence, citizenship and stockholdings of officers, directors and stockholders (as well as trustees, executors, administrators, receivers and the like) are required. Full information as to *family relationships or business associations between two or more officials and/or stockholders must be disclosed.*

Remember, however, that if the corporation has *more than 50 stockholders,* the information listed above need be filed only concerning stock holders who are officers or directors of the corporation *or* concerning other stockholders who have *one percent or more* of either the voting or non-voting stock. Information on stock held by stockholders must be filed only if shares are held in the stockbroker's name for more than 30 days.

Full information on capitalization of the corporation is required. A description of the *classes and voting power* of stock authorized by the corporate charter, as well as a listing of the number of shares of *each* class of stock issued and outstanding, must be noted in the Ownership Report. Data must also be fully disclosed as to the

This section, providing broad interpretation of FCC rules and policies, does not substitute for competent legal counsel. Legal advice on any given problem is predicated on the particular facts of each case. Therefore, when specific problems arise, you would be well advised to consult your own legal counsel.

1 See, for example, Tri-County Broadcasting Co., 1 RR 2d 57 (1963); Carol Music Inc., 3 RR 2d 477 (1964); Shamrock Broadcasting, Inc., 6 RR 2d 964 (1966); Lester & Alice Garrison, 9 RR 2d 241 (1967).

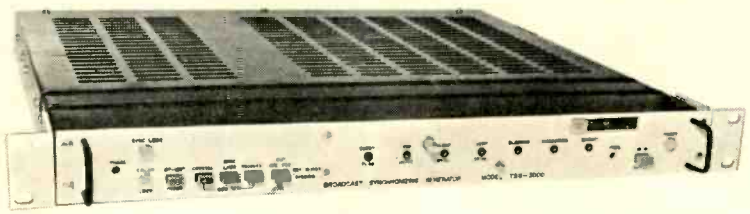
Get "in" gear

Want to know about the latest in sophisticated terminal equipment?

Talk to TeleMation!

Or talk to any of literally thousands of smart satisfied users of TeleMation products who know our equipment has achieved a standard of excellence in quality, flexibility and reliability that others are hard-pressed to meet.

TeleMation's TMV-551 Video Distribution Amplifier provides four completely isolated outputs from one bridging input. Built-in power supply and connector panel, IC series regulator for constant power supply voltage standard. Top color performance.



The TSG-3000 Broadcast Color Synchronizing Generator with all-digital circuitry, the highest time base stability and lowest pulse jitter performance available. Plus programmable pulse widths and *digital* genlock for *Crashlock* (next-field, operator-controlled lockup) or *Ratelock* (adds or subtracts one line per field until lockup is achieved).

For the finest in gear,
TALK TO TELEMATION.

TELEMATION

2275 South West Temple
Salt Lake City, Utah 84115
(801) 486-7564

New York • Washington • Atlanta • Chicago • Indianapolis • Milwaukee • St. Louis • Phoenix • Albuquerque • Tulsa • Little Rock • Oklahoma City • Denver • Dallas • Las Vegas • Palo Alto • Pasadena

Circle 107 on Reader Service Card

all solid state
MICROWAVE
RELAY LINKS
for high quality color

PORTABLE TERMINALS
FOR TV REMOTES

■ Meets EIA, CCIR, and FCC Standards
■ Available in all FCC authorized bands

Portable terminals for outdoor operation include a four foot antenna, a sturdy tripod and a calibrated pan/tilt head. Units can be assembled easily by one man at the site. No tools are required. Rugged construction provides reliable operation fully compatible with RHG Series MRS2A/7A fixed installations or similar equipments of other manufacturers. RHG relay link equipment is fully described in Bulletin 70C. Call for a "no obligation" demonstration.

RHG ELECTRONICS LABORATORY • INC

94 MILBAR BOULEVARD ■ FARMINGDALE
LONG ISLAND ■ NEW YORK 11735 ■ (516) 694-3100

Circle 108 on Reader Service Card

extent of interest and identity of any person having any direct, indirect, or other interest in the licensee corporation or any of its stock.

How much information is to be filed? Consider the following example: Suppose Corporation X is the licensee of a broadcast station. However, Corporation X is controlled by Corporation Z. What ownership information regarding Corporation Z must be filed with the Commission? The FCC requires that where Corporation Z controls the licensee corporation (Corporation X), or holds 25% or more of the number of issued and outstanding shares of Corporation X's stock, the *same information* (that is, capitalization, officers, directors, stockholders, and the like) *must be filed for Corporation Z.*

Contracts

Each licensee is required to *file* certain contracts with the Commission. A *list* of all contracts in effect at the time of filing of the Ownership Report, showing date of execution and expiration, must be included in the Ownership Report.

Here is a brief refresher of the types of contracts that Section 1.613 of the Rules requires each licensee to file with the Commission:

(1) Contracts relating to network service (affiliation agreements and the like);

(2) Contracts relating to ownership or control (articles of incorporation, bylaws, agreements for transfer of stock, proxies running for longer than one year, mortgages and similar agreements);

(3) Contracts relating to the sale of broadcast time to "time brokers" for resale;

(4) SCA contracts;

(5) Time sales contracts with the same sponsor for four or more hours per day;

(6) Certain personnel agreements.

Each licensee should keep his contract file current. Pertinent data required by the Ownership Report should be extracted and kept for ready reference in Ownership Report matters. Since it is not necessary to report some contracts that are common to the day-to-day operation of a broadcast station, a periodic review of Section 1.613 of the Rules would help.

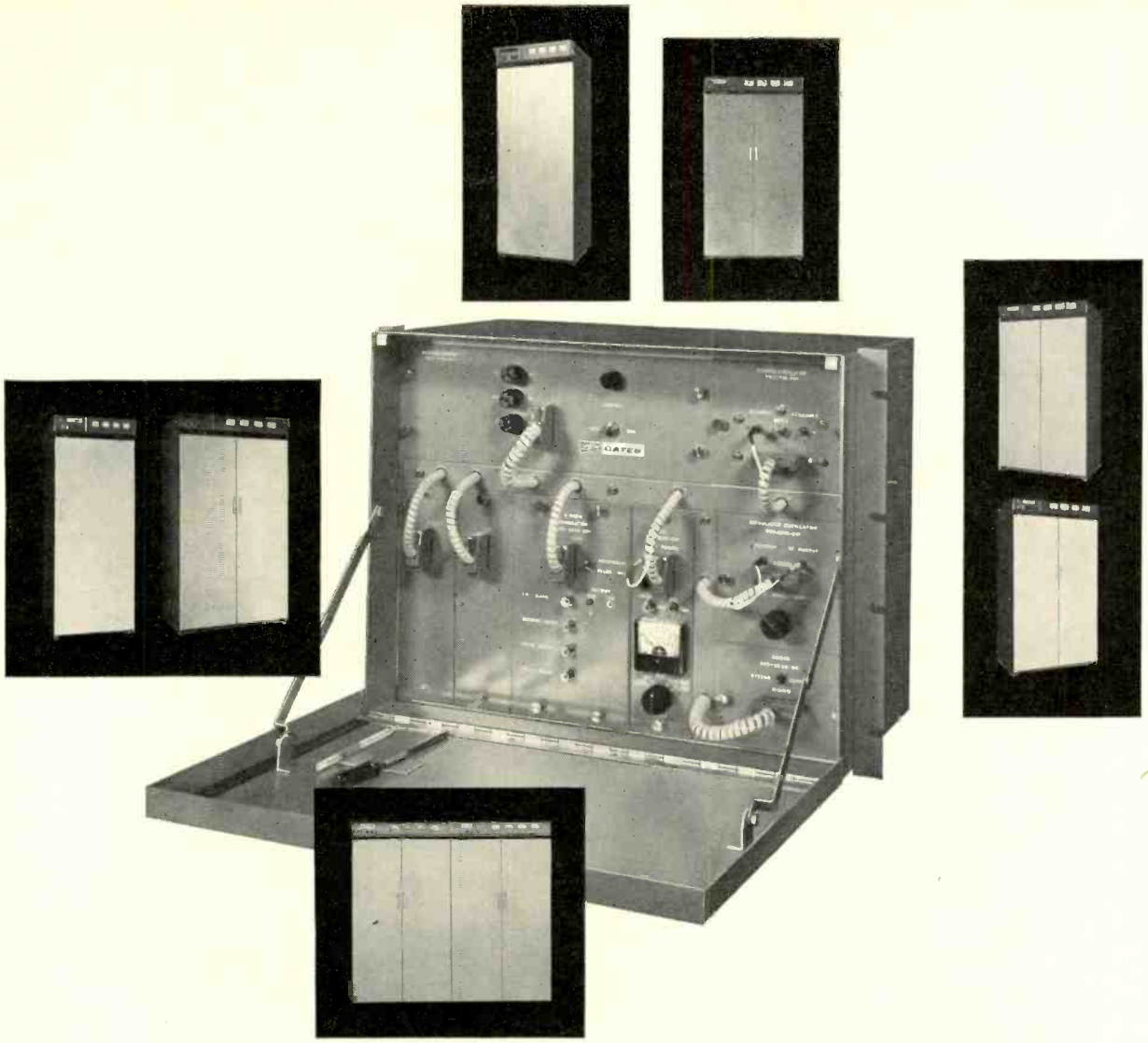
Transfer of control

A secondary purpose of Ownership Reports is to notify the broadcaster of possible transfers of control. Careful completion of all portions of the Report, before contemplated changes in stock ownership occur, may indicate that a transfer or assignment *requiring prior FCC approval* is being effectuated.

The Ownership Report cannot, of course, be used for reporting or requesting a transfer or assignment. It is the prime responsibility of the broadcaster to determine if a proposed transaction will constitute a prohibited transfer and, if so, to file a transfer or assignment application.

Consider the following situations: (1) X owns 51% of the licensee corporation's stock. He sells 1% to Y. Is this a transfer? *Yes,* and *prior* Commission consent is required.

(2) X Corporation, owned by A, B, C, and D (all members of one family), wants to reduce its



For the FM sound of the seventies... look and listen to Gates

Nine great new FM transmitters—advance-designed by Gates to give you excellent response. Low distortion. Plus the flexibility to add stereo and SCA with plug-in generator modules.

There's a one-tube, 250 W and 1 kW; two-tube, 2, 3, 5, 7.5 and 10 kW; three-tube, 20 kW; and six-tube, 40 kW.

Each employs DCFM (direct carrier frequency modulation) where modulation occurs at operating frequency. And digital automatic frequency control for rock-like stability.

An all-new solid state exciter—the TE-3—is fully metered and completely self-contained. With modular design for maintenance ease.

Get ready to cash in on the predicted FM boom in the Seventies—with the Sound of the Seventies. There's a new Gates "H3" Series transmitter waiting to go to work for you—right now.

For a descriptive brochure, write Gates, 123 Hampshire Street, Quincy, Illinois 62301.

HARRIS INTERTYPE CORPORATION

GATES

A DIVISION OF HARRIS-INTERTYPE

Circle 109 on Reader Service Card

outstanding stock by the purchase of treasury shares. This results in family member A's individual holdings being increased to more than 50% of the total number of issued and outstanding shares. Is this a transfer? *Yes,* a transfer has been effected and prior Commission approval is required.

(3) A and B, husband and wife, each own 50% of the licensee corporation stock—of a total of 4000 issued and outstanding shares of stock, A holds 2000 and B holds 2000. A sells 10 shares to his wife, B. Is this a transfer? Is prior Commission consent required? *Yes.*

(4) Similarly, if A and B are partners in the ownership of their station, and A sells any part of his interest to B, or to a newcomer, C, *an assignment has been effected,* and prior FCC approval is necessary.

(5) Suppose you and B are partners, each owning an equal share in a station. You wish to limit your liability by incorporating. Would this be an assignment? *Yes;* when a partnership incorporates, an assignment is effected and prior Commission approval is necessary.

Particular attention should be given to page 3 of the Ownership Report. Although confusing on its face, its three columns (each divided into 17 separate lines) provides a clear indicator, when properly filled out, of transactions that may require prior FCC approval. Specific facts in the examples above can be applied to the Ownership Report and provide the licensee with an indication of possible FCC notification and/or application.

Conclusion

Careful consideration of the information required by the Ownership Report will aid the broadcaster in evaluating proposed sales of stock and other transactions. Broadcasters are cautioned to report all applicable changes in the ownership structure of their facilities. The following checklist should prove helpful in determining such changes and should be consulted from time to time. *Have there been any of the following?*

(1) Any change in the effective ownership of the station?
(2) Any change of partners?
(3) Any change in capitalization?
(4) Any change in organization?
(5) Any change in officers and directors? (Have new elections taken place?)
(6) A transfer of stock?
(7) An issuance of new stock?
(8) Purchase of treasury stock by the corporation?

As to stock changes in corporations with more than 50 shareholders, information need be filed only with respect to changes involving
(a) officers or directors *or*
(b) shareholders who own one percent or more of voting or non-voting stock in the licensee corporation.

If you have doubts or questions regarding the troublesome area of Ownership Reports, be sure to consult your counsel. **BM/E**

PERFECT YOUR CCTV SYSTEM WITH **COSMICAR**® LENSES

Easy-to-operate, optically and mechanically superb lenses for CCTV and VTR cameras. That is exactly what Cosmicar is ceaselessly researching and endeavoring to make and is producing today.

A complete range from 8.5mm up to 1,000mm Cosmicar lenses. Plus zoom lenses. Including some motor-driven lenses. Noted for superb resolving power and edge-to-edge sharpness.

Be sure to get the finest image recording results with quality Cosmicar lenses.

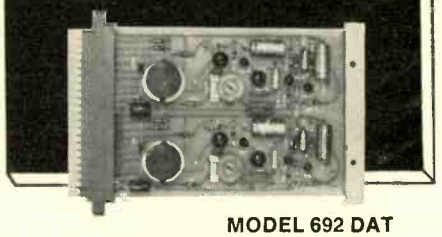
COSMICAR

COSMICAR OPTICAL CO., LTD.

568, Shimoochiai, 2-chome, Shinjuku-ku, Tokyo, Japan Cable Address: "MOVIEKINO TOKYO"

Circle 110 on Reader Service Card

now!
DOUBLE
Audio-Actuated
Gate from Fairchild!



MODEL 692 DAT

With exclusive (Auto-Ten®) circuitry, the FAIRCHILD double automatic audio signal actuated gate performs various functions of changing gain of one or two circuits (per section). The 692 DAT can attenuate channel up to 80 db when not triggered. When "ON" series resistance is 30 ohms. Use it as a compressor expander or soft switch.

SPECIFICATIONS:

Adjustable trigger thresholds: 40 db and higher.
Turn on time: 3 Milliseconds.
Release time: 0.3 to 7 seconds.
Power required: 6.2, 18 or 24 V DC at 70 ma.

For complete details write today to:

FAIRCHILD
Sound Equipment Corporation
10-40 45th Ave., L.I.C., N.Y. 11101

Circle 111 on Reader Service Card

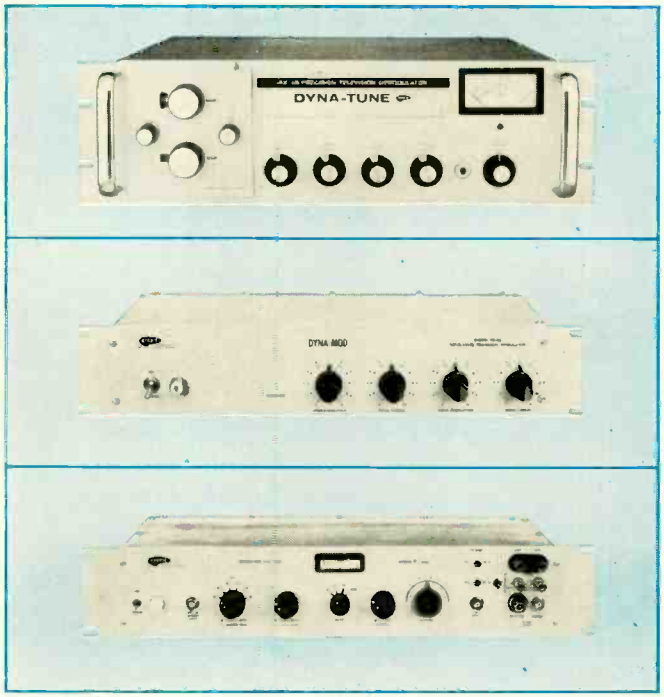
from professional-quality local origination
. . . all the way to testing, switching and distribution

DYNAIR OFFERS MORE THAN 200 DIFFERENT PRODUCTS FOR THE TELEVISION INDUSTRY

DYNAIR concentrates its major effort in one technical area: Equipment for the television industry. More than a decade of pioneering design experience has produced a comprehensive line of equipment that—year after year—sets the pace in video signal distribution, switching, modulation and RF demodulation.

FOR THE HEAD END

DYNAIR's field-proven, solid-state equipment solves CATV head-end problems and assures broadcast-quality pictures. Here are three tried-and-proven units which belong at the head end of every CATV system. . . .



RX-4B DYNA-TUNE for high-fidelity off-air color. Uses completely new filtering and signal-restoration concepts to provide superior adjacent-channel color performance in either microwave-fed or demod-mod systems. Actually improves the color signal in many critical areas over that produced by the broadcast RF transmission system.

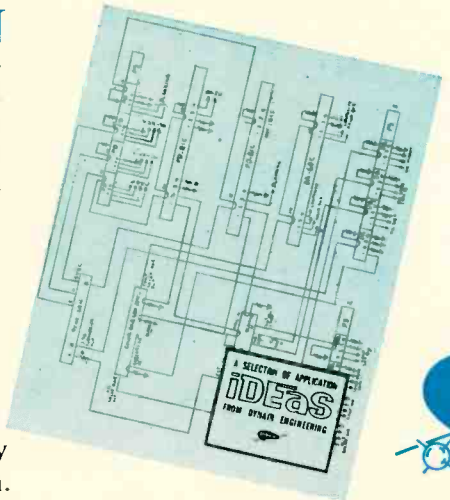
TX-4A DYNA-MOD for broadcast quality transmission. Supplies signals approximating FCC specifications. Provides interference-free pictures in a full 12-channel system . . . with crisp, clean color. Available for operation on any standard VHF channel.

TS-100B SIDEBAND ANALYZER for broadcast-precision testing. Quickly checks overall alignment of video amplifiers, modulated stage and RF amplifiers of modulators—in normal operation. Provides the same test techniques used by broadcasters and eliminates tedious point-to-point checking. Tunes to all channels for system flexibility.

FOR LOCAL ORIGINATION

DYNAIR's complete line of low-cost programming accessories are designed specifically to provide professional results without fancy cabinetry or expensive "frills." You can assemble a system for your particular needs between camera and monitor from dozens of available DYNAIR units, including . . .

- Video Switcher-Faders
- Special-Effects Generators and Switchers
- Sync Generators
- Video Distribution Equipment
- Pulse Distribution Equipment



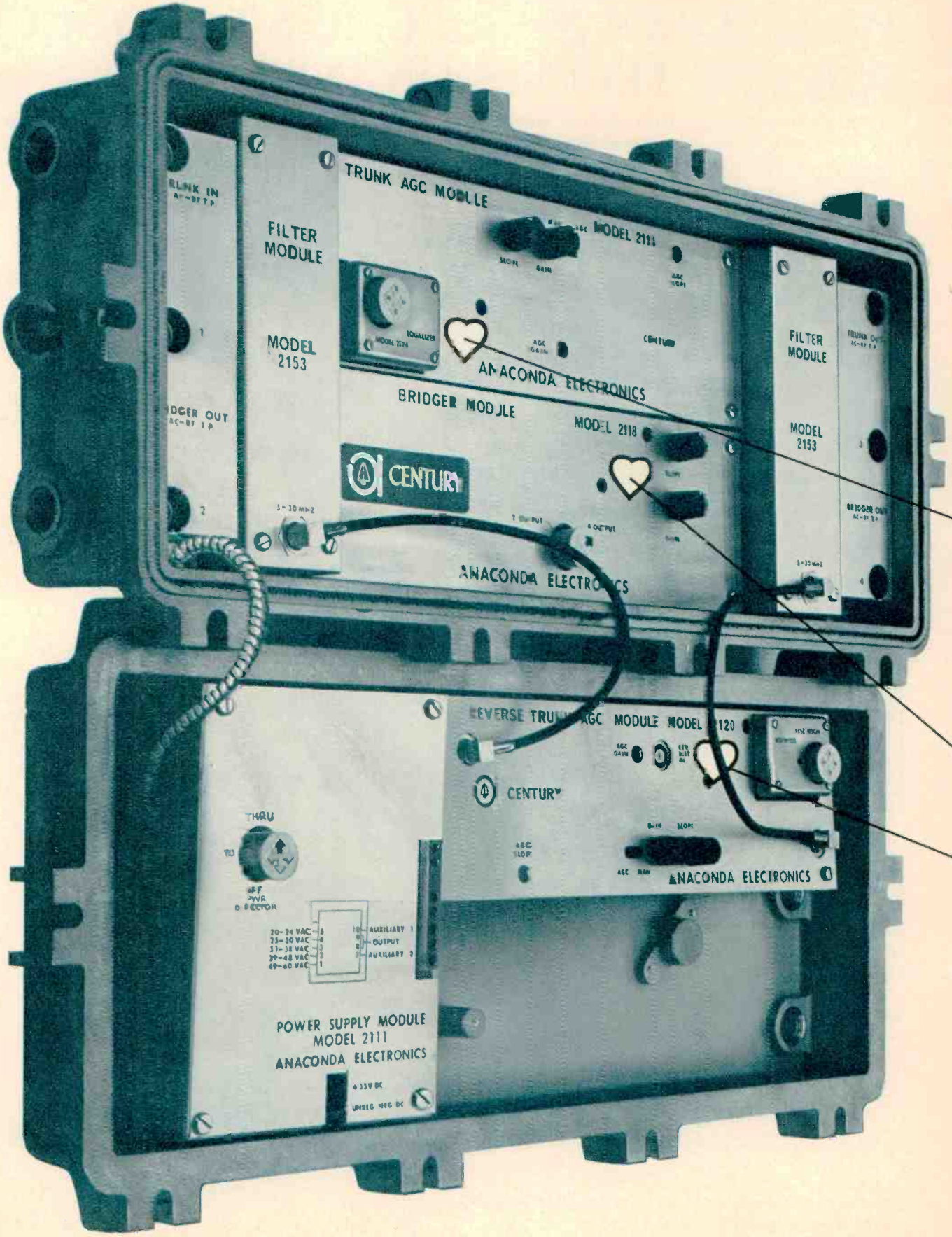
DYNAIR's new "IDEAS" booklet will prove very helpful in designing your local-origination system. Make sure you add it to your library.

DYNAIR SAN DIEGO

6360 Federal Blvd., San Diego, Calif. 92114, Phone (714) 582-9211

Circle 112 on Reader Service Card

Anaconda contributes a

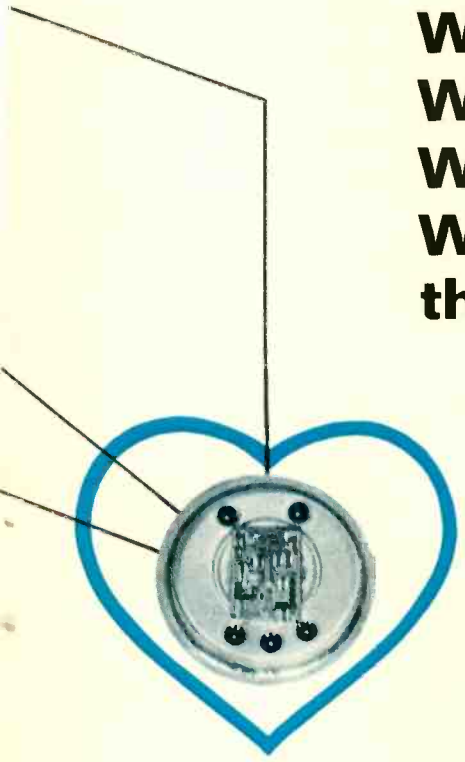


new technology to CATV:

MICROELECTRONICS!*

The industry's first hybrid thin-film integrated circuit, push-pull, plug-in modularized, 5-300 MHz, versatile, bidirectional, 43-channel, broadband cable communications amplifier.

We developed it.
We field-tested it for a year.
We designed a complete line.
We introduced it at the 1970 NCTA Convention.



"THE HEART OF THE MATTER"

* The thin-film integrated circuit (shown actual size) is the heart of the new Century Series amplifier. By eliminating discrete components and reducing lead lengths, it sets a new standard for CATV amplifier performance, reliability, and stability under all conditions.

Century Series

The New Technology from

ANACONDA electronics

305 North Muller Street, Anaheim, California 92801
And in Vancouver, in the Province of British Columbia

Circle 113 on Reader Service Card

Digital TV Switching Made Easy

By George B. Marten

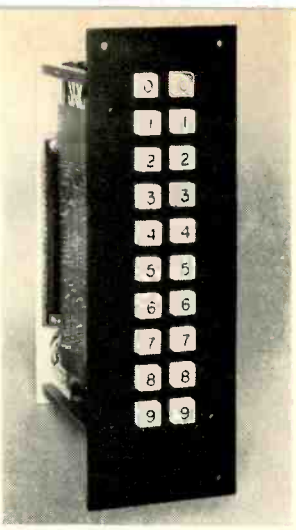


Fig. 1. Switcher control head.

In the 1970s the language of broadcast control will be digital, a technique already used in at least one TV camera and one VTR. This article explains the basics of video switching with digital control pulses.

MODERN SWITCHERS use the crosspoint system, with the switching matrix located in an equipment rack, and the control head located at the operator's position. To have a separate pushbutton for each crosspoint would mean an overly complex wiring job. A simpler method is used whereby the control head activates the switching matrix with a minimum of interconnecting wires. The system is called digital control.

How many methods of control are used?

Two basic methods: direct decimal and binary coded decimal (BCD).

What is direct decimal control?

The direct decimal control system is an electro-mechanical linkage. In General Electric's GE/BAC automated TV switching system, the TC-310-A control head (see Fig. 1) initiates control action. Notice the two rows of pushbuttons marked 0–9. Each column of buttons is interlocked by a mechanical latch bar. The left-hand column supplies the "tens" data and the right-hand column the "units" data. To select input No. 7 you press the "0" in the left-hand column (since the number is less than 10, or zero tens) and the "7" in the right-hand column. Selecting input No. 83 means pressing "8" in the left column and "3" in the right column.

The control head output is directly connected to the audio and/or video matrix control circuitry. The lights on the control-head buttons are illuminated directly from a second set of contacts in the head. Ac power provides lamp current.

How do twenty pushbuttons control 100 inputs?

