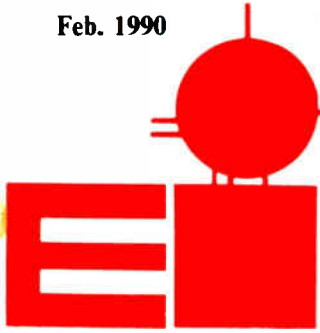




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New Invention Central To Testing HDTV Systems

The Advanced Television Test Center (ATTC) announced it has awarded Tektronix, Inc., a major contract to engineer and manufacture a special "high definition" television (HDTV) device, the ATTC Format Converter. This new invention will enable the digital videotape recording of several different forms of HDTV. The prototype is scheduled for delivery by