By using the decimal system. By definition, decimal means numbered or proceeding by tens. For instance, in Fig. 2 you see the diagram of a 60-input, 6-output switcher. For simplicity, only one output bus in each matrix is shown. All the "units" data are transmitted on 10 wires numbered 0-9. Likewise, all "tens" data are fed on 10 wires.

You will note that on the "units" side, like-numbered crosspoints are connected in parallel to the same numbered control wire (No. 9 in all six buses connects to the same No. 9 control wire at the left of the diagram). However, on the "tens" side of the matrix, each control wire connects in series with only its own particular row (No. 0 to the first or "zero" row, No. 1 to the second or "ten" row). Thus, to pick up input No. 7, you press 07 on the control head, thereby energizing the 0 control wire in the "tens" circuit and the 7 control wire in the "units" circuit.

To pick up input No. 56, press 56 on the control head, energizing the 5 control wire in the "tens" circuit and the 6 control wire in the "units" circuit.

You can see from these examples that with 10 control wires in the "units" circuits and 10 control wires in the "tens" circuit, you can control 100 inputs by energizing any two control wires; one for the "tens" data and one for the "units" data.

Now, since the first number in our numbering system is "00" rather than the "01" that we are accustomed to in normal practice, how do we avoid having to raise all numbers by one when calling for a numbered input? That is, if we let 00 equal 1, or the first input, then pressing 26 would actually energize input 27. The problem is overcome by making "00" the *standard black signal* in all cases. Thus, "01" represents the number 1 and all others fall into their proper places. The result is *standard black* and 99 other usable inputs.

All "units" and "tens" information is carried from matrix to matrix by a 21-conductor ribbon cable. (The 21st conductor is a ground wire).

What is binary coded decimal control?

Binary coded decimal control (BCD) is a further refinement of the control wiring scheme to make the control wiring interconnection even less complicated and therefore less costly in large installations. More important: *BCD is readily compatible with a computer for complete automation interface.*

Why binary rather than decimal?

With decimal, it's possible to control 100 inputs with 20 wires. Using binary, the same job can be done with only eight wires between the control head and the latching modules in the control matrix. (We'll get to the latching module and the control matrix later—stay loose). This can be quite a saving in control wiring in a large,

George Marten is with the Visual Communication Products Department of General Electric.

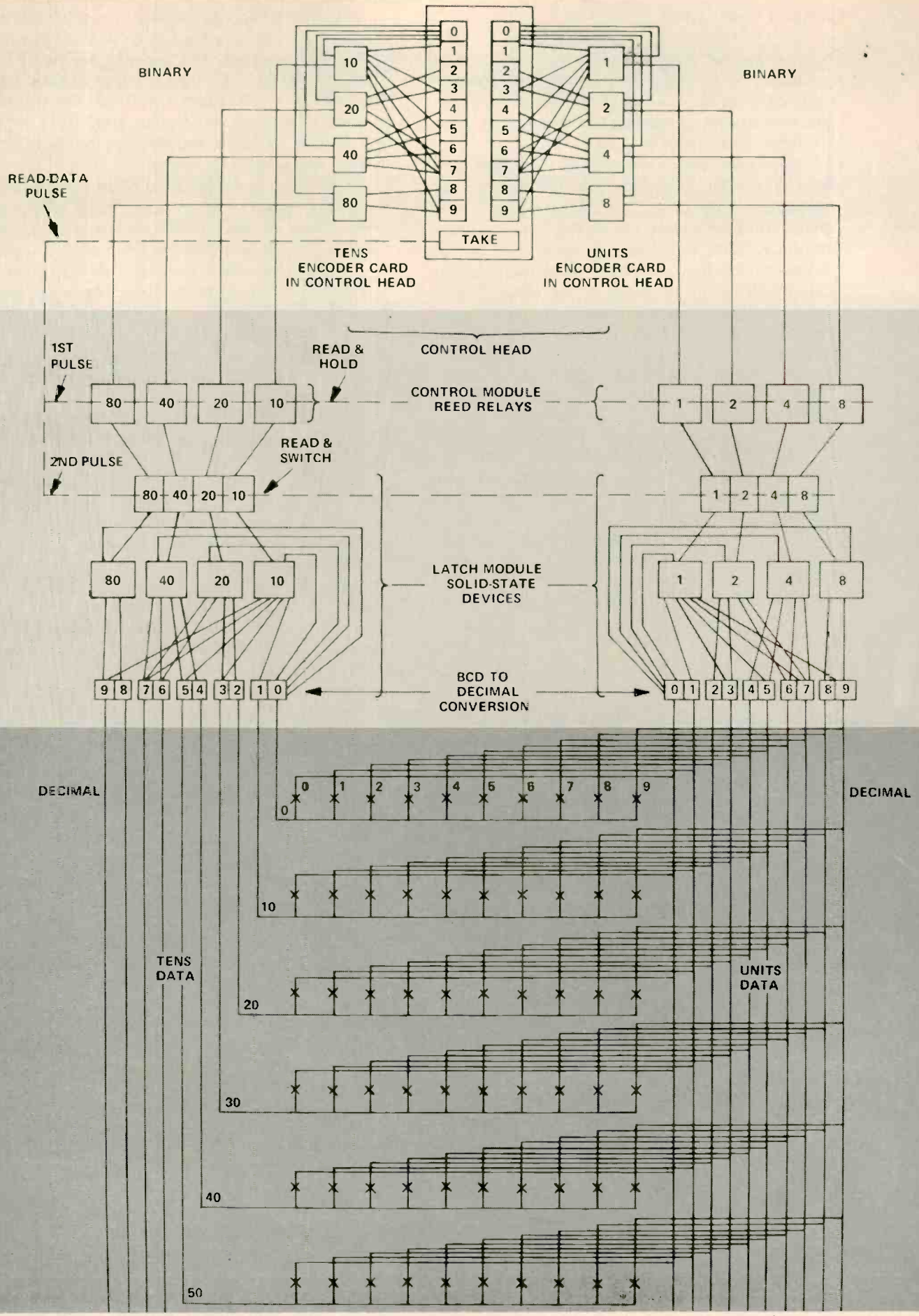


Fig. 2. GE's remote-control digital TV switcher has three main sections: Control head (top) converts decimal input into binary pulses; control and latch modules (middle) reconvert to decimal; crosspoint switcher (bottom) switches.

complex studio setup.

What is binary? How is it derived for switching?

Binary is a system of mathematical notation using only two digits—0 and 1. Decimal, the most common system of mathematical notation, uses 10 digits—0 through 9.

Most computers are made of ICs called *flip-flops*. These are solid-state switches having only two states of operation, ON and OFF (or, if you prefer, TRUE or FALSE, GO/NO-GO, YES/NO, AND/OR, etc.). Since flip-flops can work only in one of two modes, they only have to be told whether they should be in one mode or the other. This is done by telling them to turn ON or OFF—by assigning a binary number to each state. In *positive* logic, 0=OFF (or ground condition) and 1=ON (or plus potential); in *negative* logic, 1=OFF (or ground condition) and 0=ON (or minus potential).

Now in our system we have reduced the twenty control wires to eight, four for "tens" and four for "units." For the "units" data, we give each wire a number—1, 2, 4 and 8; for "tens" data—10, 20, 40 and 80.

These particular numbers were chosen because they will combine to add up to any number from 1 to 9, in the case of "units," or from 10 to 90, in the case of "tens." For instance:

0 = 0	4+1 = 5
1 = 1	4+2 = 6
2 = 2	4+2+1 = 7
1+2 = 3	8 = 8
4 = 4	8+1 = 9

The same values work for the "tens" figures by adding a zero to each number.

Now let's take it one step further and chart these numbers. Each X below indicates a signal impressed on a given wire.

	Tens					Units			
	80	40	20	10		8	4	2	1
00					0				
10				X	1				X
20			X		2			X	
30			X	X	3			X	X
40		X			4		X		
50		X		X	5		X		X
60		X	X		6		X	X	
70		X	X	X	7		X	X	X
80	X				8	X			
90	X			X	9	X			X

Here's the same exercise with 1s in place of the Xs and 0s in the blank spaces.

	Tens					Units			
	80	40	20	10		8	4	2	1
00	0	0	0	0	0	0	0	0	0
10	0	0	0	1	1	0	0	0	1
20	0	0	1	0	2	0	0	1	0
30	0	0	1	1	3	0	0	1	1
40	0	1	0	0	4	0	1	0	0
50	0	1	0	1	5	0	1	0	1
60	0	1	1	0	6	0	1	1	0
70	0	1	1	1	7	0	1	1	1
80	1	0	0	0	8	1	0	0	0
90	1	0	0	1	9	1	0	0	1

The above exercise shows you how to compose binary names or notation for the decimal numbers 0–99. For instance, the decimal number 87 is written 1000 0111 in binary. Taken directly from the chart, 8 = 1000 and 7 = 0111. Written with a space in between, it becomes 1000 0111 = 87. As another example, the decimal number 34 is written 0011 0100 in binary.

This, then, is the binary used in the GE/BAC switching system. It's possible, using only eight wires (four in the "units" circuit, four in the "tens" circuit) to control a total of 100 inputs.

A binary system of solid-state devices controls a decimal system of crosspoints, hence the name binary coded decimal.

How does the system convert the decimal input to binary and back to decimal to operate the decimal crosspoints?

System action begins at the control head (see Fig. 2). For instance, here's how the operation to pick up input No. 57 works: As you depress buttons 5 in the left column of the control head and 7 in the right, ICs 4 and 1 of the "tens" encoder card are turned on, and ICs 4, 2 and 1 of the "units" encoder card are also turned on. If you trace the connections from buttons 5 and 7 you will see how this takes place. Recall the binary exercise: 4+1 = 5 and 4+2+1 = 7. Thus the transition has been made from decimal to binary. The signal in the "tens" circuit is now 0101 (or 8=off, 4=on, 2=off, 1=on) and in the units circuit, 0111 (or 8=off, 4=on, 2=on, 1=on) for a total of 0101 0111 = 57.

This signal is now set to enter the control matrix once the TAKE bar is pressed. The TAKE bar allows you to preset a signal on the control head and then transfer it at the appropriate time by pressing only one button. As the TAKE bar is pressed, a data-read pulse is sent to the control module of the control matrix telling the reed relays (electromechanical magnetic latching relays) to read the signals on both sets of four lines and turn on or off as indicated. These relays have a magnetic latching feature which locks them in position at this point, making them independent of the electrical circuit. This feature provides memory in case of power failure. If the power goes off, the magnets hold the reed relays in place until power is restored.

Since the reed relays are too slow-acting for fast, clean switching of the crosspoints, the data-read pulse serves a second function. After the first data-read pulse, there is a time delay of 30 milliseconds; then a second pulse is sent. The time delay allows the reed relays time to quiet down and set themselves; then, on the second data-read pulse, the latching-module ICs in the control matrix are told to read the data and activate the proper crosspoint.

On the second data-read pulse, the signal is transferred from the reed relays to the input gates in the "tens" and "units" portions of the latching module, the input gates being the first IC from

the front of the latching module in each line. From the input gates, the signal is sent to the next four IC flip-flops in each line, where the conversion from binary to decimal is begun.

The decoding process is a reversal of the encoding process. For example, the signal 0101 0111 has turned on flip-flops 4 and 1 in the "tens" circuit and 4, 2, and 1 in the "units" circuit. As you can see by tracing out the diagram in Fig. 2, "tens" flip-flops 4 and 1 connect to No. 5 of the "tens" crosspoint control. "Units" flip-flops 4, 2, and 1 connect to No. 7 of the "units" crosspoint control.

The question may arise at this point: Why doesn't the signal from the "tens" No. 4 and No. 1 flip-flops also energize crosspoint control points 4 and 1? The answer is that the decimal crosspoint control ICs will not turn on unless there is a multiple signal on them consisting of those positive (or ON) signals that make up the particular number (4 + 1 = 5) plus certain negative signals. For example, the No. 4 decimal control point will not turn on unless a positive signal is received on the 4 line plus a negative signal on the 1 and 2 lines. (Since 8 never appears in combination with 4, this negative information is irrelevant.) Control point 1 does not energize until it gets a positive 1 combined with a negative 2, 4 and 8 (since 1 combines with 2 to make 3, with 4 to make 5, and with 8 to make 9). In other words, to turn on No. 1 control point, the circuits must provide the following data: turn ON 1 (positive signal); NOT 2, to make 3 (negative signal); NOT 4, to make 5 (negative signal); NOT 8, to make 9 (negative signal).

When the switch is made at the crosspoint, a sampling is made of the circuitry to determine that the correct crosspoint has switched. The sample information is then fed back through the control module to the control head where it is converted to a readout. This is done either by illuminating the correct pushbuttons (5 and 7 in our example) or providing readout data in some other form such as printout, or data display.

How can you switch a crosspoint containing a zero (i.e., 00, 30) using the binary numbers, 1, 2, 4 and 8, since none of these will make up a zero?

Since 0 = 0, or no quantity, then the zero switching signal is a negation of all our binary numbers. In other words, in positive logic where 1 = positive potential and 0 = ground condition, the binary notation for a zero crosspoint switch would be 0000. For standard black (input 00) this would be 0000 0000. You will note that on the control system diagram this condition has been indicated by drawing the zero binary lines from the side of the solid-state devices opposite the positive numeral side.

If a better memory device were found would this eliminate the data-read pulse?

No, in addition to serving as a time-delay device for the reed relays, the data-read pulse performs other important functions. One of these is to provide preset capability for the system, enabling the next event to be set up and ready for the take. Probably the prime reason for the data-read pulse, however, is the noise immunization that is found in the GE switching system. One of the most common causes of crosspoint dropout is noise on the control wires providing spurious signals to the crosspoint controls. With our data-read pulse, the actual switching interval is a very narrow 1 microsecond. Any noise in the control system would have to be coincident with this extremely narrow interval. Therefore our switchers are virtually noise-proof. **BM/E**

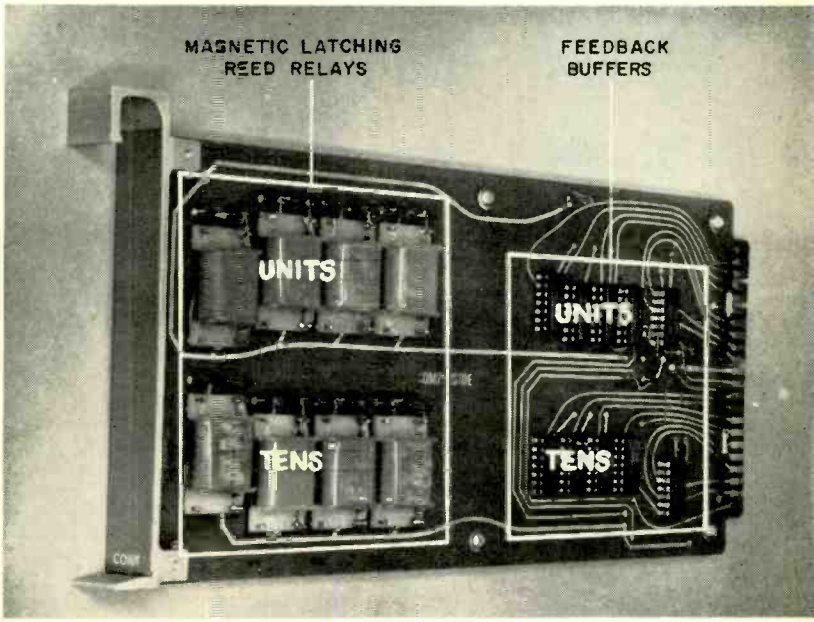


Fig. 3. In control module, reed relays latch when triggered by binary pulses from control head at remote location.

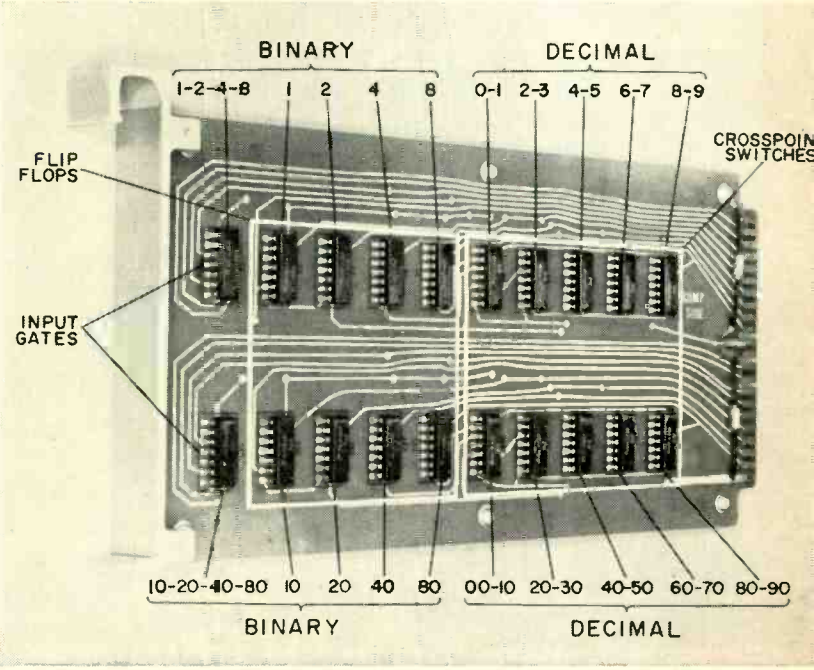


Fig. 4. These latch-module ICs convert binary pulses from control head into decimal info for crosspoint switcher.

Automation: Let Pulses Do The Work

Computer controlled pulses can do a lot for a station—from helping to sell a program, to making up the program, and then programming the machines to deliver the on-the-air signal. The mini-computer is playing a key role.

You don't need your own computer. For business/management purposes, Sarkes Tarzian says use this CRT terminal tied to its central time-shared computer. John Nolan, WDSU, New Orleans, is checking demographic data.

You can use a mini-computer to do most in-station jobs such as controlling video switching. The GE/PAC-30 can take over this man's job.

IF YOU HAD TO GIVE a concrete example of automation in broadcasting during the 60s, you'd describe either a switching function or a billing function. Or maybe a transmitter that would automatically shut itself off if it went wildly out of tolerance. But if you think of automation as primarily a preset switcher, a teletypewriter for preparing invoices, or some shut-down mechanism in case of transmitter trouble, your thinking is out of date.

In 1970 you have to reorient yourself: Think digital control. It's true that some of the end functions are still switching or billing, but a lot more functions will be automatic—cameras and VTRs will automatically adjust to produce the right color signal. You won't have to preassign equipment to handle a specific coming event. Just load any machine—the computer will search out which equipment to turn on when.

Automation in the 70s will mean a computer communicating with all production and programming equipment. And it will all be done by digital pulses—no conventional analog communications, such as setting a pot back at the console to establish voltage or current.

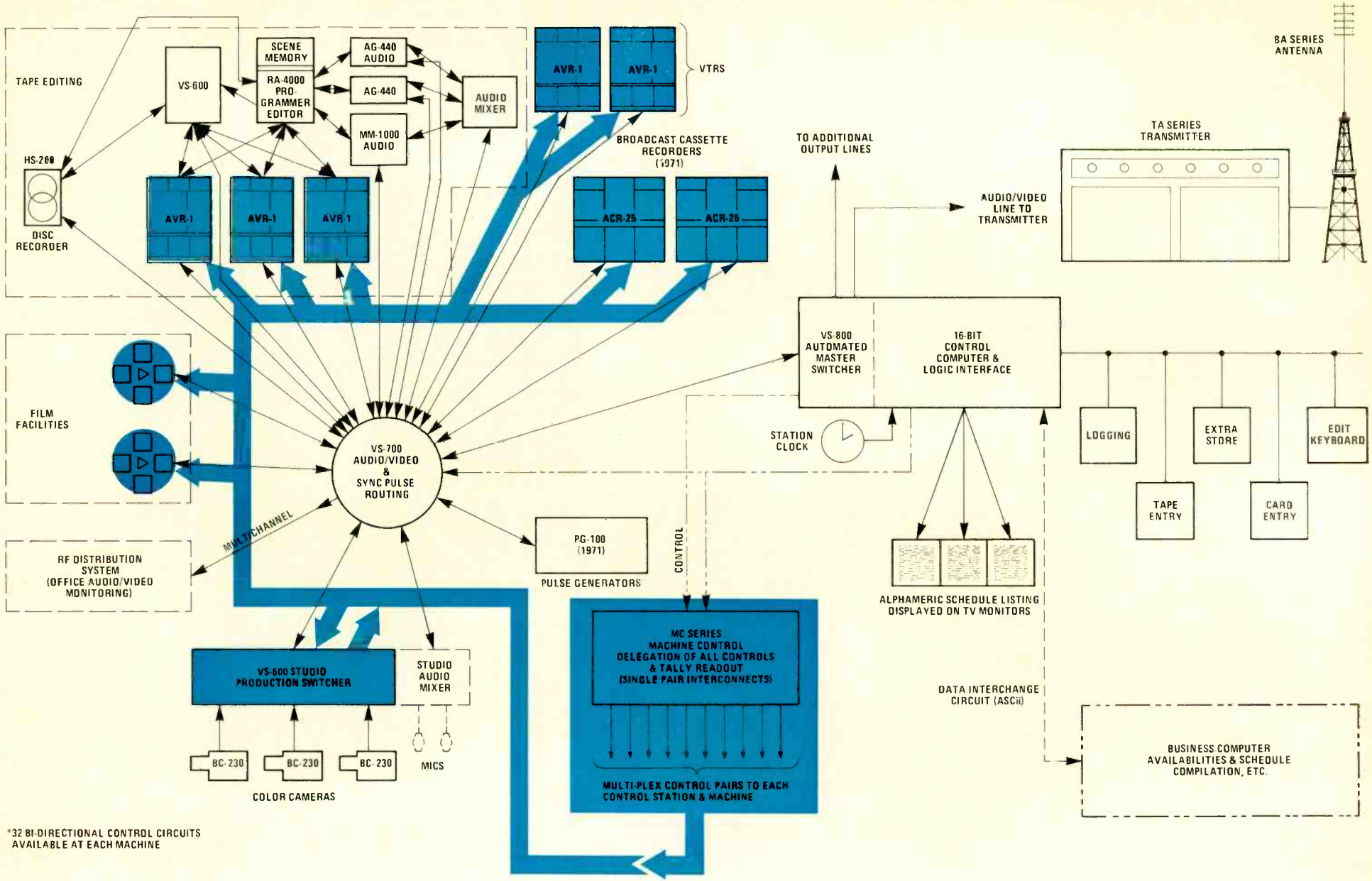
Digital control will dramatically reduce the size and number of interconnecting cables. A single cable will handle all digital instructions between a switching console and a switching matrix, for example, while conventional analog communications between two units require scores of cables.

This means new equipment will be computer-compatible. It need not be manually operated—it can be controlled by pulses from a remote computer or switching console.

The new AVR-1 automated videotape recorder announced by Ampex at the last NAB Convention is an example. It can be controlled remotely by pulses and, in addition, it makes some internal decisions automatically so that no operator need be hovering over it.

Automated cameras which will make their own adjustments for light level and color intensity will be next. Zoom lenses will be controlled by pulses generated by the computer. The new Philips PC 100 camera is digitally controlled.

The cartridge (RCA) or cassette (Ampex) VTRs will be sequenced by the central switching



Total TV automation circa 1971 envisioned by Ampex. Heart of system is 16-bit Control Computer (right center), which is programmed via Tape Entry, Card Entry or Edit Keyboard (at right). Computer then orders two basic actions: (1) commands Machine Control (large color block) to start/stop VTRs and projectors; (2) orders Audio/Video Routing Switcher (circle at left center) to route picture and sound from film islands, to or from control room and VTRs, and to office monitor system and to program line through Automated Master Switcher to transmitter or other output. Tape Editing area (upper left) has Programmer Editor with Scene Memory, enabling programmed automatic editing with video, audio tape and video disc recorder. Machine Control bus (colored) carries 32 bidirectional control circuits to each machine: Outgoing signal is command; return is verification (tally). Business Computer (lower right) has no command link with Control Computer, but can interchange information, as in reading program log, then billing clients. Control Computer can be programmed a week ahead, is busier than squirrel in peanut cannery.

computer, as will automated telecine chains.

After computer-controlled switching becomes commonplace, the next step will be control of the transmitter. Most TV stations will be fully automated by the end of this decade, in the opinion of General Electric executives.

Equipment control won't require a giant computer—a $8-10,000 minicomputer can do the job. Business functions are likely to be handled by a large general purpose computer but this computer need not be housed or owned by the broadcaster. It can be rented on a time-share basis.

Sarkes Tarzian's Tascom approach (*BM/E*, July, p. 8), for example, is a full-service system. It would include a large-scale remote computer (shared by many) that would interface with S-T's APT-2000 switching computer located at each individual station. The APT-2000 is a complete switching computer that includes a logic element, a character generator, a visual display and a keyboard. In the GE approach, the computer is a general purpose mini-process computer, the GE/PAC 30. The visual display is a separate standard CRT display.

Ampex favors a non-dedicated computer and feels the PDP-8 (Digital Equipment Corp.) or Nova mini-computers are fine. How all equipment of a TV station can be interconnected, as visualized by Ampex, is depicted in the accompanying block diagram. (See page 27.)

Note that the VTRs (the AVR-1) can be remote-controlled by either the random-access editing computer (RA 4000) or the central control computer.

If one uses a remote business computer, as in the Tascom approach, the interface equipment required at the station would include a CRT terminal composed of a keyboard (see illustration), a teletypewriter for log-writing purposes, a line printer for sales and marketing data, and a small disc memory to help in interfacing.

No special programmer knowledge would be required and the computer program actually used is so simple that it is self-explanatory.

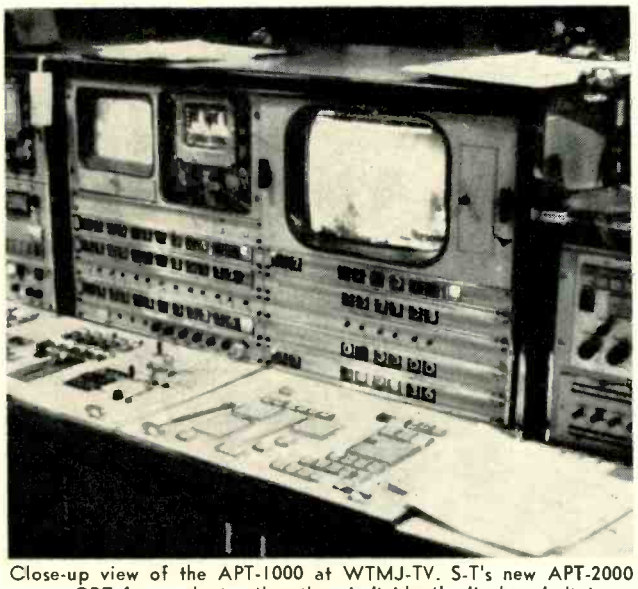
In dividing up computer functions, the program log would be prepared by the business computer and printed out by the teletypewriter. This information could be automatically entered into the program switcher—or keyboarded-in manually.

The value of a large general-purpose computer rests primarily in the jobs it can perform other than video switching and machine delegation and control.

The g-p computer can help in sales, contracts, continuity, billing, accounting and management reports.

In sales the computer can choose programs by demographics, budget, rating specs, or type of program. Availabilities and product conflicts can be instantly checked out. In fact, time can be oversold since the computer can help determine what can be juggled. The computer can advise the number of times a particular client has been preempted before. What should a total system cost the broadcaster? About $9000 a month according to Sarkes Tarzian. And a lot of this can be recouped simply by using the computer to manage film inventory more smartly and getting bills out earlier. **BM/E**

A view of WTMJ-TV's Sarkes Tarzian APT-1000 computer switcher. Smooth switches made with no hands.

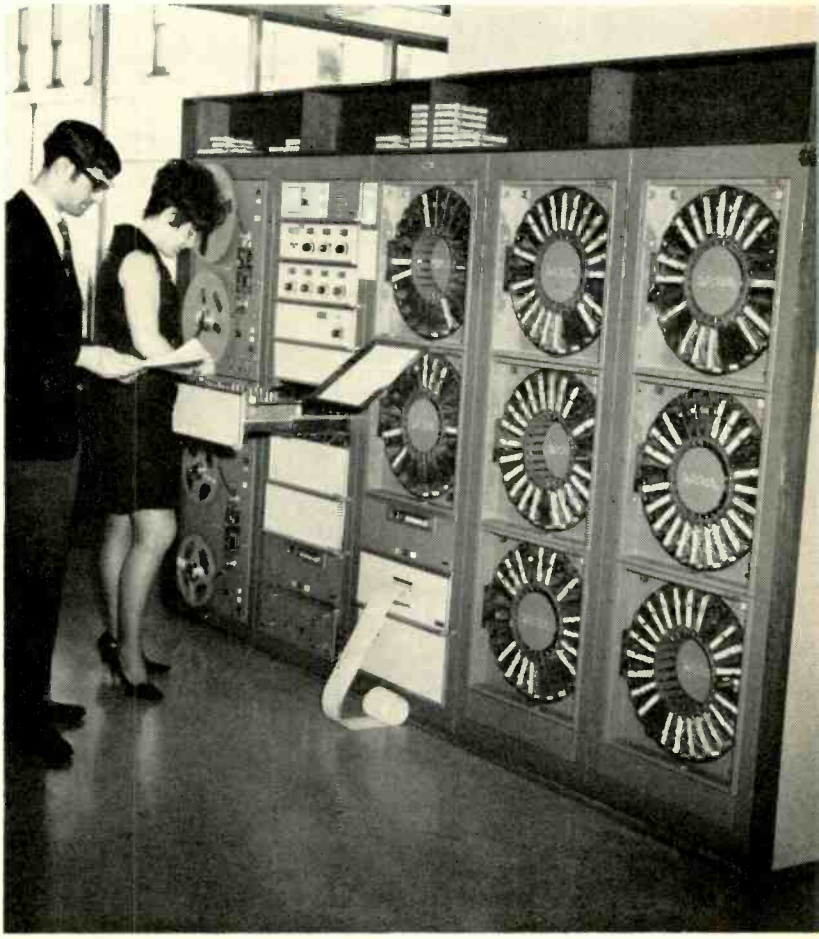


Close-up view of the APT-1000 at WTMJ-TV. S-T's new APT-2000 uses a CRT for readout rather than individually-displayed digits.

WOHI: Fully Automated Talk Station

By Joseph D. Coons

Automation is a fact of life for small-town radio. Here's how one company runs completely automated, separately programmed AM and FM, keeping staff, sponsors, and listeners happy.



Program director Richard Frankel checks WOHI's log, while Traffic Manager Joanne Brown programs the automation.

IN JANUARY, 1968, WOHI in East Liverpool, Ohio, began automated broadcasting of all AM programming. Now, over two years later, we have lots of experience under our belt, as well as the dollar figures necessary to confirm our decision to automate.

Because we believe automation to be the "wave of the future," we recommend it to you, too . . . and invite you to take advantage of our ideas and experiences that follow.

Our goals

We automated because we were interested in making our air sound more consistent and less dependent upon humans for pace and content; because we wanted to reduce our payroll; and because we were anxious to free our good personnel to do productive things, rather than keep them tied up as button-pushers and platter-turners. The move was precipitated by the decision of our morning man. Jim Lang, to go into military service. Our system, manufactured by International Good Music, was delivered and installed within two months, something of a record for a machine of such great capacity.

The decision to buy the hardware was a big one; at the time it represented an investment on the order of $40,000. But the configuration was an easy one for us to determine, for I had been the owner of a smaller IGM system for our FM station (WRTS) for about a year when the AM went in. In addition, I had been a representative for the company in Northeastern U.S. for several months when the AM system was ordered, and had seen a lot of stations and systems of all makes. Our decision followed our FM experience and my observations at other stations. (Lest you think I bought automation from IGM since I sold for them, let me assure you that such was not the case. *My* IGM rep was Bob Popke, and it was *his* sale to me!)

Joseph D. Coons is president and general manager of WOHI. He has written eight articles for *BM/E*. He is also a management consultant and a sales representative for International Good Music.

Machinery and staff

Our automation system includes two reel-to-reel transports used for music; eight Carousels with 192 cartridge trays that are random-selected for spots, features, etc.; and a time announcer. In addition, there are two single-cartridge playbacks and a real-time switcher, used to join the network.

Automation equipment can be put together in a variety of ways to meet the station's need; ours was designed to fit the WOHI format. It includes a 60-second spot, a time check as a spot separator, and a 30-second spot—all in a cluster. The clusters run normally in each five-minute period between :10 and :30 and :40 to :60 (past the hour). At :00 and :30 in each hour we have 10-minute news segments.

In addition to the clusters, we run features such as bulletin boards, commentaries, etc., at :15 and :45.

All this news and talk adds up to 40% of our format in WOHI's 18-hour day; we even produce a news strip that runs from 5:30 to 8:00 pm daily, a two-and-half hour show! Our current pay-

roll includes a station manager-salesman, sales manager, copywriter, production man/first phone/salesman, woman's editor, news director, traffic girl, bookkeeper, and two newsmen/first phones plus our chief engineer. Our retired ex-chief handles transmitter maintenance part time. Our staff thus totals 11¼. Gross exceeds $200,000 annually, and we operate AM and FM separately on 18-hour daily schedules.

How we run it

Our AM is directional days, non-directional nights. This means we must have a first-class engineer on duty at all times from sunrise to sunset. Before we automated, our engineers split some of the marginal times like nights and weekends, and our programming suffered. It made more sense, however, than bringing in a second man. Now, however, we schedule our chief to cover 6 am-1 pm weekdays. Our production man is on from 1 pm-5 pm. One of the newsmen covers each night from 5 pm to sign-off. On the weekends, both ticketed newsmen work, splitting the entire day. The result is a ticket on duty from sign-on to sign-off, but only one man on after 5 pm weekdays and all weekend. This also leaves our news director free to come and go as programming and events dictate.

In the morning, along with the engineer, our news director is on duty . . . at least for news times. As soon as the news is done, he pushes a button and the system starts up, playing music from our announced IGM tapes and spots as scheduled. In fact, occasionally we tape a newscast so that he can cover a news event; thus he isn't even there when the system turns on his newscast. The chief is then the only one present.

Weekdays after 8:30 am our traffic girl takes over system operation, and runs things until 5 pm, when she leaves. Then, back to one-man operation.

The system has enough capacity to require programming attention only, setting up spots, four times a day, at 10 am, 2 pm, 5 pm and sign-off. The sign-off work gets it ready for the next man, and so in the mornings, Tom Kelly, our chief, doesn't run the system . . . it runs itself while he does studio maintenance or reads *BM/E*. Programming takes the operator about 10 minutes each time. In addition, the operator on duty signs the paper-tape log the unit prints, and checks the system to see that it's on time every hour or so. (It can get behind when we ask it to play three

Automated Stereo FM: Another Small Town Success

Since Jan. 1, 1970, WEAI-FM, Jacksonville, Ill., has been programmed in full automated stereo during its broadcast day from 5:45 am to midnight.

There are three program segments. Early morning music is country-western, appealing to the farm audience and followed by live local news until 8. Middle-of-road music takes over at 8 am with the "Del O Show." At noon, live world and state news is given, with live "Music at Noon" until 1.05 pm, when the automated "McMasters Show" of MOR music takes over to 6 pm.

From 6 to 6:30 WEAI provides live world, state and local news, weather, and sports. At 6:30 pm, the ever-popular talk show "What's on Your Mind" is on for a half hour.

At 7 pm, the hit sound format begins—the sound to reach the 18-to-35 set. The format consists of a careful selection of all-time hits and current releases.

The system is programmed to include 15-minute intervals between each commercial; if important news or weather bulletins come along, the machine can be stopped for a live broadcast.

Sales Manager Richard Smith is pleased with advertiser reaction. Sales have been good, and the talk around town indicates the sound is reaching the desired targets. Stereo is a hit. In fact, so is WEAI-FM.

Selling the Audience

WOHI has been aggressive to point out the advantages of automation to its audience, even running an ad in the local paper to introduce the system in 1968. The station promotes its syndicated tapes and the disc jockeys heavily. Each taped personality "works" only a plausible schedule, the shows are promoted, and the announcers' voices are also used on spots.

In addition, the system is showcased, installed in the station's front windows for maximum exposure. Interested listeners are invited to watch the device and are told a little about how it works.

Although WOHI promos aren't specific, the audience seems to understand how economics and priorities made the change necessary. There have been no adverse comments from listener since the start-up errors were corrected. Because the unit is complete, the station is often visited by other operators, who usually are amazed that everything they've been hearing has been automatically controlled.

What About Live Shows?

The WOHI installation works the reverse of what you might expect: The main "air" control room, used for live shows, plays through the automation system. In other words, when it's time for a live show, the system turns on the studio. In this way, the system's automatic logger writes out the time that any live event begins and ends.

As the live programming runs, the system "tells" the operator (by means of illuminated push-buttons in the control room) when it's time for a spot; the operator then pushes a button, the system puts the spot on the air, logs it, and then turns the control room back on, logging that. In this way, there is no cartridge playing or logging whatsoever in the control room . . . except for themes, and sound-effects carts, which are played and mixed in the usual way.

Another advantage of this approach is that the

60s in two minutes, for instance!)

Programming the system is simple: Our log, prepared by the system I described in the April 1965 *BM/E*, includes Carousel locations next to each spot scheduled. The operator pegs up the spots required, and away it goes. The time format is controlled by several ingenious "peg clocks" provided by IGM in their units.

Because of the 14-inch reel capacity of the tape transports, and because our AM is naturally mono, we can run a tape for six hours at 7½ ips. We load an announced program tape on the top deck, and a "spotlight" tape on the bottom deck, and mix them in a ratio of three standard tunes to one hit. Our "announcers" change at various times. Don McMaster is on from 2-5:30 and 8-11 pm; Del O is on from 6-10 am and 1-2 pm; Fred Johnson is on from 11-12 pm, and talk is on the rest of the time. All announcers we thus air are far better than live jocks we could buy . . . even in East Liverpool! And there is no turnover. The program tapes are used once and not repeated, except the spotlight tape, which is provided weekly and used until replaced for seven days. It usually has about 40 songs on it, and is continuously reversing.

Automation people who are knowledgeable about programming often use the phrase "garbage in = garbage out," referring to the not-always-remembered fact that no matter how good the system is, it must be loaded with good material to sound good. Thus, we put very heavy stress on the quality of our cartridges and tapes. Our production man is held fully accountable for every cart in the Carousels and every sound the station makes. Of course, he cannot produce them all himself, but he is instructed to supervise others who do use the production rooms. The result is a consistent, excellent grade of material being programmed.

IGM systems overlap events with cue tones on the tapes, and this overlap is variable from event to event. It's completely foolproof in operation, and this means that once a spot or feature is recorded right, it will sound right *every time*. This, perhaps, is the biggest single improvement in our sound. We never "step on" or "wow" a spot anymore, and our sound is very, very tight when we want it to be.

But more important is the time we now have to do our public-affairs work. Our success in this area of activity is best evidenced by our sweep for two consecutive years of the AP Broadcasters Awards here in Ohio for stations in markets under

Continued on page 40

system's programming can be changed by the traffic girl even when a live show is on; the system will inform the operator of the change, and it can be executed without the usual trip into the control room, and an interruption of the program staff's activity by traffic.

The IGM unit is designed so that any event can be manually cancelled or added at any time —either at the system or in the control room.

WOHI's FM System

The system used on WRTS (FM) is a year older and a good deal smaller than the AM. It originally consisted of one reel machine, a cart playback, and a Carousel, plus an automatic logger. The FM system has since grown by the addition of two more reel-to-reel machines. Software is pretaped, unannounced country and western music, updated with a hit reel which is replaced every week. Two 14-inch reels, six hours long in mono, are mixed on a 1:1 basis, with an additional hit reel starting each quarter-hour segment. The Carousel plays a spot or promo every five minutes; the cart machine adds an ID every half hour. The station sounds busy . . . and is. There is no FM staff; the only support time is what's needed to produce three special FM newscasts daily, plus spot production time.

Maintenance Routines

As you know from earlier articles, Joe Coons is a bug on quality engineering and good maintainence. Yet, he insists that the automation system requires less attention than a live studio, for the machine handles everything the right way, tapes aren't slammed around, and the system is entirely solid state.

All electronics in the IGM system are plug-in modules, with a great deal of redundancy, or repeated use of a common plug-in circuit. WOHI has a full set of plug-ins for cartridge equipment, since so much of the station's programming is on cart. This set of plug-in spares costs about $125. A spare is used about once every 10 months or so, usually due to a transistor failure. As of this writing, there has been not one minute of lost airtime in the two years the system has run.

Each evening during the last hour of programming, when only one reel-to-reel machine is running, the WOHI operator on duty cleans every playback head in the system—16 in the AM system, five in the FM system, as well as the cart recorders in the station's production room and newsroom. Capstan idlers on the reel machines are also cleaned daily, while on the cart machines they are cleaned every seven days or so.

Once in a while, when it seems warranted by level consistency, a level-set cartridge is run in all the sources and output pots are trimmed up if necessary. This is usually every 90 days or so.

Only one playback head has needed replacement in either the AM or FM systems, and that was on a reel-to-reel Scully machine. The head cost about $22. All the switching in both machines uses only one type of relay, a plug-in KHP Series by Potter and Brumfield. WOHI keeps six of these on hand to slip into any module that's noisy. In practice, this means about one relay substitution every 90 days or so.

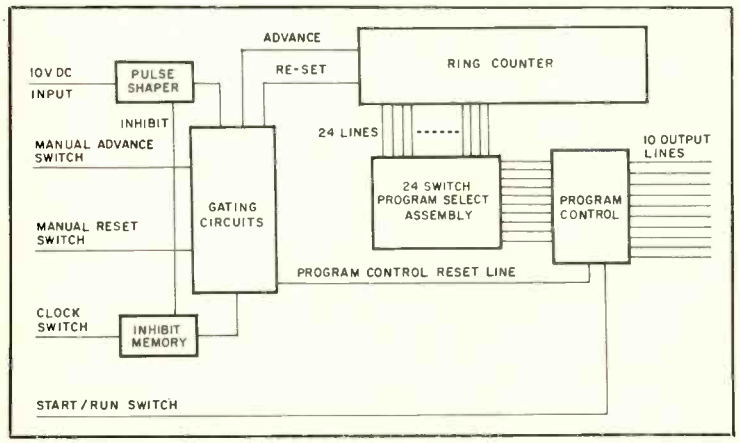
Except for head cleaning, Chief Engineer Tom Kelly keeps the automation systems in shape, taking about 15 or 30 minutes a week to do the job. The work is usually done while the systems are on the air; in an IGM system one source can be off without affecting any other source.

Integrated Circuits for Low-Cost Automation

By C. Dexter Haymond

Part of a third generation of broadcast automation equipment, this IC brain can be had for less than $3000 and installed by your chief engineer. It's more reliable and requires less maintenance than an automation system using relays.

Dexter Haymond programs KGFM on his Aitken IC controller. He says old relay-type controller was maintenance problem, but IC type is "about as bug-free as anything we've seen."



Programmer uses flip-flops to sequence through 24 inputs in preset order. Clock overrides, yanks back to station ID and sequence repeats. Manual can override also.

AFTER TWELVE YEARS of manufacturing automation equipment for radio stations, one of the major problems is still the impossibility of shipping the unit to the station and having the station engineer install, adjust, and operate the equipment properly. Automation equipment has been unique in that it has required supervision of the installation and initial operation by a representative of the manufacturer.

With these thoughts in mind, automation builder Ken Aitken investigated computer building blocks—integrated circuits. For help in design, Aitken turned to Texas Instruments, whose engineers designed the first working brain for his new APT-3 Automation system. This system uses only three kinds of ICs: edge-fired flip-flops, NAND and NOR circuits. Having been designed for computer use, such ICs have reliability measured in centuries instead of years.

Digitals, not linears

A distinction should be made between linear ICs—with which many chiefs have had sad experiences—and digital ICs used in the APT-3 and today's modern computers. Digital ICs, while they are amplifiers like linear ICs, differ in that they turn full on or full off when their inputs are fed proper signals, and are thus not subject to many of the problems associated with integrated audio amplifiers.

This new APT-3 integrated circuit control unit is so simple and reliable in operation that any radio station engineer can construct his own automation system using the APT-3 as the initial building block. It occupies only 15-¾ inches of rack space. Straightforward controls make day-to-day use of the system simple for even the inexperienced operator. Any tape machine, reel-to-reel or cartridge, with remote control ability, can be connected to the system with no alterations or additions.

The major advantage of the APT-3 is reliability, as there are no moving parts in the decision-making portion of the unit. It is safe to say that

C. Dexter Haymond is vice president of KGEE and KGFM, Bakersfield, Calif.

the Achilles Heel of broadcast automation is relays and their associated problems. Not only do relays occasionally fail, but they are the natural suspects when the engineer is troubleshooting. In contrast, the APT-3 integrated circuits are the least subject to failure; in fact, in over three years of testing and operation, Aitken has yet to record an IC failure.

First IC installation

The first broadcast installation of the APT-3 was made here at KGFM. (Incidentally, our AM station—KGEE—was the first radio station in the United States to use automation when in 1957 it began using the first system manufactured by Schafer Engineering.) When KGFM went on the air in October, 1964, the company purchased a custom-made automation system from Aitken Communications. This system now consists of three Scully 14-inch tape pullers for music (which is leased from Alto-Fonic); one Ampex tape puller for special, station-produced tapes; one MaCarTa Carousel for commercial announcements; one carousel for station features, and one Sparta cartridge-playback unit for IDs. When the APT-3 IC brain was installed, its 15-¾ inches of rack space replaced 87 inches occupied by the old control unit. It took only half as long to install the APT-3 as it did to remove the old control unit with its mass of cabling and associated equipment.

The automated operation of KGFM is an interesting success story. Bakersfield, California, has an urban population of less than 75,000 people, but has eight AM stations, four FM stations, three TV stations, and three AM stations in adjacent towns. Gross sales for KGFM have averaged over $40,000 a year since 1965. KGFM features stereo programming 24 hours a day without duplicating any portion of the programming of sister station KGEE. KGFM has a separate rate card from KGEE but has no separate personnel. All employees, including salesmen, announcers, traffic, program director, engineers, and management, double in brass.

KGFM programming consists of MOR music with commercials and features clustered on the quarter-hour. With 24 cartridges in the commercial Carousel and three two-hour tapes on the music machines, the system provides six hours of unattended operation. The order in which the machines are played is governed by 24 10-position thumbwheel switches. Programming is repeated each half hour and is started when the time control unit restarts the programmer.

Modular design

The APT-3 is constructed along modular lines with many plug-in units. This includes the 10 machine-control units, each of which has an eight-pin connector for controlling the start and stop of the machine and the photo-switching of its audio.

Provision has been made for external connections to the output of the selector switches as well as the logic inputs to facilitate auxiliary control equipment such as network joiner, automatic logging, sub-programmer, alarm panel, etc.

Trouble-shooting facilities have been built into the system. VU meters allow the operator to monitor any two functions simultaneously. He may choose to read the audio and the tone on separate meters at the same time, or he may choose to read the tone and the action of the silence sensor at the same time. He may also monitor both audio channels in the case of stereo operation. Audition facilities are built in.

We're satisfied with the APT-3 programmer and the whole automation system. It has good reliability and requires almost no maintenance beyond cleaning tape heads. **BM/E**

What's Inside the Brain?

Being electromechanical, relays are prone to malfunction when dirty. Thus they require lots of preventive maintenance. The Aitken programmer is all solid-state, uses no relays; all switching is done by digital ICs.

In the Aitken system, the various program sources (tape decks, Carousels, cart machines, whatever) are fed to a 24-switch program select assembly (see diagram). There, 24 thumbwheel switches are preset to determine the order in which sources go on the air. An advance pulse causes the programmer to switch from one source to the next, and a clock pulse inserts IDs at appropriate times.

All control functions occur in the programmer. In addition to control functions, it is necessary to have sensors to determine start and stop times, and end of music announcements. It's also necessary to combine audio signals from various sources into a single output, provide monitoring, and the program output.

Inside the programmer modular cards contain all circuitry. Six of these cards form the ring counter, containing 12 flip-flops and 24 NOR gates, with two flip-flops in a single IC and four gates in a single IC per card. Each card has four outputs. Card outputs are fed directly to the thumbwheel switches through isolation diodes and also to the lamp drivers to indicate which count is active. The switch outputs go to three additional cards containing flip-flops made from cross-connected NAND gates. An advance or reset signal sets all gates to the off position. The start switch and the thumbwheel switches provide inputs to a dual-input gate ahead of this cross-connected flip-flop to provide an output to start the next machine.

Two other features of the Aitken system:

- Advance pulses are 25 Hz, and the amplifier-filter system used has a very narrow passband, rejecting any signal 0.5 Hz or more away from 25 Hz.
- The silence sensor continues to switch from source to source until it finds a working machine. Thus if two or more program sources fail the silence sensor will search out any remaining sources and keep a program on the air.

How to Automate TV Traffic

Automatic typewriters speed the work and increase the accuracy of logs and schedules at this TV station. For the future: These machines can be interfaced with a general purpose digital computer.

DAILY PROGRAM LOGS, two types of availability sheets, program schedules, sales proposals, contracts, and even letters to listeners—all these are now produced in a fraction of the time formerly required at KTUL-TV, Tulsa, Oklahoma.

How much extra does this cost? Nothing. In fact, clerical savings from the station's new Word Processing Center top $7,400 a year. In addition, there are the substantial, if intangible, savings generated by better use of executive and operating personnel time.

For example, the daily program log, averaging 22 to 25 8½ × 14-in. sheets, is now typed onto duplicator masters in about 1½ hours on one of two IBM Magnetic Tape Selectric typewriters (MT/STs) in the center. By contrast, typing the log masters used to be a three- to four-hour job for Patty Clark. On Thursdays and Fridays, when she also had to prepare week-end logs, Mrs. Clark often spent eight to nine hours typing.

Now she has more time for other traffic duties, such as receiving and logging-in commercial films from agencies, helping traffic director Pauline Thurmond prepare the "scratch" log, from which the final log will be typed, and proofreading the finished log against the master availability sheet—also produced on an MT/ST—to be sure all commercials have been properly placed. Says Miss Thurmond, "In short, shifting this heavy typing to the center permits us both to make more productive use of our time."

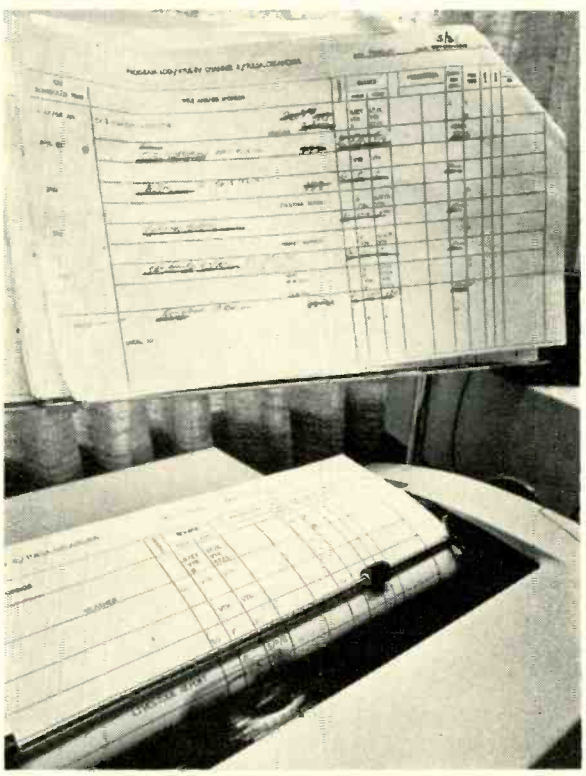
Much of the log's production is now automated by means of prerecorded tapes. There is a tape for each day's programming—a Thursday tape, a Friday tape, etc. The MT/ST operator just manually types the breaks, recording them on a second tape. Then MT/ST, a Model IV with two tape stations, merges the tapes to produce the log automatically at 150 words a minute. The masters on which the log is typed are then reproduced in 18 copies which are distributed to appropriate personnel.

The center's other MT/ST is a Model II, which records on and reads from just one reusable magnetic tape cartridge. It is used most often for correspondence: Feeding into the center is a nine-station IBM Selective Recording Network (SRN) Dictation System serving personnel with heavy loads of dictation.

Updating availabilities

Production of the station's master availability sheets every two or three weeks is also expedited by prerecorded tapes. Like the log, the availability sheets are set up across 8½ × 14-in. paper. They show the days of the week and list times that have

Debbie Welsh types KTUL-TV's weekly program schedule. Because she records the corrected schedule on tape each time she types it, she must manually enter only the changes each week.



After recording corrections, Mrs. Welsh merges two tapes and the new log is typed automatically at 150 words/min.

Kathy Smith answers a viewer's letter in seconds by typing only name and address manually. Then she programs a taped reply and her IBM MT/ST automatically types the body of the message.

been sold for as far into the future as the commercials have been placed, by date within each day's column. Miss Thurmond constantly updates the master as orders are received and clears everything sold against it.

In the past, production of the sheets was a tedious job handled by sales-department typists. Now it is produced in the center in less than a single afternoon.

In addition, automated typing has made practical a new "short" (six- to nine-page) availability report. Produced weekly onto duplicator masters in some 35 to 40 minutes, it's reproduced and distributed to all sales personnel and representatives, locally and nationally. Unlike the master sheets, which show what has been sold, the short report lists program content and what is available, at a glance, for the coming weeks.

MT/ST Operator Debbie Welsh describes her work: "These machines are faster than conventional electric typewriters. "I can do what used to be an afternoon's work in an hour, and everything goes out looking letter perfect.

"We recently typed 150 full-page letters to clients when we sent out new rate schedules," she adds. "We recorded the individual clients' names and addresses on one tape and the text of the letter on the other. Then we automatically produced these letters in just 1½ days—in addition to our regular work."

Other jobs handled in the center include:

- The weekly program schedule for newspapers and cable TV listings, automatically typed in 30 to 45 minutes because only the changes must be entered manually.
- Sales department proposals, about 20 to 25 contracts a day, in 1 to 1½ hours—the five-part snapout forms were redesigned by IBM for efficient MT/ST processing.
- Correspondence—dictated via the SRN, involving transcription and automated typing of some four belts a day.

Faster correspondence

One of the primary beneficiaries of the SRN System is operations manager Robert N. Hower, whose responsibilities include replying to all letters from viewers. In the past, he spent about 30 minutes a day dictating to his secretary, and she spent another 30 minutes typing the letters. Now, Hower accumulates viewer letters for a week; batches them by type of reply, and spends only 30 to 45 minutes a week dictating to the Word Processing Center. There, many letters are answered by manually typing just the viewers' names and addresses, then "playing-out" the taped reply. The center has prerecorded replies concerning each of several programs, and also a general reply: "We received your letter and thank you for writing, etc. . . ."

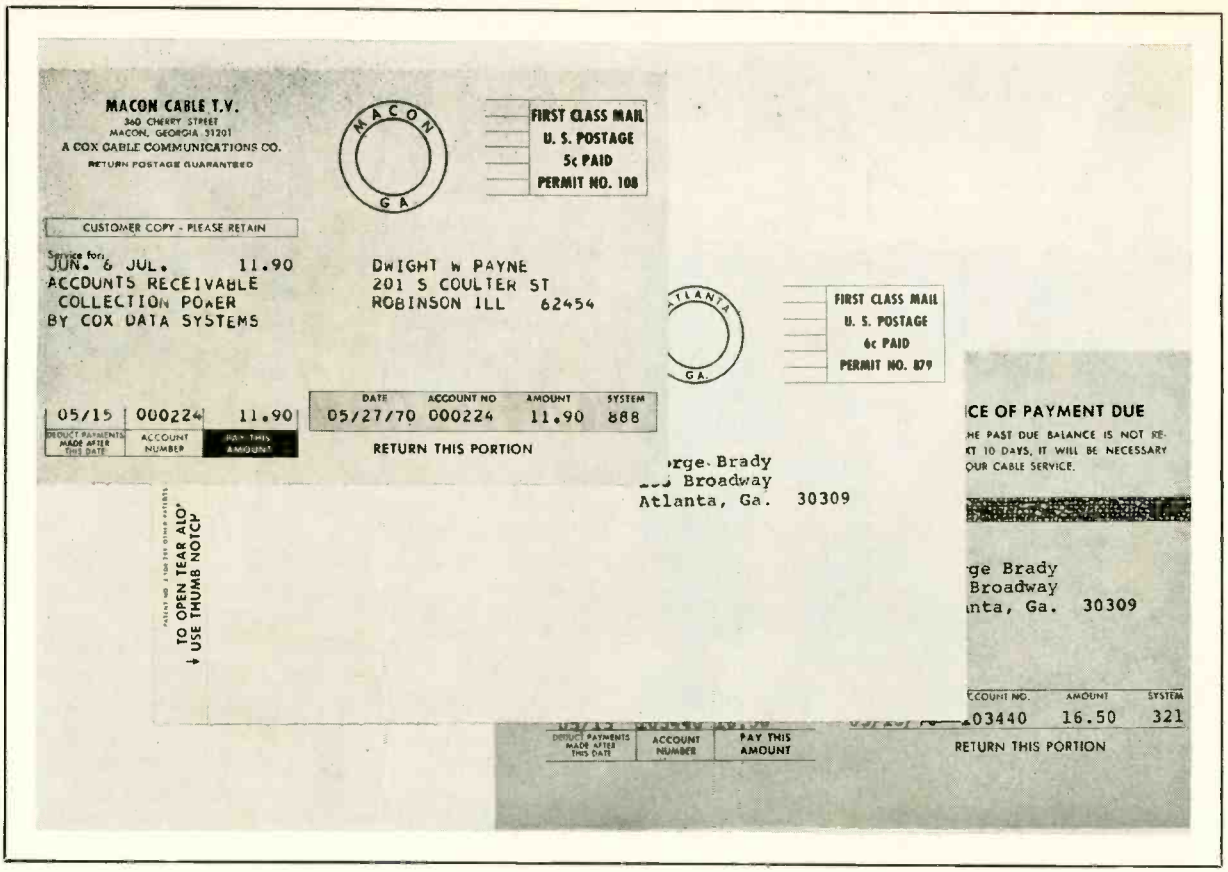
"We average about ten letters a day," says Hower, "particularly from viewers regarding program changes and the like. But if Dick Cavett has a controversial guest, for example, we get a great many more. Consequently, the Word Processing Center saves a great deal of my time and that of my secretary. Now she is able to help in other areas that are much more productive.

"Unlike some so-called time savers that actually require more people, the MT/STs have been all we expected and more," Hower emphasizes. "We now have two fewer girls in secretarial duties. We figure $600 per month per girl, including fringe benefits, or $1,200 a month. Our total equipment costs in the center are $578 a month. Thus, we are saving more than $7,400 a year and getting higher-quality work, in addition.

"There are other personnel advantages, too," he adds. "We recently hired a new MT/ST operator. She spent one week at IBM school, where she was trained specifically for our operation, with our forms and methods. Thus, she was thoroughly qualified from the first and has worked out very well."

"In addition, we just hired two new secretaries for station executives. In the past, we would have had to make shorthand a requirement. Now, we don't—and find that we can get girls more highly qualified in other skills with less difficulty."

"The result of our new word processing system and equipment has been increased efficiency and lower cost. And with the amount of paperwork generated at a TV station, that's a major operating advantage." **BM/E**



Cox Data Systems prepares for customer: statement (top), deliquency notice in envelope (middle) and, if necessary, final disconnect notice (bottom).

Computerized Accounting for Cable Systems: How can it help you?

It can get your bills out on time and accurately. It can speed collection and minimize write-offs. It can provide sales, management and accounting records you can use to save money and keep track of expenses. It can keep your own payments straight, too.

KEEPING TRACK OF YOUR FINANCES with a growing cable system can cost more than its share of headaches and money. Maybe your girl Friday can handle billing and someone else can watch expenses over the months; overdue accounts you can get around to and there will always be write-offs . . . or, of course, you can turn to a computer accounting service.

A good data service bureau will be glad to take your cash income/outflow and subscriber information and turn it into relevant figures. For example, U.S. Computer Systems (Sacramento) will work out with you a complete record of all households in your franchise area (see box) letting you know whom you've contacted, what has happened, and who remains unsolicited.

But the big attraction of a good data service bureau is computerized billing. Cox Data Systems (Atlanta) offers a complete program designed to keep close tabs on accounts receivable and to maintain advanced (two months) billing to keep the cash flow coming in.

You send Cox two basic source documents: a *work order* and an *opti-tape/bank deposit*. The work order shows all new accounts, changes, re-

connects, additional outlets, disconnects, refunds and adjustments. The opti-tape is an adding machine tape of subscriber receipts—it can be read by you as well as by the computer because of its slightly stylized print.

With this information, the data service bureau compiles for you an *accounts ledger*, showing the status of subscriber accounts, a complete list of all transactions since the last billing cycle, the age of each account, delinquency data, name, address and phone number for each account.

Subscriber statements, postmarked from your own city, itemize charges and credits, carry promos and have tear-off sections to be returned with payment.

Delinquency notices are sent first class by the bureau in envelopes ("to eliminate any undue embarassment") directly to the appropriate subscribers. Each notice lists current and past due charges and credits, with a tear-off section to be returned with payment. You will receive from the bureau a delinquents list, with each person's account information, plus phone, address, installation data and age of account.

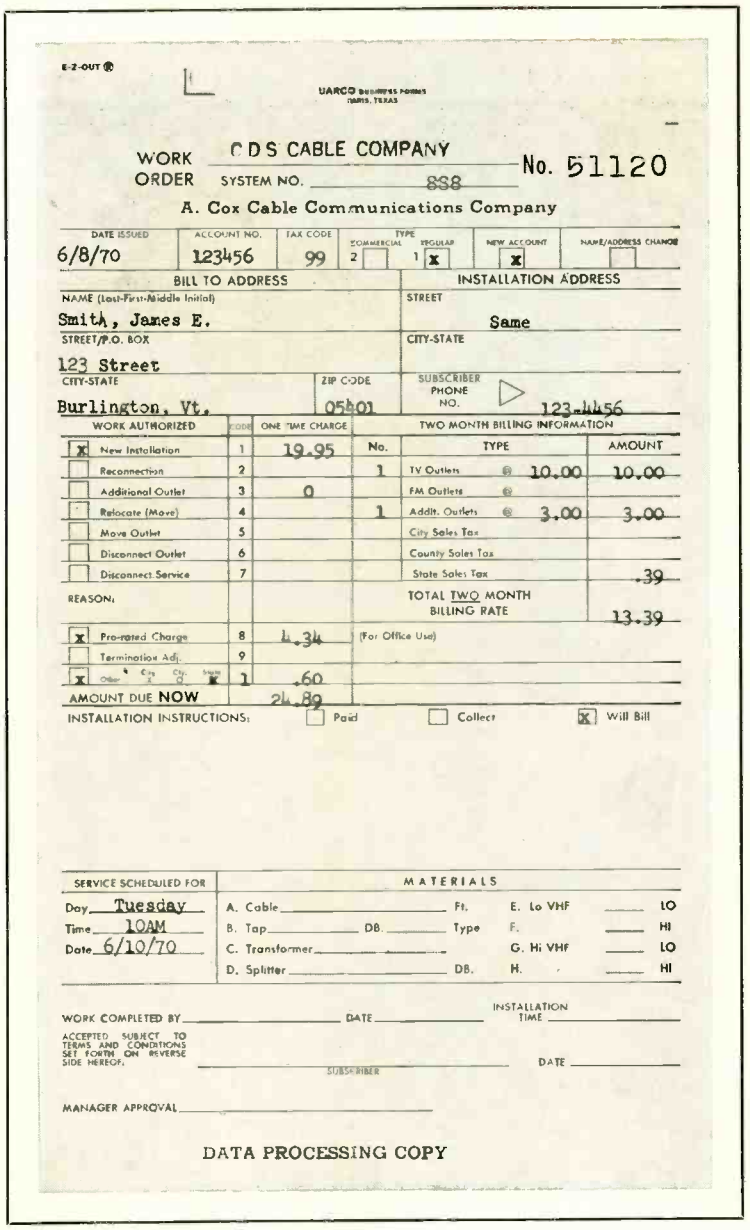
The *disconnect warning* is a duplicate of the

Computerized Data Services Do More Than Simple Billing

Accounts payable: If you just send a data service bureau such as Cox Data Systems a copy of your voucher jacket at the end of the month, you'll get, in return, checks ready for your signature, plus a list of checks written and a voucher register, showing by account number all invoices paid during the month—including names, dates, amounts and discounts. Franchise tax information is broken out from other data by the U.S. Computer Systems plan for easy tax payment calculation.

General Accounting: Monthly reports on expenses (by department), revenue and income (by classification), plus a balance sheet, can be compiled by a good computer service. Actual amounts can be shown on the reports, along with amounts budgeted for the month as well as last year's figures. Subscribers accounts on microfilm (15,000 on one four-by-seven-inch card) can be easily checked out on a desk viewer. Ledger cards with a full-year history for each subscriber can also be put on microfilm. Long-range planning and analysis is easier with computer print-outs giving the necessary figures quickly.

Marketing: You can coordinate your marketing to every home in your franchise area with a service which keeps track of all potential subscribers, giving the status (good standing, delinquent, etc.) of actual subscribers, the number of disconnected homes, number of non-cabled homes and their status (sold, unsolicited, etc.). Sales calls can be recorded by address with results listed and, if there is a refusal, reasons given (by code) for the refusal. Individual salesman records can be collated to show sales effectiveness and disconnection rate; sales by geographical area can also be analyzed from a printout.



E-Z-OUT®

UARCO Business Forms
Harris, Texas

WORK ORDER — CDS CABLE COMPANY — No. 51120
SYSTEM NO. 8S8
A. Cox Cable Communications Company

DATE ISSUED	ACCOUNT NO.	TAX CODE	TYPE: COMMERCIAL	TYPE: REGULAR	NEW ACCOUNT	NAME/ADDRESS CHANGE
6/8/70	123456	99	2	1 X	X	

BILL TO ADDRESS
NAME (Last-First-Middle Initial): Smith, James E.
STREET/P.O. BOX: 123 Street
CITY-STATE: Burlington, Vt.
ZIP CODE: 05401

INSTALLATION ADDRESS
STREET: Same
CITY-STATE:
SUBSCRIBER PHONE NO.: 123-4456

WORK AUTHORIZED	CODE	ONE TIME CHARGE
X New Installation	1	19.95
Reconnection	2	
Additional Outlet	3	0
Relocate (Move)	4	
Move Outlet	5	
Disconnect Outlet	6	
Disconnect Service	7	
REASON:		
X Pro-rated Charge	8	4.34
Termination Adj.	9	
X Other	1	.60
AMOUNT DUE NOW		24.89

TWO MONTH BILLING INFORMATION	No.	TYPE	AMOUNT
TV Outlets	1	@ 10.00	10.00
FM Outlets		@	
Addit. Outlets	1	@ 3.00	3.00
City Sales Tax			
County Sales Tax			
State Sales Tax			.39
TOTAL TWO MONTH BILLING RATE			13.39

(For Office Use)

INSTALLATION INSTRUCTIONS: ☐ Paid ☐ Collect ☒ Will Bill

SERVICE SCHEDULED FOR
Day Tuesday
Time 10AM
Date 6/10/70

MATERIALS
A. Cable ____ Ft. E. Lo VHF ____ LO
B. Tap ____ DB. Type F. ____ HI
C. Transformer ____ G. Hi VHF ____ LO
D. Splitter ____ DB. H. ____ HI

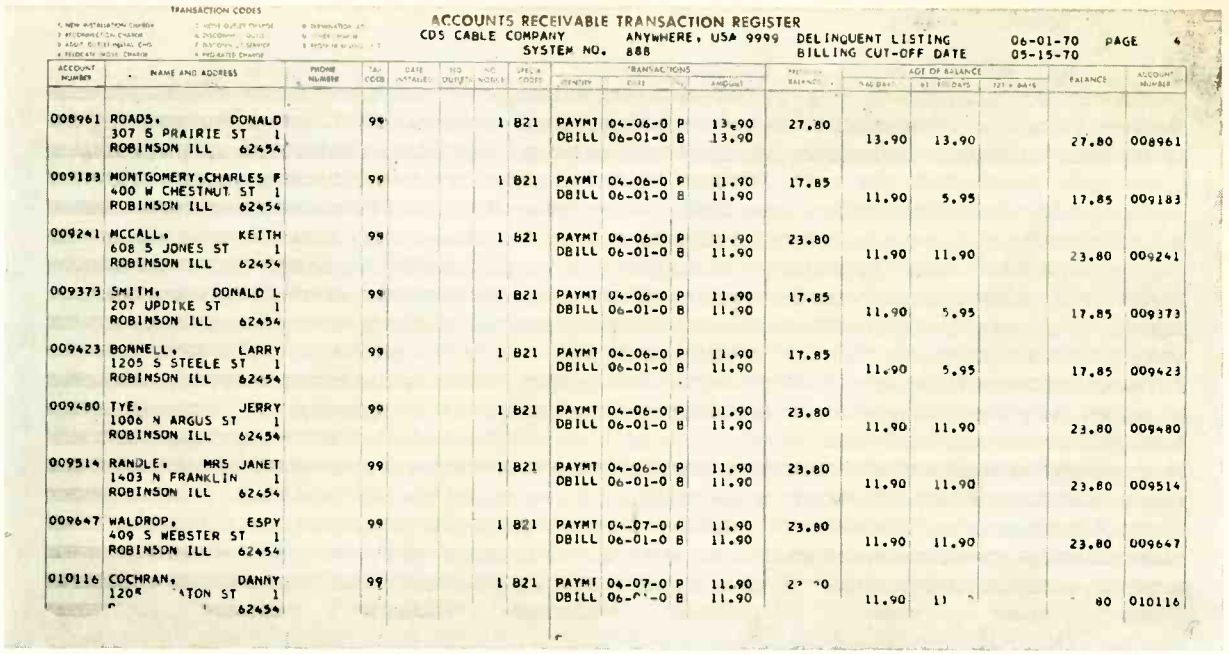
WORK COMPLETED BY ____ DATE ____ INSTALLATION TIME ____

ACCEPTED SUBJECT TO TERMS AND CONDITIONS SET FORTH ON REVERSE SIDE HEREOF. ____ SUBSCRIBER DATE ____

MANAGER APPROVAL ____

DATA PROCESSING COPY

This work order and an adding machine tape of receipts in opti-tape form is all you need to send the billing service.



TRANSACTION CODES

ACCOUNTS RECEIVABLE TRANSACTION REGISTER
CDS CABLE COMPANY ANYWHERE, USA 9999 DELINQUENT LISTING 06-01-70 PAGE 4
SYSTEM NO. 888 BILLING CUT-OFF DATE 05-15-70

ACCOUNT NUMBER	NAME AND ADDRESS	PHONE NUMBER	TAX CODE	DATE INSTALLED	NO OUTLETS	NO NOTES	SPECIAL CODES	TRANSACTIONS IDENTIFY	DATE		AMOUNT	PREVIOUS BALANCE	AGE OF BALANCE 30 DAYS	31 TO 60 DAYS	121+ DAYS	BALANCE	ACCOUNT NUMBER
008961	ROADS, DONALD 307 S PRAIRIE ST 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-06-0 06-01-0	P B	13.90 13.90	27.80	13.90	13.90		27.80	008961
009183	MONTGOMERY,CHARLES F 400 W CHESTNUT ST 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-06-0 06-01-0	P B	11.90 11.90	17.85	11.90	5.95		17.85	009183
009241	MCCALL, KEITH 608 S JONES ST 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-06-0 06-01-0	P B	11.90 11.90	23.80	11.90	11.90		23.80	009241
009373	SMITH, DONALD L 207 UPDIKE ST 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-06-0 06-01-0	P B	11.90 11.90	17.85	11.90	5.95		17.85	009373
009423	BONNELL, LARRY 1205 S STEELE ST 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-06-0 06-01-0	P B	11.90 11.90	17.85	11.90	5.95		17.85	009423
009480	TYE, JERRY 1006 N ARGUS ST 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-06-0 06-01-0	P B	11.90 11.90	23.80	11.90	11.90		23.80	009480
009514	RANDLE, MRS JANET 1403 N FRANKLIN 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-06-0 06-01-0	P B	11.90 11.90	23.80	11.90	11.90		23.80	009514
009647	WALDROP, ESPY 409 S WEBSTER ST 1 ROBINSON ILL 62454		99			1	B21	PAYMT DBILL	04-07-0 06-01-0	P B	11.90 11.90	23.80	11.90	11.90		23.80	009647
010116	COCHRAN, DANNY 120[illegible] 1 [illegible] 62454		99			1	B21	PAYMT DBILL	04-07-0 06-[illegible]-0	P B	11.90 11.90	2[illegible]	11.90	11		80	010116

Cable system gets complete accounts ledger from billing service. This one shows delinquent billing.

delinquency statement, marked "final notice." You get a copy for follow-up.

An *income summary* brings you a recap of the month's billing and cash received, plus a subscriber and system profile, franchise tax data and the balance of accounts receivable.

The U.S. Computer Systems billing service has advance or in-arrears billing, monthly, bi-monthly and yearly (with coupons); automatic prorating occurs for service of less than a full month. Aging of receivables is recorded and a "Suggested Disconnect" list is made for you, updated every 15 days.

Other services from data bureaus (box, p. 37) include recording and collating your own accounts payable activities, tax reporting, management and sales information, and your general accounting figures.

A training program for your office personnel, conducted by the bureau, should not take long (U.S. Computer predicts two to four weeks, plus on-site support afterwards) and a complete changeover to computer services for cable systems can probably be accomplished as fast as you can get your information to the bureau and your people trained. **BM/E**

Who Needs a Computer? Buy or Hire?

If you can't get bills out on time, collect on time, or answer customer questions accurately you need a computer. Or if your systems and management are widely scattered you need a computer. And if you reach 50,000 subscribers you might consider buying your own.

Danger here is that the computer is only about one quarter of the cost of data processing. Installation and remodeling costs, extra peripheral equipment and hiring of computer specialists are the bigger costs.

If you buy your own, you stand to invest $750,000 in equipment that could be outdated in a short time. U.S. Computer says its bi-monthly billing cost is 7-½ cents per subscriber per month.

Not that every cable operator is enamored with his data service bureau. Too often in the past an operator has contracted out to a local bureau without first studying all of the transactions involved and the people necessary to provide inputs. The two professional billing companies mentioned here have experience—at last count, Cox Data Systems serves 31 and U.S. Computer 32 systems. Operators now using these two service bureaus include: Cox Cable Communications, Davis Communications, FCB Cablevision, H&B American, Harriscope, Multi-View Systems, San Jose Cable TV Service, and Storer's CATV Division.

Coming next month

CM/E

CABLE MANAGEMENT/ENGINEERING

A NEW MAGAZINE WITHIN A MAGAZINE

REACHING 50% MORE CABLE PROFESSIONALS AT ONE-HALF THE PAGE RATE OF ANY OTHER PUBLICATION IN THE CATV FIELD

To obtain more information about CM/E . . . CABLE MANAGEMENT/ENGINEERING, call Mactier Publishing Corporation at 212-661-0450.

THE DITCH WITCH R40...
THE NEW TRENCHER
FROM The Professionals

The new 37-HP R40 offers a revolutionary design option: operator's selective front or rear power steering . . . plus single- or double-auger or offset digging booms . . . front- or rear-mounted vibratory plow or backhoe . . . a new hydraulic boring unit. Other Ditch Witch "extra value advantages" include four-wheel-drive; unmatched operator convenience and safety; hydraulic travel speed independent of four selective digging chain speeds, plus reverse. Production potential of over 2,000 FPH, depths to 6', widths to 12". Let a Ditch Witch Professional show the R40 soon!

A division of
Charles Machine Works, Inc.
100 Ash Street
Perry, Oklahoma 73077 USA

Circle 115 on Reader Service Card

Automated Talk Station

Continued from page 31

225,000, one of two categories in which awards are made. After all, our little station has three full-time newsmen, plus women's editor Barbara Jones. All spend the bulk of their time on public-affairs programming. We run two different local commentaries daily, documentaries up to two hours long from time to time, and frequent editorials. We have the time to feed actualities from our three mobile units, too, since we never have to stay in the shop spinning discs.

Of course, the use of pre-taped programming for music has freed us from buying, auditioning, and cataloguing records, and we no longer have to try to get the men to play *our* music instead of *their* music. (In fact, I frequently relate to automation-lookers the fact that my hair turned grey one morning listening to Joan Baez for three cuts in a row during traffic time in our steel- and pottery-manufacturing town. Ugh! It is, unfortunately, still grey.)

How about the timeliness of the station? Most people who haven't heard it think it must sound canned. Not so. We can do such a good job on the features, news, etc., and the system puts in so many things like time checks, etc., that no one notices the fact that the announcers are just pleasant, not talking about the weather or other community stuff. And unlike pre-automation days, none of them talk too much, or use bad grammar, or have any of the failing our live people had.

The audience also likes our consistency. We sound good no matter what day of the week or what time of the day you turn us on . . . not counting one or two of our live shows, which need some work.

As for the advertisers, business has been up consistently every month for over 30 months. That's my favorite indicator!

What would we do differently?

As in all things these days, progress has been made in the design of automation equipment. IGM's new Instacarts and MOS memory would mean we would need to program only once a day and could have even more flexibility in our schedule than at present.

Also, we learned the hard way how important it is to be fully prepared for your air date. The system at WOHI was only operational for a day before it went on the air, and as a result we weren't fully ready to run it: Cartridges weren't ready, operators weren't trained, etc. When you automate, it's important to eliminate those human factors that cause poor performance, including lack of operational know-how, rushed production, etc. Our first few months were pretty rugged.

Of course, that's long ago. Today, our maintenance is minimal, our production is tops, and our station is even more successful economically. Above all, the listeners like it, and the advertisers buy it . . . and that's the name of the game. **BM/E**

NEWS

Continued from page 10

Bay Area Educational Television Association, which will (if the FCC approves of the contribution) use the U to complement its present services on KQED-FM-TV (Channel 9). . . . . Things seem to be going well with **Sparta's,** early-summer price cut (average of 11% off) on AM/FM transmitters—the transmitter line came as part of the purchase of **Bauer Broadcast Products Company**. . . . . **TCI's** first customer on its new microwave route between Denver and Salt Lake City is **NBC,** sending its network video signal to affiliates in Grand Junction, Colorado, and Salt Lake City. . . . . The **English Electric Valve Company** range of TV camera tubes, previously distributed by **Visual Electronics,** will now be available in the U.S. by direct purchase from **English Electric Valve North America Ltd.,** Buffalo, New York. . . . . **W. & G. Instruments,** Hanover, N.J., is the sole distributor in the U.S. for the West German company, **Howaldtswerke Deutsche Werft,** manufacturer of electronic measuring and test equipment for fault location in cables. . . . . Gary L. White has formed **The White Association, Inc.,** Detroit, the nation's first black-owned industrial audio-visual productions firm, which will offer professional services in planning, writing, directing and producing industrial movies, radio and TV commercials, slides and slidefilms and special TV programs.

Recent acquisition developments include the purchase of **Hillsborough CATV, Inc.,** (Plant City, Florida) by **TM Communications Company,** as part of TM's plan to establish microwave relay stations across the state when the company introduces the Mid-Florida Cable Television Network. . . . . Two sales were approved by the FCC: WCTU-TV (Charlotte, N.C.) going for $1,225,000 to **Turner Broadcasting of North Carolina;** KOCO-TV (Oklahoma City) for $6.5 million to **Combined Communications Corporation**. . . . . An agreement in principal has been reached for the sale of WKJG-TV (Fort Wayne, Indiana) to **TVC** for an exchange of stock. TVC is a leading CATV systems company and WKJG-TV is in the top 100 TV markets.

Financial reports list record sales for **Belden Corp.** in the first half of 1970—earnings to June 30 for the Chicago-based manufacturer of wire and cable totaled $2,126,330, up 12% from the first six months of 1969. Sales were up 16% to over $54 million. . . . . **Cox Cable's** second quarter revenues gained 9% from the 1969 figure and income "before extraordinary items" increased 40% to $336,-329. . . . . **The Grass Valley Group** (solid-state equipment for broadcasting) had a 23% increase in sales for the first half of 1970 and net income went up to $364,-000, 4% above the first half of 1969. . . . . **Metromedia's** first half of the year went like this: gross revenues of $88,369,168; net income of $2,313,708, which came out to $.40 per share, up $.08 from last year. . . . . And the June network TV billings (according to TvB figures) were 8.5% over the 1969 June figure, reaching almost $123,500,000, of which $85 million was nighttime. The six-month billings total was $866,897,500, 6.3% over last year. Of this amount, **ABC's** share was $230,-303,200, **CBS's** was $342,438,400 and **NBC's** $294,110,900.

"TUNE IT ONCE... IT STAYS THERE!"

SPARTA'S NEW SERIES OF BAUER STRIP-LINE FM TRANSMITTERS

The "Strip-line" concept is brand new to broadcasting. It was developed to answer the needs for more reliability in FM transmitters. The broadband grounded grid amplifier assures optimum performance without the usual knob-tweaking adjustments. Our "Strip-line" transmitters are tuned once . . . and stay there! The final amplifier has just 3 operating parts . . . moving contacts are gone, no expensive-to-replace cavities and all front panel tuning controls have been eliminated. Our new solid state FM exciter gives push-button control of multiple programming.

SPARTA
ELECTRONIC CORPORATION
5851 FLORIN-PERKINS ROAD (916) 383-5353
SACRAMENTO, CALIFORNIA 95828
A DIVISION OF COMPUTER EQUIPMENT CORPORATION

2.5 KW "STRIP-LINE" FM TRANSMITTER MODEL 602

★ 25% more power than competitive 2 KW models
★ Needs only a 3-bay antenna to deliver Class A power.
★ New solid-state FM exciter

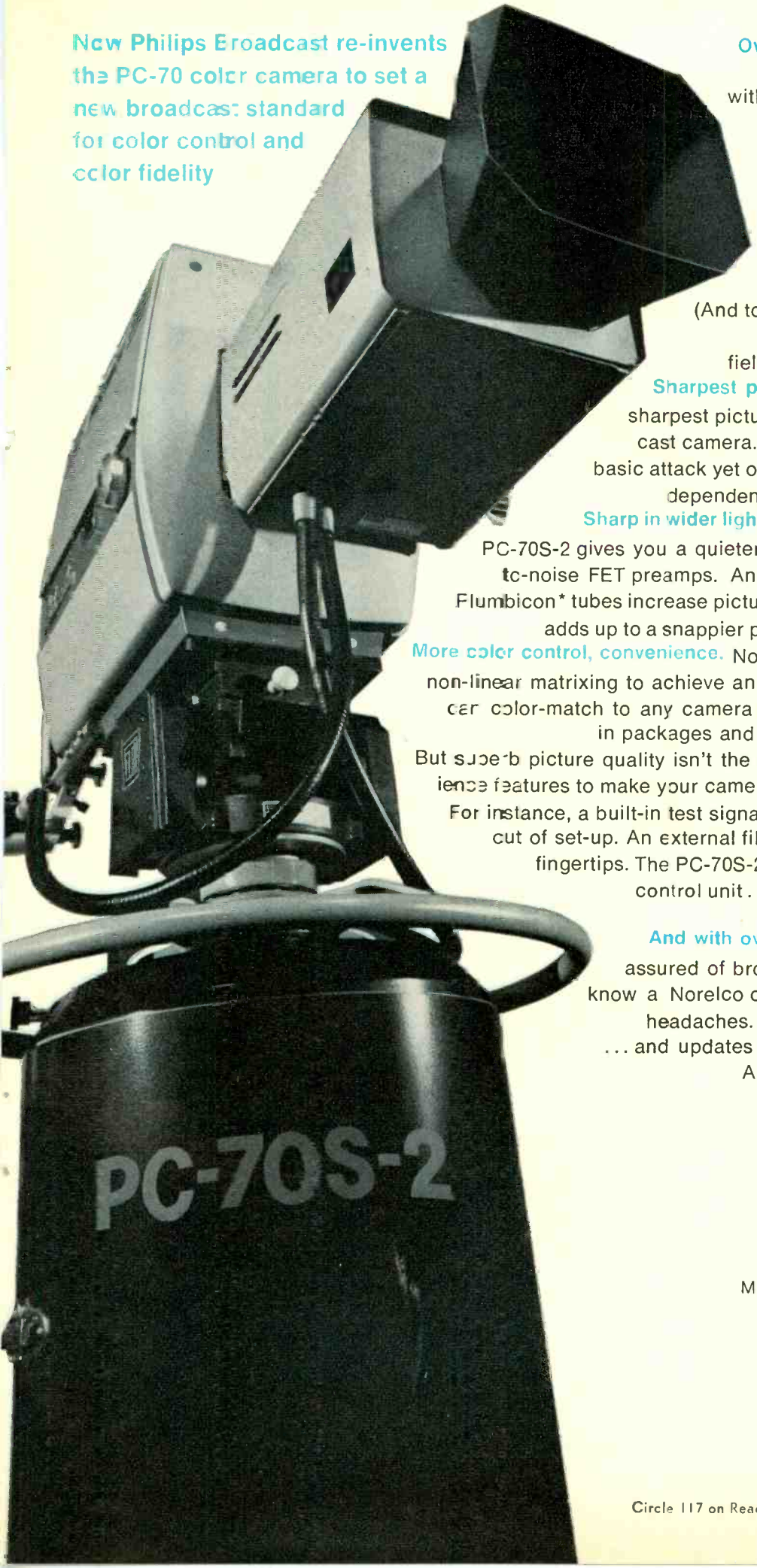
Circle 116 on Reader Service Card

The Innovators Introduce:

"Son of PC-70"

The Norelco PC-70S-2

New Philips Broadcast re-invents the PC-70 color camera to set a new broadcast standard for color control and color fidelity



Over 1,000 3-Plumbicon* cameras have been delivered throughout the world, with more than 600 serving broadcasters and production companies in the United States. It is the standard other cameras try to match.

That was tough before. Now it's tougher. Because today the Innovators are introducing the PC-70S-2, with an important list of new features. (And to prove you are always state-of-the-art with Norelco, they're available as field update kits for older PC-70 models.)

Sharpest picture yet. Our key innovation is the sharpest picture detail you have seen from a broadcast camera. A new technique introduces the most basic attack yet on picture-degrading "noise" . . . level-dependent comb-filtered contour enhancement.

Sharp in wider light range. In low-light situations, too, the PC-70S-2 gives you a quieter picture. We've added 48-db signal-to-noise FET preamps. And at all light levels, separate-mesh Plumbicon* tubes increase picture resolution and dynamic range. It all adds up to a snappier picture in every area from light to dark.

More color control, convenience. Now the PC-70S-2 is also available with non-linear matrixing to achieve an infinite range of tints and hues. You can color-match to any camera you own. Even those problem colors in packages and costumes snap into true-to-life color.

But superb picture quality isn't the whole story. There are many convenience features to make your cameraman more expert, more productive. For instance, a built-in test signal generator that takes the guesswork out of set-up. An external filter wheel control at the cameraman's fingertips. The PC-70S-2 ranges far and free from the camera control unit . . . up to 3,000 feet with standard cable, or 1,000 feet with mini-cable.

And with over 1,000 cameras delivered, you are assured of broadcaster-proved dependability. You know a Norelco camera will deliver performance, not headaches. You know Norelco delivers service . . . and updates to keep you abreast of innovations. Ask us about details and prices now.

Norelco®
PHILIPS BROADCAST EQUIPMENT CORP.
A NORTH AMERICAN PHILIPS COMPANY

One Philips Parkway
Montvale, New Jersey 07645 (201) 391-1000

Circle 117 on Reader Service Card

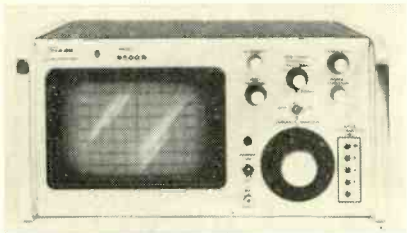
*Reg. T.M. N.V. Philips of Holland

BROADCAST EQUIPMENT

CATV sweep system

Model 9500T sweep unit (at headend) and 9500R (portable receiver unit) for use in CATV system alignment without program interference.

9500T, sweep generator and sweep transmitter, can operate as sweep burst transmitter with front panel switch for selecting test-rate intervals of 1, 2 or 4 seconds; freq range (1 to 300 MHz) as well as output level required selected by operator; sweep width variable from 200 kHz to 300 MHz; rf output +54 dBmV. 9500R



receiver unit needs no auxiliary equipment for sync purposes—can view sweep test signals within range of +5 to +70 dBmV; variable freq marker produces two marker peaks 6 MHz apart for easy channel-width reference; marker dial calibrated from 50 to 250 MHz; freq range 50 to 300 MHz. Price for the 9500 system: $3550. TEXSCAN.

Circle 275 on Reader Service Card

Automatic TV film projector

Developed by Hokushin Electric Works Ltd. (manufacturer) and NHK (Japan Broadcasting Co.), model TC-701 computer-controlled projector uses self-threading and self-returning film cassettes. Has short access time: 19 seconds from end of one cassette to start of next. Picture and sound start and stop instantaneously. Holds eight cassettes, more on special order. Projection lamp is halogen, 24 V, 250 W. Reel capacity: feed, 400 ft. or 15 min.; takeup, 15 min. special reel. Projector can signal a vidicon camera for automatic changeover from color to monochrome or vice versa. LISTEC.

Circle 276 on Reader Service Card

Lens computing slide rule

CCTV system planner can quickly select correct lens for camera with this new tool. Covers lenses of 9, 12.5, 25, 50, 75, 100, and 135 mm, and distances from 3 to 500 feet.

If designer knows how big an area he wants to televise, and how far he can locate the camera, he plugs in the two factors to the slide rule and reads off correct lens to use. GBC.

Circle 277 on Reader Service Card

Low-cost laser communicator

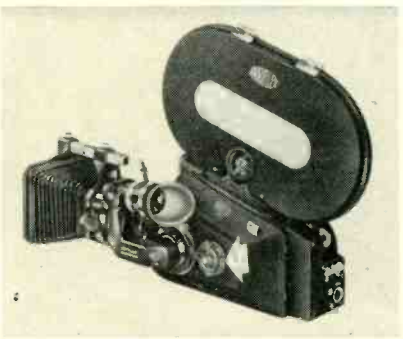
Two-way communication system modulates laser beam with voice, video or data signals; 0.75 MHz bandwidth; efficiency is 3—5% of

transmitted power available up to 10 miles away; helium-neon gas laser tube starts automatically within 10 milliseconds, generating intense collimated beam of red light, wavelength 6328 Å; output power 0.3 mW; input level of 5 mV allows acceptance of signals from microphones, tapes or any conventional audio source; transmitter power consumption 15 W, receiver 50 mW; can operate on 115 Vac, 50–60 Hz, or on battery. Price of all solid-state system in kit form, $150; assembled $200. METROLOGIC INSTRUMENTS.

Circle 278 on Reader Service Card

Exposure control in 16-mm camera

Model 16BL camera has behind-lens exposure control system which allows cameraman to shoot under varying light levels while maintaining correct exposure by adjusting *f*-stop setting according to an indicator in the viewfinder. System provides exposure information, but leaves control in hands



of cameraman. Exposure control takes light from reflex viewing system. Inputs range from 16 to 500 ASA and from 24 to 50 ft/s. Power is self-contained battery. ARRIFLEX.

Circle 279 on Reader Service Card

Counter-timers

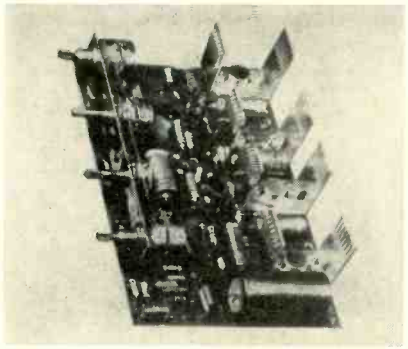
Model 100B has seven functions, 40 MHz frequency range, five or seven digit display, two input channels with individual trigger controls, display storage, and interface compatibility with other instruments. Operating modes include count, multiple-period average, frequency A, period A, ratio A/B, time interval, and time A-B. Time base is 1 MHz, with aging rate of ±2 parts in 10^6/mo, temperature

stability ±5 parts in 10^7/°C from 0° to +40°C, voltage stability of ±7 parts in 10^6 for ±10% variation in line voltage. Model 101B is similar, with range to 50 MHz; model 105A has range to 512 MHz. MONSANTO.

Circle 280 on Reader Service Card

Modular amplifiers

Assembled, board-mounted amplifier modules include 1, 3, 20 W mono, 10 and 30 W with guitar tremolo, 8 and 20 W stereo, and stereo magnetic phono preamp. Accessories: hardware, cabinets, front panels, etc.



Shown is 20-W model R1-120; cost $39.95. Other models also inexpensive. R1-120 specs: Freq resp ±1.5 dB 20 Hz-40 kHz; THD under 1% at 5 W out; output impedance 8 ohms; input sensitivity 0.5 V, treble +3, −14 dB at 10 kHz, bass ± 10 dB at 100 Hz. CALECTRO-AMPEREX.

Circle 281 on Reader Service Card

Test gear briefs

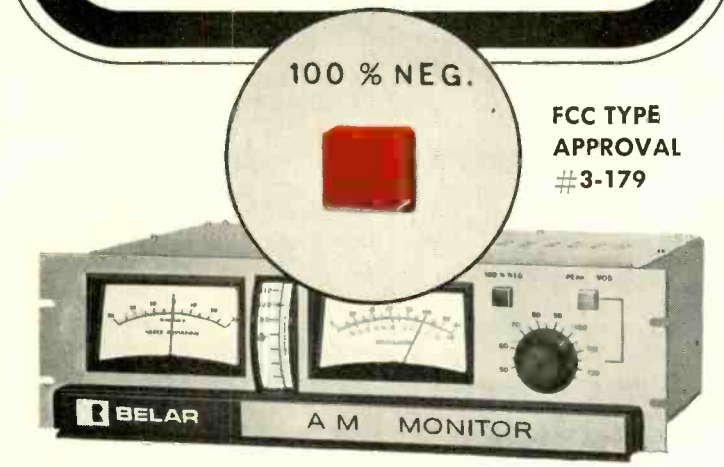
Directional rf wattmeter has accuracy ±5%, full scale power ranges 1 W to 10 kW and freq range 0.45 MHz to 2.3 GHz, fits ⅞-in. coax, measures forward and reflected power, with connectors N, C, SC, UHF, BNC, TNC, LC, costs $119. BIRD ELECTRONIC. **282**

Color TV monitor comparator, MRC-65, produces reference illuminant which closely matches chromaticity coordinates of CIE illuminant D6500, is certified with ±200 K, operates from 117 Vac, costs $335. MACBETH DIV. KOLLMORGEN. **283**

Cable fault finder, model 107, is time-domain reflectometer, works with up to 2500 ft. of 0.412-in. cable, locates shorts with ±2% accuracy, tells whether fault is open or short, with L or C mismatch. CRAFTSMAN ELECTRONIC. **284**

Triggered scope, model 555, has 5 in. CRT, 10 MHz bandwidth, sensitivity 20 mV/cm, sweep range 1μs/cm, to 1 s/cm, inbuilt square-wave calibrator. $346. KIKUSUI. **285**

let this be a warning to you!



FCC TYPE APPROVAL #3-179

If that red light is flashing — two things are for sure:

1. You have a negative modulation problem. **2.** The BELAR AM Monitor caught it for you, because the 100% Negative Peak Indicator Light is exclusively BELAR's. And it's independent of any calibration procedures.

In fact, the BELAR AMM-1 AM Monitor is loaded with special, exclusive features.

Like the digital frequency deviation meter with analog display, the carrier level meter, the modulation meter, BELAR's built-in modulation calibrator, exclusive ±20Hz frequency calibrator, and off frequency alarm drivers.

This monitor is immediately available and immediately usable, with the same guaranteed performance as BELAR's FM and TV monitors, and all BELAR broadcast equipment.

BELAR

BELAR ELECTRONICS LABORATORY, INC., DEPT. BM-90
BOX 83, UPPER DARBY, PA. 19084 • (215) 789-0550

Circle 118 on Reader Service Card

Replace Mercury Vapor Tubes Directly with WILKINSON Silicon Rectifier Stacks!

Because...

- ☐ Only non-encapsulated WILKINSON Silicon Rectifiers can be repaired in seconds with low-cost replacement diodes!
- ☐ Exclusive "GO, NO GO" indicator automatically warns when the reverse leakage of any diode is in excess of 50 microamps.
- ☐ Only WILKINSON Silicon Rectifiers are available in a complete tube replacement range of from 866 to 857B.
- ☐ WILKINSON Silicon Rectifiers function in ambient temperatures of from − 85 F to +158 F.
- ☐ No more filament heat and consequent filament burnout . . . lower power cost and reduced hum, too.
- ☐ No warm up time is necessary . . . instantaneous operation!
- ☐ Just plug in WILKINSON Silicon Rectifiers . . . no re-wiring is necessary.
- ☐ Only WILKINSON Silicon Rectifiers are fully guaranteed and have a safety margin well in excess of tube rating.

For complete details write today to:

WILKINSON ELECTRONICS, INC.

1937 MACDADE BLVD. WOODLYN, PA. 19094
TELEPHONE (215) 874-5236 874-5237

Circle 119 on Reader Service Card

Earth resistance tester, type 1805-30303 (by Norma), measures soil resistance to facilitate safe grounding of towers, cables, systems, etc. Four ranges: 0-5, 5-50, 50-500, 500-5000 ohms; accuracy ±1%, operating freq. 135 Hz. Portable, solid-state, $245. FREED TRANSFORMER. **286**

Oscillator, type 1316, provides up to 1.6 W (125 V open circuit, 5 A short circuit) from 10 Hz to 100 kHz with 1% accuracy. Output constant within 2%, drift is 0.005% over 12-hr. period, and instrument may be synced to external standard. Two outputs, in-phase and quadrature. $920 (rack), $950 (bench). GENERAL RADIO. **287**

Power monitor, model PM157, checks ac or dc to 10 A, separately or in combination, measures ac line voltage, reads out in amperes and watts, indicates safe current for common fuse resistors, costs $69.50. SENCORE. **288**

Cable fault locator uses pulse echo technique, spots fault within a few feet in balanced and coax cables to 21 miles, in open overlead lines to 200 miles. Model T 03/3 Howaldtswerke Echometer locates crosstalk coupling points and side-to-phantom Cx. W. & G. INSTRUMENTS. **289**

Inline meter jack, model MJ-50, is make-before-break assembly to be installed in AM antenna transmission line, thus permitting hot insertion of Delta impedance bridge. Jack is rated for continuous operation up to 50 A and is insulated for 10 kV rms. DELTA ELECTRONICS. **290**

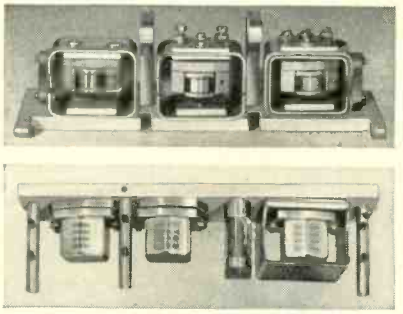
Color TV sweep generator, WR-514A, provides fundamental sweep output on all vhf channels, i-f frequencies, video (50 kHz-5 MHz), color bandpass, and FM band 88-108 MHz. Has inbuilt marker adder, 7 crystal-controlled i-f markers, uses BNC connectors. $375. RCA. **291**

Panoramic receiver/scope, model R1074, scans 30-300 MHz, shows readout on dual-trace scope. Provides continuous spectrum display over logarithmic 60-dB range of part/all of 30-300 MHz. HRB-SINGER. **292**

Sweep analyzer, model 911G, has two channels, gives continuous readings of phase shift and amplitude vs freq from .008 Hz to 10 kHz, with noise and harmonic rejection of 40 dB. Has accuracy of ±1% freq, ±2% amplitude, 2° phase shift over range of ±180°, 0.2 dB amplitude ratio. Cost $9250. BAFCO. **293**

Continued on page 56

IMPROVED PERFORMANCE!



NORTRONICS ANNOUNCES THE 9000 SERIES TAPE HEADS FOR PROFESSIONAL and STUDIO EQUIPMENT

UNEXCELLED PERFORMANCE IN AMPEX, SCULLY AND OTHER PROFESSIONAL RECORDERS

- Extremely smooth response from 20 Hz to 20 KHz.
- Extra wide pole faces for minimum low frequency contour effects.
- Hi-Q, low loss core structures.
- Extra deep deposited quartz gaps for sharp, clean edge definition.
- Full gap depth for maximum wear life.
- All metal hyperbolic face for reduced oxide loading and intimate tape contact.
- Gap Colinearity—Precise Gap Alignment For Both Azimuth and Phase on Multi-Track Heads, either 4-Channel or 8-Channel.

MORE CONVENIENT THAN FACTORY REPLACEMENT

- Available locally, from your distributor.
- Replace heads in the field, minimum down time. Plug-in simplicity. No need for a spare nest.
- Wide choice of Record, Play, and Erase Heads, for ¼ inch, ½ inch, and 1 inch tape, in a variety of track styles.
- Full details in Nortronics Bulletin 7295A, available free on request.

Nortronics COMPANY, INC.

8101 Tenth Avenue North
Minneapolis, Minnesota 55427
Phone: (612) 545-0401

Circle 120 on Reader Service Card

The move to color film gave KULR-TV top billings.

"We were the first station in the state to go full color with the addition of the Kodak ME-4 Process," says Pete Schmidt, Photo Director for the Billings, Montana station. "We've got the lead by a mile in our market. We're using our color capability mostly for news, shooting about 7,000 feet a month.

"One of the new mini-ME-4s was what we decided on because, let's face it, when you're running anywhere from 40 to 1200 feet of film a day, you just can't justify the investment of a big processor.

"We've got a great installation. The processor, replenisher tank, mixer, venting and everything fit into a 15 x 12-foot room, and we have lots of working space left over. I never have to touch the chemicals. I mix in a hydromixer, and use a direct pump-up system to send it to the tanks. We're looking forward to the new Kodak packaged chemicals for mini-ME-4s to make everything even easier.

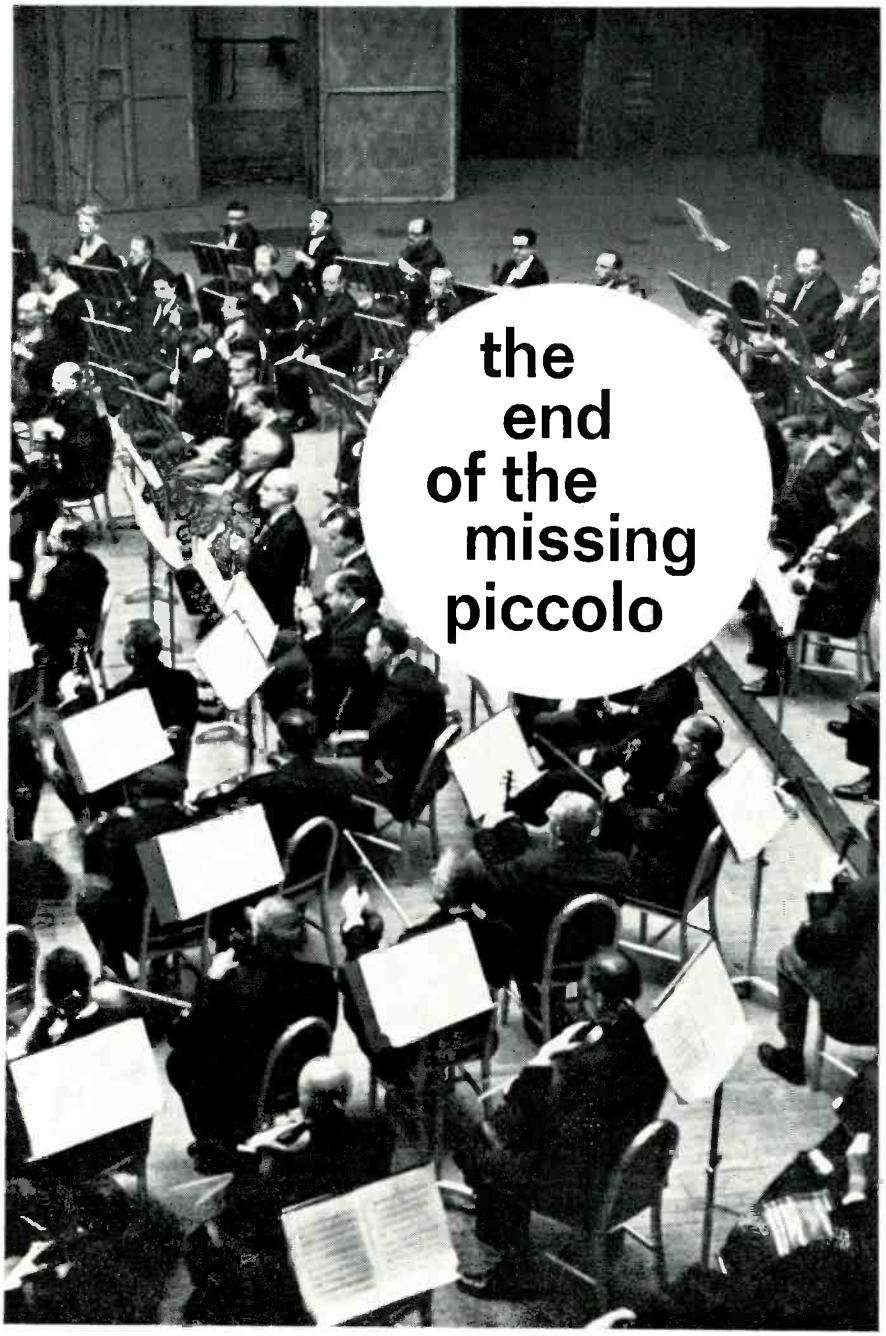
"Kodak Sales and Engineering Representatives worked with us for over a year before we got our processor. Taking their suggestion, we looked at other installations so that we'd have a good idea what we were getting into. Now that we're into it, we like what we're producing."

If your station can't justify a big color processor, check into one of the new, less expensive mini-ME-4 processors. The men to check with are Kodak Regional Chief Engineers. Call John Waner in Hollywood, Dick Potter in Chicago, or Ray Wulf in New York. You *can* afford color—you can't afford not to.

EASTMAN KODAK COMPANY

ATLANTA: 404/351-6510
CHICAGO: 312/654-0200
DALLAS: 214/351-3221
HOLLYWOOD: 213/464-6131
NEW YORK: 212/262-7100
SAN FRANCISCO: 415/776-6055

Kodak



Every signal that comes from AEL's new FM Solid State Exciters and Solid State Stereo Generators carries the same full range sounds that went in.

Features like extremely low audio harmonic distortion, flat responses, and only two printed circuits, make the AEL exciters and generators the most up-to-date available.

Signal us and we'll tell you about all our broadcast equipment.

AEL fidelity capability

AMERICAN ELECTRONIC LABORATORIES, INC.
P.O. Box 552 • Lansdale, Pa. 19446 • (215) 822-2929 • TWX: 510-661-4976 • Cable: AMERLAB
Circle 121 on Reader Service Card

SALE OF THE MONTH

Weekend special boosts audience and sponsors

John Winkel
Local Sales Manager
WCBS-FM, New York City

The Challenge: We are a rock FM station in New York City and ours has to be the toughest competitive market in the country. We can't just play the music and wait for our share of listeners and sponsors. After all, there are plenty of other youth-oriented stations around for our advertisers to turn to if we don't offer something special. How do we beat the competition? It's a familiar problem, but one of our recent solutions gave us a new approach to winning advertisers and audience.

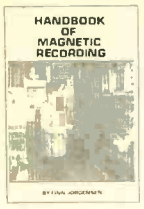
The Solution: First we developed a programming concept: Woodstock—its first anniversary. The importance to our audience of this rock festival, its music and its message, assured us of plenty of listeners. To make it an appropriate commemoration, we decided to plan a full three-day, 46-hour, weekend of music and commentary related to Woodstock. And we scheduled the special for August 14, 15, and 16—just one year after the Festival. To wrap it up, we sold the entire package to three sponsors: Coca Cola, Bristol Meyers and The Newmark & Lewis Audio Center. The result was a refreshing combination of exciting programming and unified sponsorship—a great change of pace for the end of summer.

Let's Hear From You . . .

Here's the latest in our monthly BM/E department giving local market radio and TV ad personnel a place to exchange stories and ideas from their own experiences. The format is simple—just send us a short description of your best "Sale of the Month" in the style you see above. If we use it, we'll send you $10.00 plus a certificate "AWARD FOR THE SALE OF THE MONTH." Good Luck!

Helpful Books that Belong in Every Station—Now on 10-Day FREE Trial!

HANDBOOK OF MAGNETIC RECORDING



By Finn Jorsensen. A one-stop source of information for anyone interested in the "fine points" of the art—audio, instrumentation, and video. Here is the absolute latest on the art of magnetic recording—in one compact volume covering all currently popular applications from audio to weather surveillance data recording. It explores the differences between recorder types, transport designs for specific application, magnetic head design and operation, and gives a detailed explanation on how to judge tape quality, how it's made, and the best type to use for a specific purpose. The first Chapter explains the principles of magnetic recording, the use of bias, single- and multi-track recording, and quality versus track width. The proper use of recorders is spotlighted in Chapter 7, and Chapter 8 discusses care and maintenance, including an extensive trouble-shooting chart. Chapter 9 provides information on the use of recorders in such applications as oceanographic and geophysical research, telemetry, weather surveillance, broadcast, educational, and industrial. The final Chapter tells how to measure head losses, equalization, adjustments, frequency response, wow and flutter, plus recording standards. 192 pps. over 90 illus. Hardbound.

Order 529 ..... **only $7.95**

BROADCAST ANTENNA SYSTEMS HANDBOOK

Brand-new, practical, guide to all types and styles of broadcast antenna systems. Covers preparing engineering data for the FCC, designing, engineering and operating systems, selecting antennas, measuring performance, improving coverage, etc. Includes AM-FM-TV UHF, FM DA antenna systems, FM dual polarization, microwave directional AM, etc. 18 BIG Chapters—160 pps.—over 100 illustrations.

Order T-44 ..... **only $7.95**

EDUCATION OF A BROADCASTER

by Harry Bannister, V-P, NBC. A racy, informative, anecdotal book studded with behind-the-scenes stories and highly personal opinions. Very possibly the best book written about the industry, it is an enthralling account of the growth of broadcasting.

Order T-79 ..... **only $5.95**

THE ELECTRONIC MUSICAL INSTRUMENTAL MANUAL

By Alan Douglas. New 5th Edition of the classic guide to the design and operation of electronic musical instruments. The most significant aspect of this comprehensive handbook is that, with the possible exception of freak or novelty devices, there is no electronic musical instrument in production which does not employ basically one or more of the circuits described. Moreover, the treatment of how various sounds are produced electronically is undoubtedly the most thorough and complete ever published. The chapter on commercial electronic instruments spans over 112 pages, with detailed coverage of virtually every type of unit produced—theremins, solovox, univox, melochord, novachord, electrochord, and numerous brands of both U. S. and European organs. Both tube and transistor circuits are covered. Foldout inserts contain complete schematic diagrams are included for 11 different units. Liberal use of other schematic diagrams make this a highly recommended volume for anyone having an interest in the subject. 372 pps., plus 11 schematic foldouts. Over 340 illustrations Hardbound.

Order 280 ..... **only $10.75**

AM/FM Broadcast Station Planning Guide

BRAND NEW—Tells you everything you need to know about Planning, Building, or Remodeling an AM or FM Radio Station!

Whether you plan to build a new station or remodel and update an existing one, "AM/FM BROADCAST STATION PLANNING GUIDE" is the "total" book . . . covering every aspect of planning, building, and equipping the facility. Not a single subject is ignored, from the initial frequency search to properly equipping and maintaining a station. This is truly the all-in-one manual for anyone interested in the proper design and operation of a broadcast facility.

Also a part of the initial planning is choosing a site, selecting equipment, arriving at plans to house the facility, whether it'll be a combined operation with studio and transmitter under one roof, or whether each phase will operate separately. The large 8½"x11" pages contain literally dozens of actual, tested floor plans—from relatively simple ones for small-market stations, to these designed for larger, medium and metropolitan operations.

The subject of equipment, from microphone to antenna, is handled in a revealing manner—not just a repetition of manufacturers' statistics and specifications. Subjects covered include: towers for AM and FM, FM antenna types and which is best for a given situation, ground systems, transmission lines, transmitters and transmitter facilities, studio-to-transmitter program transmission systems (including remote control), a thorough treatment on studio equipment (including program automation), and studio design from both operational and acoustic viewpoints.

This all-encompassing manual also includes detailed instructions on how to conduct proof-of-performance measurements, how often they should be performed, and what to do if quality isn't up to par.

To keep you operating within the law, the author has mapped out a thorough preventive maintenance schedule, including actual examples of recommended maintenance log forms. The final chapter, to whet your appetite, describes a number of "prestige" stations and how they serve their audiences. And, finally, an extensive Appendix lists data needed by every broadcast engineer.

Order No. 500 ..... **only $12.95**

THE RADIO PROGRAM IDEABOOK

by Hal Fisher. All the programming ideas you need to build and hold an audience. Written for everyone in radio programming. For the program director looking for a fresh source of ideas this volume is loaded with suggestions to help him push his station's ratings to the top. For the ambitious announcer or deejay, this publication will help accelerate his progress. 10 BIG Chapters contain scores of unique ways to give your audience a reason to listen—the do's and don'ts of good programming and commercial success. You'll learn how to spot audience losers, conduct a newspaper column, publish a newsletter, start fan clubs, revitalize programming and pump new life into your station's sound . . . and bank account. Contains tested and proven methods of systemizing the program department, of handling traffic and scheduling. Lengthy treatment is given to production and sure-fire program ideas including news, public service, audience participation, agricultural, women's and children's, farm, educational and cultural, music, holiday programming etc. Hiring good announcers is fully explained in the final chapter, along with suggestions on developing cooperation with the commercial department and a number of ideas to help the program department operate more smoothly. 256 pages of tested and proven audience-building ideas, over 50 illustrations. Hardbound.

Order T 268 ..... **only $12.95**

PLANNING THE LOCAL UHF-TV STATION

by Patrick S. Finnegan, V-P & Ch. Eng. WLBC & WMUN. This brand-new guide describes all requirements for planning, building and operating a small, expandable UHF station. A valuable reference for station owners, managers and engineers containing practical data on eqpt., layout and economic factors involved. Includes many do-it-yourself hints and cost-cutting tips. 12 Chapters: Selecting a Site; Estimating Coverage; The Studio; Control Room; UHF Transmitter; Transmission Lines; UHF Antenna; Film; Planning the Building and Layout; FCC Factors.

Order T-43 ..... **only $10.00**

FM RADIO STATION OPERATION HANDBOOK

First comprehensive guidebook on FM radio station engineering, operations, and management. Completely covers all phases of FM, from automation, studio design and operation, sales, rates, office practices, to remote control, antennas, etc. Shows how successful FM stations operate, how they make profits, what they do in programming, etc. 25 big sections, 192 pps.

Order No. T-94 ..... **only $9.95**

Absolutely the World's Greatest Radio Promo Sourcebook!

- ★ **A GIANT 372-page Handbook—a virtual promotion encyclopedia!**
- ★ **Over 250,000 words with all the promo ideas you'll ever need!**
- ★ **Over 1500 on air promo themes adaptable to any format!**
- ★ **Contains over 350 contests, stunts, station and personality promos!**
- ★ **Bound in handsome 3-ring binder!**

BRAND-NEW and up-to-date—geared to TODAY'S radio needs! Here's the MUST book for stations wanting to attract more listeners, boost ratings, increase sales and profits. HANDBOOK of RADIO PUBLICITY & PROMOTION contains just about all the sure-fire promotion and publicity ideas a radio station might ever need—hundreds of specific plans that can be profitably used by any station. One idea alone of the hundreds offered can be worth many times the small cost of this indispensable sourcebook.

Promotion is the keyword—the basic reason one station excels over another, all else being equal. Promotion is an important part—an integral part—of today's radio. Using the right approach you can give listeners **a reason** to tune in, **a reason** to keep listening, and at the same time make your station more salesworthy. True, few stations can afford a full-time staff of promotion experts, so here's the answer—a comprehensive handbook of hundreds of unique, exciting individual promotions, contests, stunts, station and personality promos, etc. In each case, complete "nuts and bolts" details—how it works, copy details, prizes, sponsors, tie-ins—are included to enable you to adapt the idea to your **own** station format or sound. The author doesn't merely describe a promo or contest with a paragraph or two—he presents a synopsis of practical information, then provides **complete instructions on how to plan it, sell it and program it**

Covering 9 basic categories, the all-encompassing, audience-building contents include contests, outside stunts, fun promotions, special station promotions, promotions for special days, weeks, and months (categorized month by month), station anniversary promotions, on-air themes, plus general station and personality promos.

Additional Sections are a source of fresh new ideas, offering quickie humor material, station IDs, humorous show openers, and much, much more.

The first Section—Contests—provides invaluable data on all types of promotions—year-long ones, short ones running only a week or two, and contests that can be expanded and tailored to your own circumstances. Each one is designed to involve and absorb your audience.

Section Two—Outside Stunts—presents many out-of-the-ordinary schemes for any season or climate; for **any** age group plus stunts of a general nature

The Fun Promotions Section covers a variety of unusual techniques for seasonal and year-round use involving names, traffic safety, secretaries, husbands, wives, superstitions, awards, cleanup time, weather etc.

Section four offers tested and proven special station promotions designed to involve all facets of community activities and endeavors.

Section five contains special promotions for every month of the year, as well as a variety of station anniversary promotions.

Sections on general station and personality promos suggest ways to accent news, weather, and other programming specialties, plus various techniques of calling attention to your on-air people. Also, the humor material will help add pazzaz to DJ shows and to program openings and closings.

Order No. 213 ..... **only $29.95**

PLEASE TURN OVER FOR MORE GREAT BROADCAST BOOKS AND 10-DAY TRIAL COUPON

AUDIO SYSTEMS HANDBOOK

by Norman H. Crowhurst. This brand-new, authoritative reference and guide encompasses professional audio systems of all types—studio, public address, commercial sound, hi-fi reproduction, intercom, etc. Coverage is complete—from microphones to loudspeakers, from mixers and filters to amplifiers. Here is essential technical data on such important facets as loudness compensation, low-level distribution, noise suppression, pre-emphasis, equalization, constant-voltage lines, studio systems, program sources, special devices, remote controls, radio feeds, phono and tape pickup, compression and limiting and much much more. Indispensable for: Chief Engineers, studio technicians, recording engrs., stereo experts and all audio system technical personnel. Will greatly aid professional audio engineers and technicians in evaluating and selecting (or designing) system components to achieve flawless performance. Moreover, the data can be used to improve performance of present systems and provide the basis for meaningful tests and measurements to check component and system performance. 192 pages, over 125 illus., hardbound.

Order No. 494 ..... **only $7.95**

Radio News Handbook—New Second Edition

by David Dary. "The thousands of broadcasters now engaged in professional news broadcasting will find this to be a treasure chest of ideas to improve and enhance their present newscasts. The book will become dog-eared and yellow with age before its equal will find its way to the desks and offices of student and professional alike."—Dr. John Rider, Southern Illinois University.

This updated and revised handbook is written for both aspiring and experienced broadcast journalists. Serves as a day-to-day guide as well as a source of vital information for those practicing newsmen who are endeavoring to improve their professional status. An entire Chapter is devoted to the extremely vital subject of news sources, both local and regional as well as national and world-wide. The reader will learn practical methods of covering a news beat, interviewing, and dealing with tipsters and stringers, plus how to develop the local angle and maintain a future file. From there, the author delves into radio news basics and on-air presentation, including in-depth sections on evaluating news, writing style, and the fine points of newscast mechanics. Then, so that a newsman may acquire a familiarity with on-the-scene reporting, there is a Chapter on mobile news units and their operation. The Chapter on editorializing fills a virtual void with what is perhaps the only existing set of basic guidelines on the subject. Of particular value to newsmen who cover court news is a Chapter dealing with law, courts, and radio news. Included for ready reference are glossaries of legal and news terms, the code of ethics of the Radio Television News Directors Association news program standards of the National Association of Broadcasters.

For the beginning newsman, there is a solid grounding in radio news basics, mechanics, and style, plus necessary details on the workings of a radio newsroom. Announcers, salesmen, and even managers will find Radio News Handbook a helpful guide in understanding and working with their news departments. 192 pps.; heavily illustrated; Hardbound.

Order No. 216 ..... **only $7.95**

The orientation is business—the language is dollars and cents—the object is a profitable financial statement!

MANAGING TODAY'S RADIO STATION by Jay Hoffer, KRAK

Sacramento. This brand-new and entirely original book completely covers radio management, programming and sales—answers the long-felt need by the industry for a book on today's needs.

No radio station should be without this practical, all-encompassing guide to operating a professional, commercial broadcasting facility. Analytic and interpretive in its content, the book is uniquely written and easy-to-understand. Based on actual experience, the content will enable you to handle day-to-day problems as well as plan future growth for tomorrow. Here are the straightforward answers every station executive needs to the problems involved in assembling all the component parts and building them into a smoothly-running profitable operation. This invaluable text will be worth its small cost many times over—for those who aspire to any level of management and for those already there. It offers practical solutions and experienced advice on the duties of a manager. It thoroughly examines the cold, hard facts of station operation—the nature of the business, expected return on investment, budgeting and projections, etc. It offers in-depth coverage on audience ratings, advertising, automation, double billing, unionism, preventive maintenance, etc. It covers format control methods, station image, community involvement, news, editorials, sports, copywriting, sources of air talent . . . and much, much more. This volume is perhaps the only current source of information on selling radio. It provides a wealth of information on how to find and train salesmen, employment contracts, sales meetings, house accounts, rate cards, keeping tabs on the competition, how to combat the newspaper "habit," reps, merchandising tie-ins, how to avoid bad debts and speed up collections, etc. The book is profusely illustrated w th scores of photos, diagrams and examples of contracts, promotion material, program and personality synopses, advertising, station newsletters, sales letters, rate cards, merchandising gimmicks, publicity material, etc. 288 pps., Hardbound.

Order No. 461 ..... **$12.95**

RADIO PROMOTION HANDBOOK

By Wm. A. Peck. A complete guide on ways to develop better ratings, and increase sales! It's a proven fact! Clever and well-planned promotion-campaigns lead to bigger audience ratings and greater sales! This brand-new publication is aimed at helping broadcast stations reap benefits of bigger and better promotional campaigns. Jam-packed with literally hundreds of ideas, and complete with scores of factual examples to spark hot, new ways of promoting a station, this is a book no progressive station should be without! The author, drawing on many years of experience, tells how to make everything that happens at your station help to PROMOTE your station. Both on-air and off-air campaigns are included: How to integrate on-air promotions with programming by means of contests, stunts, games, jokes, promotional announcements, station breaks, etc. Also, how to develop and tie-in off-air campaigns, personal appearances, sales promotionals, public relations, and advertising in other media.

256 pps., 5½x8½", Comb-bound.

Order No. 267 ..... **only $9.95**

RADIO SALES PROMOTIONS

300 Merchandise-Moving Ideas! A compendium of more than 300 creative selling ideas designed exclusively for radio stations. Here are sales tools that work! A vast supply of ready-to-use ideas for producing sales in 43 categories, from air conditioners to washing machines. Based on the premise that radio time must make a sponsor's cash register ring, here are powerful, positive ideas that will do just that . . . and add thousands of dollars of revenue to your own till in the process. Unbelievable? Try them for yourself and see . . . on our money-back guarantee. BIG 8½" x 11" size.

Order T 214 ..... **only $10.00**

THE MAN BEHIND THE MIKE

by Hal Fisher. This "Guide to Professional Broadcast Announcing" offers the practical help you need. Use of the down-to-earth pointers in this massive 288-page volume will help both seasoned veterans and "green" announcers. Offers practical guidance on **every phase of announcing.** Contains over 40 drills to spark interest. Tells how to develop true professional talents, how to become a good d.j., newscaster or other specialist. Managers and program directors will find a wealth of data to guide them, in addition to a host of management and programming ideas. 288 pps; 21 ch. Hardbound.

Order No. 266 ..... **only $7.95**

INTERPRETING FCC BROADCAST RULES & REGULATIONS, (Volume 2)

This brand-new reference discusses the most recent FCC decisions on important subjects. The material in Volume 2 is completely new—none of it duplicates the data in Volume 1. Indispensible for broadcast station personnel. 192 pages, 20 chapters.

Order T-492 ..... **Comb-bound $6.95**

INTERPRETING THE FCC RULES & REGS Vol. 1

Bring yourself up to date on federal regulations governing your operations, complete with detailed practical suggestions on how to fulfill necessary obligations. Provides clear-cut procedures to follow in operating your broadcast facility in compliance with federal regulations.

Order No. T-95 ..... **only $5.95**

SAVE $3.99 ON FCC RULES PACK! No. 492 and No. T95—ORDER "FCC PACKAGE"—BOTH BOOKS—UNDUPLICATED COVERAGE—FOR ONLY $9.95

MODERN RADIO BROADCASTING: Management & Operation in Small to Medium Markets—

By R. H. Coddington

Here are the real "nuts-and-bolts" of modern radio operation, based on two decades of experience in all size markets—from the metropolitan goliaths to the "peanut whistle" variety. No matter what your interest in broadcasting—management, production, engineering, etc.—you'll refer to this encyclopedic volume time and again.

Written for those who are, or who aspire to be, owners and managers, **Modern Radio Broadcasting** provides an in-depth view of the largest single category of broadcasting station operation—the so-called "small" market. Regardless of your present status in broadcasting—experienced or inexperienced, veteran or student—you can't help but move up the ladder armed with the straight-forward information presented in this book. A glance at the partial Contents will give you an idea of the scope covered in this practical, all-encompassing guide.

Chapter 1 describes the small market, its unique aspects, its peculiarities, what a station must do to ingrain itself in a community. The cold, hard facts of economy come under scrutiny in Chapter 2. Chapter 3 spotlights the often intricate ramifications of market and facility selection, while Chapter 4 follows up with the official FCC requirements and Chapter 5 explains compliance with FCC rules and regulations in general.

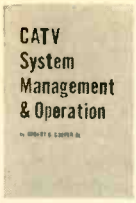
The pitfalls lurking behind land acquistion and building requirements are exposed in Chapter 6, and Chapter 7 explains transmitter and antenna equipment requirements. Chapter 8 is devoted in its entirety to studio equipment. Chapter 9 gets down to the "brass tacks" of staffing a station—from manager to janitor. Due to the scope of the subject, three chapters are devoted to programming, sales, and promotion, and the many ramifications and complications of these operations.

The last six Chapters are devoted exclusively to engineering, with special emphasis on microphones and studio equipment. Especially for those not acquainted with construction, Chapter 17 divulges many practical and successful techniques essential to good engineering practice. The final Chapter is devoted entirely to the all-important subject of maintenance, the maintenance log, and the transmitter or operating log. For anyone in broadcasting, or those studying the subject, this book is an absolute must! Regardless of your position, you'll do better with the aid of this all-in-one radio operating guide. Order **Modern Radio Broadcasting** today . . . at our risk . . . and prove it to yourself.

Partial Contents include: The Unique Requirements of the Small Market—Audiences, Dollars and Profits in the Small Market—Choosing A Market and Selecting A Facility—From Form 301 to The License—The FCC—Some General Requirements—Land and Building Requirements—Equipment in General and the Transmitter in Particular—Control Room and Studio Equipment—The Staff—Programming in General—Music in Particular—Other Program Types and Program Logs—Sales and Promotion—Getting Off the Ground—The Engineer-Part of the Management Team—Fidelity—The Product's Showcase—Consider the Source—Basic Microphone Quality—Secondary Characteristics of Microphones—Construction Notes—Operation and Maintenance Notes.

Order No. 482 ..... **only $12.95**

CATV SYSTEM ENGINEERING: THIRD EDITION



By Bill Rheinfelder. Here is the new 3rd edition of what has become the accepted technical standard of the CATV industry . . . an expanded and revised version of the first and only authoritative book on planning, designing, and operating a CATV plant. Containing only tested and proven information, this classic text is a must for every individual with an interest in day-to-day cable TV operation as well as a handy reference volume of straight-forward answers to the problems encountered almost daily in any system. While specifically written to serve the needs of cable TV, much of the data will be useful to technicians involved in other video amplifier system applications. 256 pps., 140 illus. 14 Chapters. Hardbound.

Order No. 298 ..... **only $12.95**

CATV SYSTEM MANAGEMENT & OPERATION

By Robert B. Cooper, Jr. A complete guidebook to CATV—from locating new CATV situations, through acquiring a franchise, obtaining financing, opening and operating a system, budgeting, and buying and selling systems. While primarily non-technical in nature, this book covers the technical aspects the owner-manager should be aware of. It also discusses literally scores of helpful points on designing, installing, and constructing a cable system, including cost data. The real strength of this unique volume lies in the practical tips it provides—guide-posts learned the hard way by the author in his years of CATV experience. Everything you need to know about CATV is included—from the legal ins and outs of acquiring a franchise, through negotiating a pole-line contract, to acquiring capital, selecting equipment, etc. Five Appendices offer invaluable data in the form of a Model Ordinance, Joint Pole Agreement, Construction Specs for CATV on Pole Lines, CATV Cash Flow Charts, and Subscriber Contract. 256 pages. Comb-bound.

Order #T-100 ..... **only $12.95**

CATV SYSTEM MAINTENANCE

The first and only book devoted to the maintenance of CATV systems, from the antenna through construction techniques, to complete trouble-shooting. Includes adequate technical data on system design. Major emphasis is on maintenance — providing a wealth of information on how to locate and correct equipment failures, including tips on how to eliminate various types of interference and radiation problems at the head end. Step-by-step maintenance charts are included. 192 pages.

Order No. T-82 ..... **only $12.95**

CATV OPERATOR'S HANDBOOK

Completely covers all aspects of the subject, from obtaining a franchise to financing and planning a new system . . . from installing a plant, promotion, selling hookups, to the very latest topics such as local program origination. Contains tested and proven information essential for practical day-to-day operations as well as for reference. 160 p., over 100 illus.

Order No. T-73 ..... **only $7.95**

SAVE $11.85 ON CATV Combo
All 4 books above, only $ 34.95

TECHNICAL PAPERS PRESENTED AT THE NAB ENGINEERING CONFERENCE

These complete transcripts include the technical papers presented at the Conferences, plus a transcript of the FCC/Industry Panel discussion. Contain all the photos, slides and drawings presented in conjunction with the technical talks. All the very latest developments are covered. Here are volumes that belong on the shelf of every station library—something every broadcast engineer should read and re-read several times. These Official Proceedings are a wonderful source of ideas, and provide the answers to many troublesome problems. Invaluable as aids in helping stations make important buying and engineering decisions. Each volume 256 pps., BIG 8½ x 11" size.

1967 NAB ENGINEERING PROCEEDINGS
Order No. T-140 ..... **only $10.00**
1968 NAB ENGINEERING PROCEEDINGS
Order No. T-148 ..... **only $10.00**
1969 NAB ENGINEERING PROCEEDINGS
Order No. T-149 ..... **only $10.00**
1970 NAB ENGINEERING PROCEEDINGS
Order No. 170 ..... **only $10.00**

Helpful Books that Belong in Every Station—Now on 10-Day FREE Trial!

Broadcast Station Operating Guide

By Sol Robinson, Gen. Mgr., WLAD Danbury, Conn.

Here, in one handbook, are all the guidelines for station operation—from starting a new facility to making a profit, from programming to accounting.

A "must book" for anyone in broadcasting. Deals with the specifics of day-to-day operation—encompasses every level of responsibility.

The secret to success in broadcasting, like in any other business, is knowing what to do and how to do it. The best way to learn these "secrets" is through actual experience—but not only **your own!** When possible, learn from others who have made it the hard way. Sol Robinson, manager, WLAD, through his new book, clearly explains what broadcasting is all about. Throughout, much emphasis is given to the business aspects of radio, making it an invaluable guide for station managers and other executives.

Broadcast Station Operating Guide is one of those rare books which will prove valuable to both newcomers and oldtimers, and all those in between. For example, it tells how to develop sound programming, what to do about editorializing, "payola," lotteries, network shows, political broadcasts, the Fairness Doctrine, etc. It thoroughly delves into all types of market studies—population, demographics, audience preference surveys, advertising, etc. It offers guidelines for accounting procedures, filing FCC applications, operating in the public interest, commercial practices, etc. It covers announcing procedures. It discusses considerations for establishing a new station—financing, engineering, legal problems—frequency search, transmitter site, studio location, equipment and program tests, etc.

Considerable information is included for setting up and operating the sales department, from hiring and training salesmen to developing effective sales copy. Tells how to sell local, regional, and national accounts, gives guidelines for setting rates and developing rate cards, making sales calls . . . how to promote your station, how to develop and use audience data, how to compete with other media . . . and much, much, more.

Order T-467 ..... **only $12.95**

EXTRA 20% Bonus Offer

Order $25.00 or more of books, send remittance with order, and we'll send "Education of a Broadcaster"—Reg. Price $5.95 —Free—if you request it.

Other Books for Broadcasters

FET APPLICATIONS HANDBOOK: Second Edition
By Eimbinder. The most current and comprehensive guide available today. Of immense value to anyone looking for new ideas and basic circuit descriptions. 352 pps., over 250 illus. Hardbound.
No. 240 ..... **$14.95**

SERVICING ELECTRONIC ORGANS
By Applebaum & John. Here's your "ticket" to the exciting and rapidly growing field of electronic organ service and repair, covering the most popular instruments in use today. 160 pps., 8½x11", plus 36-page foldout section. Vinyl cover.
No. 503 ..... **$7.95**

CB RADIO OPERATOR'S GUIDE
By Brown & Lawrence. An all-in-one handbook on Citizens Band radio, and how to make the best use of available equipment, right down to the "nitty gritty" rules and regulations! 224 pps.
No. 499 ..... **$7.95**

Funk & Wagnalls DICTIONARY OF ELECTRONICS
Now you, too, can "look it up" in your Funk & Wagnalls. Contains modern, easily-understood definitions for almost 5000 electronics terms. 238 pps. Hardbound.
No. 281 ..... **$6.95**

COMMERCIAL RADIO OPERATOR'S LICENSE STUDY GUIDE
By Berens. All the information you need to pass the second-class FCC exam, including a lengthy discussion of the FCC rules and regulations. 256 pps. Hardbound.
No. 282 ..... **$7.50**

HOW TO BUILD A WORKING DIGITAL COMPUTER
A "non-engineering" level book on how digital computers work, with step-by-step instructions on how to build—and learn from—your own working model! 184 pps. Hardbound.
No. 278 ..... **$7.95**

DIGITAL COMPUTER THEORY
By Nashelsky. If you need comprehensive knowledge of computer operation, this outstanding text is for you. 320 pps. Hardbound.
No. 276 ..... **$7.95**

SOLID-STATE CIRCUIT DESIGN & OPERATION
By Prentiss. A truly practical guide to the design and operation of solid-state circuits. 272 pps., 150 illus. Hardbound.
No. 508 ..... **$9.95**

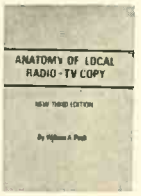
DIGITAL COMPUTER ANALYSIS
By Turner. Just what technicians and engineers need to gain a working knowledge of digital computers and logic circuits. 501 pps.
No. 264 ..... **$11.95**

MATHEMATICS FOR ELECTRONICS
By Herrick. A modern math book prepared specifically for the electronics technician. 1015 pages. Hardbound.
No. 255 ..... **$12.95**

ELECTRONIC CIRCUITS
By Herrick. A modern college level first course on electronics circuitry, encompassing all the theory considered necessary for the technician. 721 pps., plus Appendix of Symbols and Formulas. Hardbound.
No. 269 ..... **$11.95**

ELECTRONIC CIRCUIT DESIGN HANDBOOK
A brand-new third edition of the ever-popular circuit designer's "cookbook," with nearly 600 award-winning designs submitted by distinguished engineers. 384 pps., 8½x11".
No. 101 ..... **$17.95**

ANATOMY OF LOCAL RADIO-TV COPY



by Wm. A. Peck. Guaranteed to be the most valuable thing a radio-TV writer can get his hands on . . . next to a typewriter! This new, enlarged, updated 3rd edition of a real industry classic contains over 40% new material, loaded with hundreds of ways to increase station billing with sales-proven copy. Its purpose is to help you remove the "error" from the trial and error system. The techniques described have passed the most critical test to which advertising can be subjected . . . they sold the merchandise! Leading station executives have said of this book. "It sets the standard for radio-TV copy at the local level." "I have seen the principles in this book literally turn to gold . . . should be required reading for every media sales and creative staff." . . . "A practical, hard-hitting and immediately usable manual." Yes, you and your clients both will profit from the ideas in this invaluable volume . . . ideas which have sold "impossible" prospects. 16 chapters include more than a hundred sample commercials for all types of accounts, making the book a veritable copy library!

Order No. T-90 ..... **only $5.95**

NO RISK COUPON—MAIL TODAY

TAB BOOKS, Blue Ridge Summit, Pa. 17214
Please send me book(s) listed below.
I enclose $ .....
☐ Please invoice on 10-day FREE trial.
_____ _____ _____ _____ _____
_____ _____ _____ _____ _____
Name _____
Station or Co. _____
Address _____
City _____ **State** _____
SAVE POSTAGE by remitting with order. B97

If you want a tube distributor who knows your business, give it to him.

He's your RCA Broadcast Tube Distributor. No.1 in tubes for all broadcasting applications.

What made him No. 1? Emergency service is one reason. It's like money in the bank.

For example:

You're on the air. It's late, a tube fails. You're low on replacements. Too low for comfort. So you call your RCA Broadcast Tube Distributor. To keep you on the air, he'll get out of bed to fill your order!

There are more reasons.

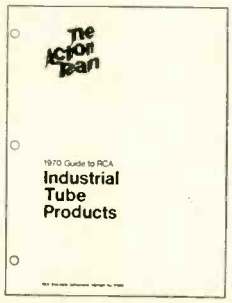
Experience. He talks your language, knows your needs. Some of our distributors have been in the business of supplying broadcasters for as long as we have—40 years!

Engineering service. He has a "hot line" to RCA's Field Engineers. Call him any time you need their services. Call even if you need help in servicing our competitor's equipment!

Quality. You know the story. He stocks the finest. In power tubes, for example, brand preference studies by leading electronic publications have listed RCA as the first choice of professional designers year after year!

Inventory. The widest. Power tubes, rectifiers, vidicons, image orthicons. Think of his establishment as your tube warehouse. For all practical purposes, that's what it is!

Need more reasons? Call your local RCA Broadcast Tube Distributor. For starters, ask him for the new 1970 Guide to RCA Industrial Tube Products, or write: RCA Electronic Components, Commercial Engineering, Dept. 211, Harrison, N. J. 07029.



P.S. Your RCA Broadcast Tube Distributor is also the man to call for RCA Starmaker Microphones.

RCA

NEW LIT

For copies of these literature offerings, circle numbers for appropriate items on Reader Service Card.

Chart T529 lists **reel-to-reel helical VTRs** by manufacturer, including such data as model numbers, formats, and type of video tape required. Ampex. **200**

Engineering handbooks, slide rules are listed in 64-page catalog RS-70. Topics covered include electrical, mechanical, chemical engineering, architectural and pipefitting work. Includes summary of each book, which are available by mail from Technical Guide Publications. **201**

Bulletin offers **resistor** assortment in free cabinet. Flyer lists values in four wattage sizes. Cabinet and resistors sold for price of resistors alone. Ohmite. **202**

100-page catalog 7-70 contains info on **electromechanical components and equipment.** Sections include counters, flow meters, precision potentiometers, servo mechanisms, and timers. Offered by Electronics Div., American Relays. **203**

Brochure describes line of **audio and video products** for broadcasting, featuring specifications and prices on Color Corrector, Mark II Image Enhancer, Dynamic Presence Equalizer, Color Masking Processor, Television Display System, Audimax, and Volumax. CBS Laboratories. **204**

Technical paper, "Two Way Repeater Station Utilizing Hybrid Thin-Film Amplifier as Building Block" was given at 1970 NCTA convention, is available reprinted from Anaconda Electronics. **205**

1970/71 **stereo component** catalog describes 12 new units in 25 pages. Includes speaker systems, music centers, stereo receivers, an electronic crossover bi-amp, tuner preamp, and bi-amp speaker systems. Altec Lansing. **206**

Booklet describes easy **CATV maintenance** through use of input and output test points. Line includes splice blocks, multitaps, directional couplers, and a power insertion unit. Passive units are designed to accept Entron TP-4 test probe, which measures rf level in the range of 10 to 300 MHz. Entron Inc. **207**

Bulletin XE-70 covers system components for **xenon, mercury lighting** systems. Gives features, engineering data, and physical specifications on power supplies, igniters, and lamphouses. Christie Electric Corp. **208**

NAMES
IN THE NEWS

Magnetic tape pioneer **Alexander M. Poniatoff** retired August 25 as chairman of Ampex Corp., which he founded in 1944. He becomes chairman emeritus. **William E. Roberts,** president and chief executive officer, has assumed chairmanship of Ampex.

John H. Battison has joined Carl E. Smith Consulting Engineers, Cleveland, Ohio. He founded and was first president of the Society of Broadcast Engineers, and has written and edited many articles for *BM/E* and *Broadcast Engineering.*

Gary A. Dent

Jim Carr

New director of Operations at National Trans-Video, Inc., Dallas, Texas, is **Gary A. Dent.** He was formerly general manager of Cable Associates, Inc.

Jim Carr, engineer with WFIL-AM Philadelphia, has resigned to rejoin WABC AM-FM-TV New York.

Meredith Corporation's Broadcasting Division has promoted three men to radio station general managers: **John Scott** at WHEN, Syracuse; **John Crowley** at KPHO, Phoenix; and **Russell Gast** at WOW AM-FM, Omaha.

Now heading the Commercial Broadcast Transmitter Department at American Electronic Laboratories Inc. (Lansdale, Pa.) is **Donald A. Richardson.** He was formerly chief engineer of the Communications Systems Division of Granger Associates.

The Corporation for Public Broadcasting (Washington, D.C.) has appointed **Cal Watson** director of Television Station Projects. He was formerly manager of radio and television services at KWSU, Washington State University in Pullman.

Rose Blyth Kemp has been appointed vice president for planning and development of Columbia College, a television, motion picture, and liberal arts school in Los Angeles.

Guess who's minding the station?

Broadcast Products' AR-1000. This completely modular solid-state system represents the latest design concept in total station automation. It will readily implement *your* format, whether it be Live Sound Country, Hit Parade '70 or Good Music FM. The AR-1000 provides an exclusive 'skip' feature in all carousel memories, allowing you to program 24 hours in advance regardless of variables in your spot load. Also available is the all new, highly compact "Mini-Mate", a full stereo system that handles up to 8 inputs for under $6,000. With either system, you can be sure of tight, accurate, reliable operation.

For complete information, write or call:

BROADCAST PRODUCTS, INC.

12330 Wilkins Avenue, Rockville, Md. 20852
Phone: (301) 933-3400

Circle 123 on Reader Service Card

PROTECT your broadcast equipment against lightning surges with WILKINSON AC LINE SURGE PROTECTORS

Excessive voltage surges caused by lightning, transformer arcing and induced transients are everyday occurances that cause heavy damage to valuable broadcast equipment.

Now through the use of WILKINSON voltage sensitive Line Surge Protectors you can protect your equipment from line surges that may exceed even twenty times the normal line voltage.

A WILKINSON pulse compensated Line Surge Varister, is placed across a line of its rated voltage. Should a surge or increase of voltage occur, the resistance of the varister decreases at log scale as the voltage increases, thus acting as a momentary load or short circuit to the surge. WILKINSON Line Surge Protectors draw little or no current and are capacitor compensated for microsecond surges, thus damping all line disturbances as well as excessive voltage increase.

A small investment in WILKINSON Line Surge Protectors is your assurance that your valuable broadcast equipment will not be damaged due to line surges.

Model SIA-1 110 V. Single phase $125.00
Model SIA-2 220 V. Single phase $225.00
Model SIA-3 220 V. Three phase $325.00
Model SIA-4 440 V. Three phase $425.00

For complete details write to:

WILKINSON ELECTRONICS, INC.

1937 MacDADE BLVD. • WOODLYN, PA. 19094

• TELEPHONE (215) 874-5236 874-5237 •

Circle 124 on Reader Service Card

CROSS-TALK

Dear BM/E:

A recent letter (*BM/E* February 1970) complaining of short tube life, rattled my cage and propelled me to the typewriter.

When I first entered broadcasting I was sternly advised that filament voltages should be maintained *exactly* at the published values or something grim would happen to the tubes (and to my career).

That was not totally false information, but neither was it precisely true. ("A little knowledge is dangerous.") Let's discuss it. For a respected source, let us consult RCA Technical Manual TT-5, "RCA-Transmitting Tubes" (1962) p. 67:

"The operating voltages applied to . . . filamentary cathodes should not be permitted to vary more than ±5% from values specified . . . Heater voltages for unipotential cathodes should be maintained within ±10% of rated values . . ."

That does *not* say that the voltages *must* not vary. If we restate the above to read: "The voltages *may* be permitted to vary, but not over 5% (or 10%) . . ." we are closer to understanding the matter, and the truth will show up in dollars and cents results.

For further insight, let us turn to the Eimac Engineering Newsletter: "Life vs. Filament Voltage."

"For a small decrease in temperature and peak emission, life of the carbide layer and hence tube life can be increased by a substantial percentage. Peak emission as meant here is the emission obtained in the . . . Test Specification. This is normally many times the peak emission required in communication service."

Eimac suggests that filament voltage for the 3CX2500A3 and similar types should be dropped from the published 7.5 V to 7.2 V, a reduction of 4%, for broadcast and communication service. This is consistent with the RCA opinion as restated above.

Alternatively, Eimac proposes reducing the voltage until some critical performance standard, such as plate current, power output or distortion deteriorates, and then operating the tube slightly above that point.

Now, for the dollars and cents: By adopting the alternate method we obtained a 100% increase in the life of our final amplifier (from 4000 to 8000 hours), with a comparable improvement in service from our modulators.

Ted Shireman
KALI Radio
San Gabriel, Calif.

the SCHNEIDER SYSTEM

TV-10 11.2 to 1 f2.1
MANUAL / SERVO Zoom Lens

MOUNTS ON ALL COLOR CAMERAS
OPERATORS CHANGE MOUNT IN STUDIO
SERVOMODULE CONVERTS MANUAL LENS
FOCUS & ZOOM TO 28" FROM THE LENS
EXPANDS 0.3"x 0.4" IMAGE TO FULL SCREEN
ADD SERVO AT ANY TIME
INSTANT CHANGE RANGE EXTENDERS
OPERATIONAL BACK FOCUS CONTROL
UNCONDITIONAL ONE YEAR WARRANTY

AVAILABLE FROM ALL COLOR CAMERA MANUFACTURERS
FREE BROCHURE AVAILABLE ON REQUEST

TELE-CINE INC.
303 W42nd St., New York, N.Y.
(212) 247-3575

Circle 122 on Reader Service Card

Spotmaster

TP-1B Tape Cartridge Winder

This rugged and dependable tape winder fills a need in every station using cartridge equipment. No longer is it necessary to restrict your cartridge operation to stock sizes, or to tie up your conventional tape equipment loading cartridges. The TP-1B handles all reel sizes (up to 3600′ of 1 mil tape), winds new or old cartridges in any length. Available with or without Spotmaster tape timer, providing precise minute and second calibration for creating exact-length tapes. TP-1B is $104.50, with Tape Timer $129.50. Lubricated tape and empty cartridges are also available.

BROADCAST ELECTRONICS, INC.
A Filmways Company
8810 Brookville Rd., Silver Spring, Md. 20910

Dear BM/E:

In reply to Mr. Elihu T. Brown (*Crosstalk*, April 1970) you said that a station should "strive to put out the best possible signal and not be concerned with the receiving equipment used by listeners." I partly disagree with this. It is my belief that a broadcast station engineer should be very much concerned with the characteristics of receivers used by the general public.

Many engineers that are concerned in generating theoretically perfect audio often forget that the overall system is not from microphone to transmitting antenna; it is from microphone to the listener's ear, and 99% of the ears are listening to small speakers and low-quality audio amplifiers. There is much the engineer can do to improve the system if he will take this into account. It is interesting to note that in Nashville, of the six commercial AM stations, only one uses audio enhancement and it is consistently rated number one by the major polls.

In answer to the question you posed: No, I don't think control rooms should necessarily use three-inch speakers, but I do think that engineers should use three-inch speakers and I think they should pay careful attention to what their signal sounds like on less than studio-quality equipment.

John Pate
Chief Engineer
WGNS(AM)
Murfreesboro, Tenn.

Dear BM/E:

I was extremely interested in your articles on two blind DJs—the one at WPTH-FM in Fort Wayne (my home town) and at WPGU in Champaign.

I thought it might interest your readers to learn of a blind DJ here in the West. He's Mel Sauer, morning man and PD at KOLT here in Scottsbluff. Mel has been blind since six months after birth and has worked for KOLT 12 years.

Mel is a very unique person, in that he is his own engineer, taking readings on a special piece of electronic equipment that uses tones to indicate meter readings and is some 95% more accurate than the human eye. This equipment was made at a cost of over $1500 by two first-class engineers in Omaha, and is believed to be the only one of its kind.

Mel does his own spot production and is responsible for his own accounts. He's received many national, state and local awards for his service to the community.

Just a short note that I thought some readers might be interested in, and to tell you not to forget us in the West!

Mike Rockwell
Assistant Chief Engineer
KOLT (AM)
Scottsbluff, Nebr.

Now you can afford TV's leading color camera adapted for CATV

■ For the finest color achieved by hundreds of TV broadcasters—at a price you can afford—you'll want the Norelco PCB-701 Plumbicon* camera system ■ Total remote control of camera positioning and zoom lens cuts your operating costs dramatically ■ Mounts on wall, ceiling, tripod ■ For data, contact the innovators.

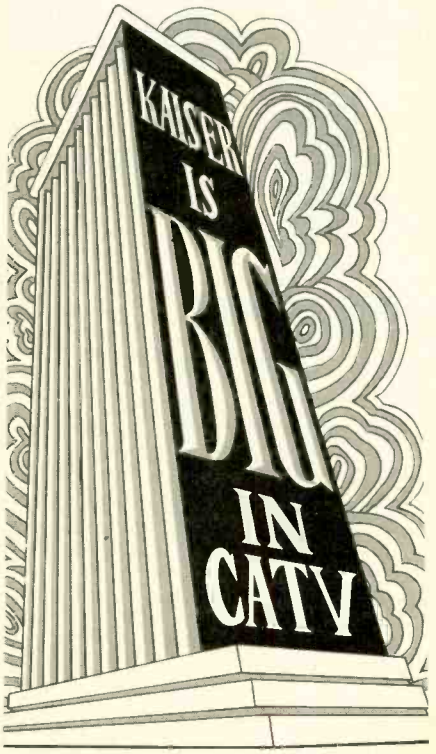
*Reg. T.M. N.V. Philips of Holland

Norelco® PHILIPS BROADCAST EQUIPMENT CORP.
One Philips Parkway, Montvale, N.J. 07645
Telephone: 201/391-1000
A NORTH AMERICAN PHILIPS COMPANY

Circle 125 on Reader Service Card

DON'T MISS... THE AUDIO ENGINEERING SOCIETY'S 39th TECHNICAL MEETING AND EXHIBITION OF PROFESSIONAL EQUIPMENT AT THE HOTEL NEW YORKER OCTOBER 12-15th

AUDIO A IN



• Equipment • Engineering • Installation
Send for our complete folder on CATV. No obligation.
KAISER CATV
Division of Kaiser Aerospace & Electronics Corporation
PHONE (602) 944-4411
P.O. BOX 9728,
PHOENIX, ARIZONA 85020

Circle 126 on Reader Service Card

Broadcast Equipment

Continued from page 46

For more information circle product's boldfaced number on the Reader Service Card.

Test gear briefs

Pulse marker plug-in, model PCM 7633A, is designed for Model 1500C 20 Hz—4 GHz sweep and marker system. New plug-in offers up to 12 switched crystal markers at customer-specified intervals (1 KHz—115 MHz), may be used individually or together. Markers are accurate to ±.05%, are cabled directly to scope vertical input, isolated from test circuit. Output 10 V peak. Cost $250 plus $17 for low band markers, $35 for high band markers. KAY ELEMETRICS. **295**

Color TV signal generator, model 144, provides NTSC encoded color bars, full or split field, modulated staircase with variable APL 10% to 90% and fixed APL of 50%, convergence crosshatch, VITS staircase or color bars, EIA sync, composite color test pattern consisting of crosshatch lines or dots with two insert areas for staircase or color bars and message service (time, temp, etc.) for cablecasting. Cabinet or rack mount, cost $2100. TEKTRONIX. **296**

Video equipment briefs

Camera support line includes lightweight pedestal, tripod, tripod dolly, and cradle head. Designed for use in studio, CATV, CCTV, educational. CINTEL. **297**

Tripod is short and heavy duty, working from 23 to 57½ in. above floor. Has four legs, will support 5 × 7 in. camera; weighs 7 lb. QUICK-SET. **298**

Instant studio consists of platform on wheels which mounts TV camera and monitor, holds helical VTR below, has mike boom and five integral quartz lamps. Customer furnishes mike, camera, VTR; other gear contained: Weighs 220 lb as furnished. TV DOLLY-LITE. **299**

Phase corrector equalizes phase errors in video amplifiers, covers range 0.002 to 5 μs, cost $542. RANK CINTEL. **300**

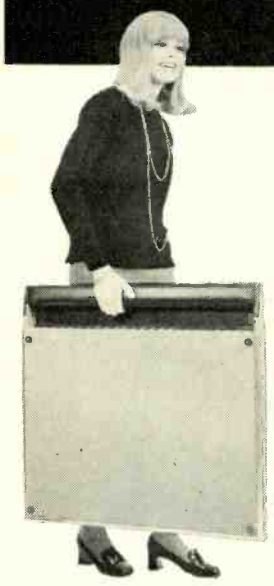
Expandable TV camera can be purchased as basic pickup head, with user later adding viewfinder, tally lights, intercom, etc. Uses 1-in. vidicon with automatic beam control; viewfinder has 5-in. pix tube. NASCO. **301**

New color CRTs, Matrix line, use screen which increases picture brightness without sacrificing contrast, have high-resolution precision-aligned electron gun, and improved screen phosphors. Type 25BCP22 currently available, will replace 25XP22, 25AP22, 25BAP22, 25BGP22 and others. RCA. **302**

TV modulator, model IFTM-4170, uses IF modulation, crystal-controlled VCO for aural, IC video modulator. FUNG ENGINEERING. **303**

Portable TV control center, model AC-125, provides video monitoring and control, waveform monitoring, and audio mixing. Handles three cameras, mikes, VTR, film chain. Unit weighs 90 lb, measures 22 × 16 × 19⅝ in. Cost $2950. AMPEX. **304**

NEW!
FAIRCHILD PORTABLE MIXING CONSOLE!



The FAIRCHILD PORTABLE MIXING CONSOLE is the world's first truly portable mixing console . . . it goes wherever you go! It weighs only 45 pounds complete and is about the size of a suitcase, but only 2" thin. Put it on a desk, table, or stand, plug it into an external power supply or use the battery power source and it's ready to mix up to 16 inputs and 8 outputs including monitoring on each channel. One set of batteries (16 alkaline or ordinary flashlight "C" type batteries), self-contained in the arm rests, will provide 25 hours of continuous operation.

A complete 16-input, 8-output system with monitoring capability costs only $7990.00. (About $6000.00 less than a standard console with comparable facilities.)

Outstanding performance, reliability, and durability are assured because the FAIRCHILD PORTABLE MIXING CONSOLE consists of the identical component circuitry which has made FAIRCHILD standard consoles the pacemaker in motion picture, television, radio and recording studios throughout the world.

Take a FAIRCHILD PORTABLE MIXING CONSOLE to your next recording session. The quality is unquestionable, the portability is obvious and, of course, the price is right!

FIVE MODELS AVAILABLE:
16 inputs ____ 8 outputs
16 inputs ____ 4 outputs
16 inputs ____ 2 outputs
12 inputs ____ 4 outputs
12 inputs ____ 2 outputs

FAIRCHILD PORTABLE MIXING CONSOLES from $4990.00 to $7990.00.

For complete details and performance specifications write to:

FAIRCHILD SOUND EQUIPMENT CORPORATION
Dept. BME-9, 10-40 45th Avenue • Long Island City, N.Y. 11101

Circle 127 on Reader Service Card

Video control console contains switcher-fader and special-effects generator, can handle six cameras, contains six 5-in. pix monitors and audio mixer. Cost $6350. GBC. **305**

Triaxial cable, 20 AWG for studio use is 0.36 in. OD and weighs 7.5 lb/100 ft. 14 AWG for remote use is 0.52 in. OD and weighs 13.5 lb/100 ft. Developed for use with Norelco PC-100 color camera. BRAND-REX. **306**

Zoom lens designed for C-mount CCTV cameras. Is 6 in. long, has 2¼ in. dia, max aperture of *f*/2.5, 5:1 zoom ratio, 20—100-mm focal length. Zoom is motorized by miniature motor run by two D cells. Cost $495. ZOLOMATICS. **307**

Table holds TV monitor (or receiver) on top, helical VTR underneath, is made of 1-in. chrome-plated tubular steel. Model TS-48 costs $39.50, is guaranteed five years. GBC. **308**

Color TV film chain includes IVC-230 camera and IVC-4000 multiplexer. Camera uses three vidicons, has integral 9-in. monitor, costs $19,500. Multiplexer accepts up to four projector inputs, has two outputs, costs $4000. Chain operates by local or remote control. IVC. **309**

Video monitor stand holds helical VTRs and picture monitors, uses 4-in. industrial type casters. Model AV-200 holds 350 lb, will glide through standard doorways. Includes back-mounted electrical outlet box with 20-ft heavy-duty power cord and winder-bracket. WINSTED. **310**

Automatic light level control for color TV film islands repositions to preset picture level in absence of light, has adjustable settings to any standard operating parameters, is compatible with any color film chain camera on market. Solid-state and self-contained, costs $1395. BESTON ELECTRONICS. **311**

Motor-driven scanner pans CCTV cameras up to 20 lb, has threaded base socket to fit camera support, slide-on camera adapter for instant mounting, all-angle pan head. Synchronous motor makes one panning sweep per minute. WELT/SAFE-LOCK. **312**

TV Character generator, model D-1500, furnishes titling information for broadcast, CCTV, and CATV. Self-contained keyboard unit; composite video output; internal or external RS170 sync; 32 characters/line; 15 lines/page; 64 ASCII characters available. Costs $3965. DATA-VISION. **313**

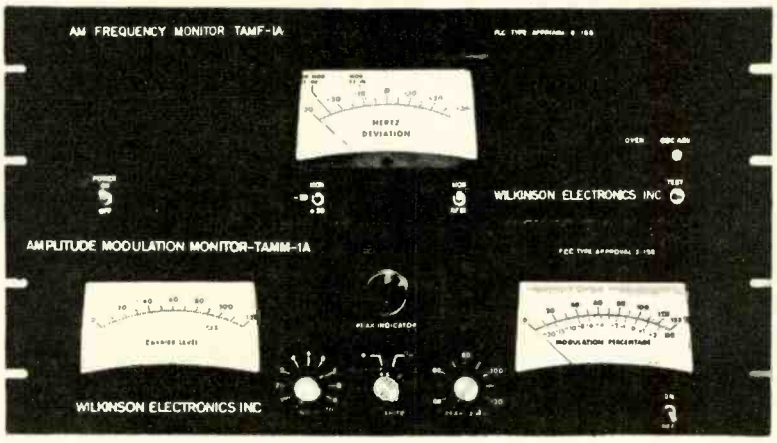
3-D CCTV system comprises model 5002 optical device installed on camera lens, model 6001 screen installed on monitor, and model 7001 stereo glasses. No electronic modifications. Permits recording scene on VTR or film and playing back in stereo. Prices: $1750 for lens; $150 for screen (8-in. picture monitor size); $35 for glasses. STEREOTRONICS TELEVISION. **314**

Picture monitor/receiver accepts B&W composite video or off-air vhf and uhf. Type TH-32-A has 38 sq. in. picture area, horizontal resolution better than 350 lines, with list price of $195. GENERAL ELECTRIC. **317**

Air cleaner Envirazone II, protects quadruplex VTR and extends headwheel life by cleaning air and forcing it around headwheel assembly, removing contamination and protecting from outside matter. Filter removes dust particles 0.3 μm and larger, with efficiency of 99.97%. ENVIRCO. **318**

Solid State Solid Service

WILKINSON
AM MONITORS
Shield Serve Save



TAMF–1A AM Frequency Monitor FCC Approval 3–158 Ultra Stable ± ½ Hz per month . . . 5¼" rack space . . . Weight 10 lbs. . . . Approved for modulated RF input . . . Self Testing Self calibrating . . . Instant operation.

TAMM–1A AM Modulation Monitor FCC Approval 3–156 Extremely precise remote or local . . . . . RF range .1–30MHz Weight 11 lbs. . . . rack space 5¼" . . . . Demodulator provides 2 audio outputs 30 HZ–45 KHz ± ½ db at ¼% distortion.

For complete details, write or call:

WILKINSON ELECTRONICS, INC.

1937 MacDADE BLVD
WOODLYN, PA. 19094

TELEPHONE (215) 874-5236 874-5237

Circle 128 on Reader Service Card

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

DISPLAY CLASSIFIED ADVERTISING: $22.50 per inch 1x; $22.00 per inch 3x; $21.00 per inch 6x; $20.00 per inch 12x. ALL OTHER CLASSIFIED ADVERTISING 25¢ per word; minimum $3.00. BLIND BOX NUMBER: No extra charge. Replies sent to address below will be forwarded to you. PAYABLE IN ADVANCE; send check with order. CLOSING DATE: 5th of 2nd month preceding issue date.

BM/E, Monterey and Pinola Avenues, Blue Ridge Summit, Pa. 17214 Phone 717/794-2191

CIRCUIT/PRODUCT DESIGN ENGINEERS

The engineers we seek will include their talents in Video, Audio and Computer related circuitry designing products for the Television Broadcasting Equipment market. Send resume to the personnel manager. Vital Industries, Inc., 3614 S.W. Archer Road, Gainesville, Florida 32601.

HELP WANTED

Engineer, chief, for 5000 watt directional 50,000 watt stereo FM; new equipment. No announcing, must know audio well and conduct scheduled maintenance, send current picture, resume and requirements to General Mgr. WMIX, Mt. Vernon, Ill. 62864.

Chief engineer for Midwest AM directional, Class C FM New studios, good equipment. Send resume to Box 970-I, BM/E, Blue Ridge Summit, Pa. 17214.

POSITIONS WANTED

Top 40DJ/announcer/news/sales. Broadcast school graduate, some experience, very entertaining, third endorsed. Musical background, college, veteran, dependable, no drifter. Available immediately. Will relocate anywhere. Call 312-225-4039 mornings or write Ed Robinson, 500 E. 33rd St. 1708, Chicago, Ill. 60616.

Third phone beginner looking for first job. Resume and tape on request. Call Robert Banks, 503-981-4721. Write 234 E. Lincoln, Woodburn, Ore. 97071.

BUSINESS OPPORTUNITIES

FIELD SALES REPRESENTATIVES—If you are making regular calls on customers in all areas of television broadcasting, and are interested in selling a complete, well established, line of video patchfields and accessories, please write or call: MR. JESS F. LANCASTER, Marketing Manager, Broadcast Products, COOKE ENGINEERING CO., 900 Slaters Ln., Alexandria, Va. 22314 703-548-3889.

EQUIPMENT FOR SALE

GE 50 kw Transmitter BT-50-A1 complete with associated equipment including cabling, 3 ea. 280 ft. and 2 ea. 160 ft. guyed towers, transmitter shack, etc. To be offered for sale by public bid. Available late 1970 for disassembly and removal from location near Sacramento. Arrangements to inspect the facility, currently operating, and to request copies of the Bid form, contact immediately B. N. Brown, Sacramento Municipal Utility District, P.O. Box 15830, Sacramento, California, 95813. (916) 452-3211, ext. 576.

EQUIPMENT FOR SALE (con't)

For Sale:

1-CBS Audiomax IIIS (Stereo)	$900.00
1-HP 335BFM Monitor	$350.00
1-Rust SFM-19 Pilot Freq. Mon.	$225.00
2-Russco Studio Pro Turntable	$100.00 ea.
2-Gray 303 Tone Arms	$ 35.00 ea.

M. Rubin, KPPC, 213-681-0447

SCULLY TAPE RECORDERS: Mono., 2, 4, 8, 12, & 16 track models plus 270 automatic players. Some models in stock now. W.A.L. custom audio control consoles & console modules. Solid state 120 Watt power Amps. We buy and rebuild Scully lathes. WIEGAND AUDIO LABORATORIES, INC. 3402 Windsor Road, Wall, N.J. 07719. Phone 201/681-6443.

SOLID-STATE AUDIO PLUG-IN OCTAL (1" Dia x 2" H) modules. Mic preamps, disc & tape preamp-equalizers, tape bias osc. & record ampl., power amps & power supplies. Send for free catalog and audio applications. Opamp Labs., 172 So. Alta Vista Blvd., Los Angeles, Cal. 90036.

Ampex 300, 350, 352, 400, 450 users, for greater S/N ratio, replace first playback stage 12SJ7 with our plug-in transistor preamp. For specifications write VIF INTERNATIONAL, PO Box 1555, Mtn. View, Ca. 94040.

Jack Panels and patch cords, Audio and Video, new and used. Precision video coax cable and connectors (Belden 8281). Write for catalog. Gulf Electro-Sales, Inc., 6325 Beverly Hill, Houston, Texas 77027. Phone 713-781-3066.

GENERAL Electric Videcon camera-slide chain. CONRAC AV12E. New G.P.L. 350 camera. Sync generator, process Amp, Marconi-Ampex 3500 Vidicon camera, zoom lens, Ampex 660B. Capt. Bill, WIMS RADIO-Michigan City, Ind.

AMERICA'S LARGEST STOCK AND CONSIGNMENT LISTING of new and used broadcast and recording equipment. We trade-sell and buy. THE MAZE CORPORATION, P.O. Box 6636. Birmingham, Ala. 35210.

Audiomation Labs stereo system in racks, four years old, three 14-inch decks, solid state carousel, cartridge playback, sequencer, announcer T. fader, perfect condition, $3,500 FOB. WMVG, Milledgeville, Ga.

RCA TK-30 and TK-31 image orthicon cameras; RCA TR-2 and TR-5 videotape recorders, plus many incidentals. Television Facilities, Inc., Box 396, Montgomeryville, Pa. 18936. Tel. 215-855-0970.

RCA headwheel panels-unused RCA highband and low-band headwheel panels priced to sell. Contact WHDH-TV, 50 Morrissey Blvd., Boston, Mass. 02125. Ph. (617) 288-5000.

Towers for sale, erection and maintenance, 18 years experience in tower erection. Robinson Tower Company, P.O. Box 143, Greenville, N.C. 27834. Phone 919-758-1453.

The complete and reliable source for new and used broadcast equipment. Request our free listings. Broadcast Equipment and Supply Co., Box 3141. Bristol, Tennessee 37620.

Any type tower erection finance. Bill Angle—Tel. 919-752-3040. Box 55, Greenville, N.C. 27834.

RADIO STATION FOR SALE

Radio Station 5,000 watts . . . Eastern Arizona coverage . . . expanding community . . . $175,000. KHIL, Willcox . . .

WANT TO BUY

Television transmitters wanted: We need used high and low band television transmitters, any power. Must be in excellent condition. Contact Bruno Schwebel, Telesistema Mexicano, S.A: Av. Chapultepec 18, Mexico, 1, D.F., Phone: Mexico City 5-18-56-74.

WANTED: Someone who can repair an antique carbon microphone. Turner Kirkland, Union City, Tenn. 38261.

PROGRAM SERVICES

$3.00 buys set number one and catalogue of carefully selected one liners. Shad's House of Humor, Suite 501, Applegate Tower, 3744 Applegate Ave., Cincinnati, Ohio 45211.

DEEJAYS! 11,000 classified gag lines, $10.00. Unconditionally guaranteed! Comedy catalog free. Edmund Orrin, Boyer Road, Mariposa, Calif. 95338.

PROGRAM SERVICES (con't)

Deejay Manual—A collection of one-liner comedy pieces for sparkling DJ's $3.00. Write for free "Broadcast Comedy" catalog. Show-Biz Comedy Service (Dept. R) 1735 East 26 Street, Brooklyn, N.Y. 11229.

D.J. one liners! Write for free samples, and also receive details on: California Aircheck Tapes, Voice Drop-ins, D.J. Source Guide, and much more! Command Productions, Box 26348-A, San Francisco 94126.

MISCELLANEOUS FOR SALE

DECALS, TRADEMARKS & LETTERING made for sales aids. All kinds since 1944. Write for idea catalog. Mathews Co., 827 S. Harvey, Oak Park, Ill. 60304.

TECHNICAL SERVICES

AMPEX HEAD ASSEMBLY

Relapping and replacement head service for all AMPEX professional studio model recorders. Our precision relapping extends head life for maximum use. Brand new shelf stock replacement heads of our manufacture available when relappping not advisable. Prices include thorough assembly cleaning, optical and electrical inspection and complete testing on Ampex equipment. Monaural assembly relapping . . . $35.00 complete. Monaural assembly replacements . . . $119.50 complete. "Loaner" assemblies available. For more data, contact LIPPS, Inc., 1630 Euclid St., Santa Monica, Calif. 90404 (213) EX 3-0449.

Computerized FM frequency search. Engineering Associates, Inc., P.O. Box 510, Versailles, Ky. 40383. Phone: 606-873-8311.

INSTRUCTIONS

Are you interested in a professional announcing career in radio? Then enter America's most unique and practical Broadcasting School . . . The SCHOOL OF BROADCASTING TRAINING in Artesia, New Mexico. Three months training on two commercial radio stations . . . KSVP AM and KSVP FM Stereo gives you three months actual commercial broadcasting experience that really counts when you apply for your first full time radio job. Third class radio-telephone license with Broadcast endorsement included . . . needed at many radio stations for employment as a disc jockey. Room and Board available and placement assistance after graduation. Class is limited to 12 only. BONDED! Approved by the New Mexico State Board of Education! Classes begin Sept. 2, 1971 and January 2, 1971 and June 2 1971. Also six weeks course for First Class FCC license theory and laboratory training beginning September 2, 1970. Enroll Now! Write . . . Dave Button, Manager . . . School of Broadcast Training, 317 West Quay, Artesia, New Mexico. 88210 Telephone 505-746-2751 for reservations!

AMERICAN INSTITUTE OF RADIO offers the nation's finest quality course for your first class License in three to four weeks. Individual instruction. Classes start every Monday. Tuition $300.00.
A. I. R. in FLORIDA Koger Building—Boulevard Center—3986 Beach Boulevard. PO Box 16652, Jacksonville, Florida.
A. I. R. in TENNESSEE 2622 Old Lebanon Road, Nashville, Tennessee 37214. 615-889-0469.

First phone through tape recorded lessons at home plus one week personal instruction in Washington, D.C., Atlanta, Boston, Detroit, New Orleans, Minneapolis, Seattle, Denver, Portland, Los Angeles. Proven results. Our 17th year teaching FCC license courses. Bob Johnson Broadcast License Training, 1060D Duncan, Manhattan Beach, Calif 90266. Phone 213-379-4461.

"1970 Tests Answers" for FCC First Class License, Plus Command's "Self-Study Ability Test." Proven! $5.00. Command Productions, Box 26348-A, San Francisco 94126.

FCC License and Associate Degree in Electronics earned mostly by correspondence. Free catalog. Grantham Electronics School, 1505 N. Western, Hollywood, Calif. 90027.

BM/E ADVERTISERS' INDEX

American Electronic Laboratories, Inc. 48

Anaconda Electronics 20, 21

Audio Engineering Society 55

Belar Electronics Laboratory, Inc. 45

Broadcast Electronics, Inc. 10, 54

Broadcast Products 53

Cosmicar Optical Co., Ltd. 18

Ditch Witch, a div. of Charles Machine Works, Inc. 40

Dynair Electronics, Inc. 19

Eastman Kodak Company 47

Fairchild Sound Equipment Corp. 19, 56

Fort Worth Tower Co., Inc. 59

Gates, A Division of Harris-Intertype 17

Grass Valley Group, Inc., The 5

International Good Music .... Cover 3

Kaiser CATV, Division of Kaiser Aerospace & Electronics Corp. 55

Nortronics Company, Inc. 45

Philips Broadcast Equipment Corp. 42, 43, 55

Pruzan Company 39

RCA Corporation 12, 13

RCA Electronic Components 52

RHG Electronics Laboratory, Inc. 16

Sarkes Tarzian, Inc. 9

Schafer Electronics 3

Shure Brothers, Inc. .... Cover 2

Sony Corp. of America .... Cover 4

Sparta Electronic Corp. 41

Stanton Magnetics, Inc. 11

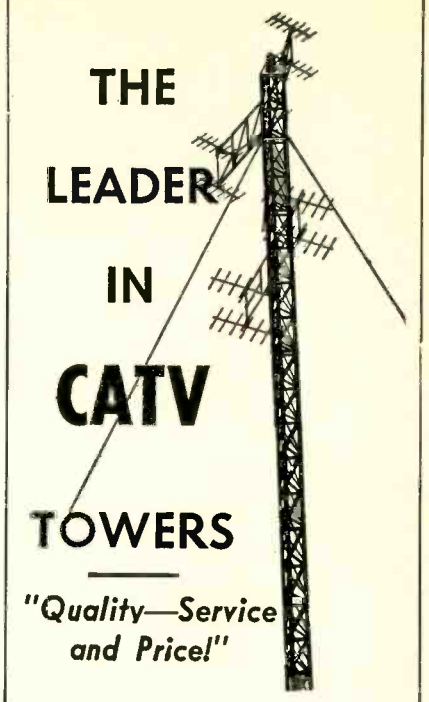
TAB Books 49, 50, 51

Tektronix, Inc. 7

Tele-Cine Inc. 54

TeleMation, Inc. 15

Wilkinson Electronics, Inc. 46, 54, 57



THE LEADER IN CATV TOWERS

"Quality—Service and Price!"

Yes, quality, service and price on CATV systems are the reasons for Forth Worth Tower's position as the industry's leading supplier. Experience gained as a pioneer supplier of CATV enables Fort Worth Tower to provide you with a quality product at a price that is reasonable and attractive.

Take advantage of our experience. For assistance in systems planning, engineering and complete systems quotations . . .

CALL OR WRITE TODAY

Fort Worth Tower

COMPANY, INCORPORATED

P. O. Box 8597, Fort Worth, Texas
(817) JE 6-5676

— Associated Companies —
Tommy Moore, Inc.
Big State Engineering, Inc.
Tower Construction Finance, Inc.

Circle 129 on Reader Service Card

NORTHEAST
820 Second Avenue
New York, New York 10017
212-661-0450
H. R. Shanton Granger

SOUTHEAST
Ken Fairleigh Associates
P.O. Box 3956
Charlotte, North Carolina 28203
704-366-1434
Kenneth F. Fairleigh

MIDWEST
612 North Michigan Avenue
Chicago, Illinois 60611
312-642-3774
Thomas F. X. Carter

ADVERTISING SALES OFFICES

MACTIER PUBLISHING CORP.
820 Second Avenue
New York 10017 212-661-0450

Sally Ann Morley
Sales Administrator

WEST COAST
1245 East Walnut Street
Pasadena, California 91106
213-795-1528
213-684-0590 (Los Angeles)
Lawrence C. Papp
Burt Underwood

Thompson & Healey Inc.
1111 Hearst Building
San Francisco, California 94103
415-362-8547
William J. Healey

JAPAN
Nippon Keisoku Inc.
P.O. Box 410
Central Tokyo, Japan
Yoshi Yamamoto

FROM THE EDITOR

Learn Digital

As Ben Wolfe (Post-Newsweek Stations) said at the 1970 NAB Convention: "If you want to stay in broadcast engineering, you'd better learn digital circuits, for they will soon be commonplace in our industry."

We agree with Mr. Wolfe. Remember the old-timers who in 1950 thought TV wouldn't make it, who pooh-poohed transistors as toys? Their 1970 counterparts are saying ICs and MSI are OK for computers and satellites, but not for broadcasting.

Nonsense. If you've read this issue and our recent coverage of the NAB and NCTA shows, you must be aware that state-of-the-art broadcast gear is appearing with computer-type integrated circuits and medium-scale integration. What's more, the computer itself has galloped onto the scene, some 25 years old and a grown-up hard worker ready to perform hundreds of broadcast and cable TV jobs: billing, scheduling, switching, routing, sweep-testing, etc.

In the next decade, you may well have to specify, purchase, install, supervise, and operate a computer and its peripheral equipment. How can you intelligently run an equipment complex if you don't talk its language?

We've all been living in an analog world, and now we've got to learn digital. Of course, you engineers won't have to repair an IC—you'll just replace it. And you managers won't have to know how to interconnect the components of an automation system. But both of you should know what digital circuits are all about.

All right—learn digital. How? Where? One good introduction is *Digital Principles and Applications*, by Albert P. Malvino and Donald P. Leach (McGraw-Hill, 1969, $9.95), which begins by explaining diode switches and binary numbers. Also useful are *Digital Logic Handbook* (Digital Equipment Corp., 1970, free), and *Digital-to-Analog Converter Handbook* (Hybrid Systems Corp., also free). And Prentice-Hall, John Wiley, Hayden Book Co., and Howard W. Sams & Co. have similar books.

You might also check any nearby college or technical school for a basic course in digital electronics.

Finally, ask the manufacturer. Next time that equipment salesman comes around, ask him how he expects you to cope with the gear he'll be selling you in the 1970s. It is to the hardware supplier's advantage to steer you toward understanding digital circuits, for the sooner you are knowledgeable about the basic language his product uses, the sooner you'll be ready to buy it.

Thomas R. Haskett
Associate Editor

PRODUCT INDEX

A quick reference to products mentioned editorially or in advertisements. Page number is listed first (light face type) followed by reader service number (bold face.)

AUDIO

45/281 **Amplifiers, modular**/Calectro-Amperex
18/111 **Audio-actuated gate**/Fairchild
C3/130 **Automation equip**/IGM
53/123 **Automation system**/Broadcast Products
3/101 **Automation system**/Schafer
C2/101 **Cartridges**/Shure Bros
11/105 **Cartridges, calibration standard**/Stanton Magnetics
56/127 **Mixing consoles, portable**/Fairchild
45/118 **Monitors, AM**/Belar
57/128 **Monitors, AM**/Wilkinson
48/121 **Solid state exciters**/AEL
48/121 **Solid state stereo generators**/AEL
46/120 **Tape heads**/Nortronics

TELEVISION CONTROL & STUDIO EQUIPMENT

15/107 **Broadcast color synchronizing generator**/TeleMation
44/279 **Camera, 16mm**/Arriflex
42/117 **Camera, color**/Philips
12/106 **Camera, color**/RCA
56/301 **Camera, expandable**/Nasco
56/297 **Camera supports**/CinTel
57/313 **Character generator**/Datavision
56/304 **Control center, portable**/Ampex
57/305 **Control console**/GBC
57/309 **Film chain, color**/IVC
44/276 **Film projector, automatic**/Listec
5/102 **Helical Scan VTR process system**/Grass Valley
56/299 **Instant studio**/TV Dolly-Lite
56/303 **Modulator**/Fung Engineering
56/300 **Phase corrector**/Rank Cintel
57/317 **Picture monitor-receiver**/GE
12/106 **Tape recorder**/RCA
56/298 **Tripod**/Quick-Set
15/107 **Video distribution amplifier**/TeleMation
54/125 **Zoom lens, manual-servo**/TeleCine

TRANSMITTER EQUIPMENT

16/108 **Microwave relay links**/RHG
17/109 **Transmitter, FM**/Gates Radio
41/116 **Transmitters, FM**/Sparta

CATV (See also: COMPONENTS, WIRE & CABLE)

20/113 **Amplifier**/Anaconda Electronics
9/104 **Automation by computer**/Sarkes Tarzian
C4/131 **Camera, color**/Sony
55/125 **Camera system, Plumbicon**/Philips
55/126 **Equipment, engineering, installation**/Kaiser
18/110 **Lenses**/Cosmicar
44/275 **Sweep system**/Texscan
39/114 **Systems**/Pruzan
59/129 **Towers**/Fort Worth Tower
40/115 **Trencher**/Ditch Witch
19/112 **Various products**/Dynair

CCTV

44/277 **Lens selector**/GBC
57/307 **Lens, zoom**/Zolomatics
57/312 **Scanner, motor-driven**/Welt/Safe-Lock
57/314 **3-D system**/Stereotronics Television

TEST EQUIPMENT

45/284 **Cable fault-finder**/Craftsman
46/289 **Cable fault locator**/W&G Instruments
46/291 **Color TV sweep generator**/RCA
45/282 **Directional RF wattmeter**/Bird Electronics
46/286 **Earth resistance tester**/Freed Transformer
46/290 **Inline meter jack**/Delta Electronics
45/283 **Monitor, color TV**/Macbeth Div., Kollmorgen
46/287 **Oscillator**/General Radio
46/292 **Panoramic receiver-scope**/HRB-Singer
46/288 **Power monitor**/Sencore
56/295 **Pulse marker plug-in**/Kay Elemetrics
56/296 **Signal generator, color TV**/Tektronix
46/293 **Sweep analyzer**/Bafco
45/285 **Triggered scope**/Kikusui
7/103 **Waveform monitor**/Tektronix

PHOTOGRAPHIC & LIGHTING EQUIPMENT

57/311 **Light level control, automatic**/Beston Electronics

COMPONENTS, WIRE & CABLE

56/302 **CRT's, color**/RCA
54/124 **Silicon rectifiers**/Wilkinson
57/306 **Triaxial cable**/Brand Rex

MISCELLANEOUS

57/318 **Air cleaner for VTR**/Envirco
44/280 **Counter-timers**/Monsanto
44/278 **Communication system, two-way**/Metrologic Instruments
46/119 **Surge protectors**/Wilkinson
57/310 **Stand for video monitor or VTR**/Winsted
57/308 **Table for monitor or receiver**/GBC

How are IGM's new INSTACART and MOS MEMORY performing?

Let's ask Russ Morgan, general manager of station WTTR, Westminster, Maryland, after six months' experience with the first IGM 500 system to incorporate both Instacart and MOS memory.

Above, general manager Morgan with WTTR's IGM 500 equipment, including 10-step music sequencer, network switcher, automatic logger with verified printout, time announcer, Instacart, and MOS memory.

"Sensationally well," says Russ. "The 200-event MOS random select memory has been flawless."

"It handles a heavy commercial load and allows us to program spot breakers and PSA's as we want them. It has more than enough capacity to allow us to program 6 a.m. to 6 p.m. at one time. It's flexible enough to allow us to add last minute fill-ins without reprogramming."

Thanks Russ. Don't forget that anytime you need more capacity, say 300 events, you can have it as a plug-in at modest cost. Now, how about your 48-tray Instacart, Russ?

"It's been trouble free, also—and the most versatile cart-playing unit on the market. In combination with the MOS unit, it gives us fast programming. And that's not all. We use *one* of the 48 trays for fill music and ID's. It's controlled by the real time switcher while the rest are controlled by the MOS memory. This saves the cost of another single cart player."

Some IGM 500 system users, Russ, control three or more Instacart trays from separate channels, saving still more money by completely eliminating single cart players. Since all 48 trays can be called on instantly, there's no worry about having time to cue them up.

After three years of investigating automation equipment, Station WTTR is convinced that the IGM 500 system was the right choice. Many other IGM 500 and 600 control systems equipped with Instacarts are now in the field, and many additional IGM MOS memory units are in operation. All are working flawlessly. They add to IGM's ability to match any station's needs exactly, with exclusive modular approach to control and playback equipment.

For "tomorrow's engineering today" in automation equipment, write or call International Good Music, P. O. Box 943, Bellingham, Wa. Tel. (206) 733-4567

IGM

Circle 130 on Reader Service Card

WITH SONY'S NEW COLOR CAMERA.

Plan on starting local origination in accordance with the FCC's latest ruling on CATV? If so, you can equip your station with NTSC color capability for what you'd expect to pay for black-and-white.

The new Sony DXC-5000 color camera not only sells for under $10,000 but is a marvel of simplicity as well.

The DXC-5000 has only three controls as opposed to more than 30 on conventional color cameras; thus, anyone can learn to operate it in roughly three minutes. And when you add the compactness of the camera (it weighs a mere 29 pounds), the fact that it accepts external sync input from any standard color generator, and its built-in electronic memory that maintains natural color patterns under changing lighting conditions, you have a package that can't be beat.

To find out how you can bring perfect color to your CATV programming easily and reasonably, call your Sony color camera dealer—today!

SONY®
...the better one
SONY CORPORATION OF AMERICA
47-47 Van Dam Street, Long Island City, New York 11101

Circle 131 on Reader Service Card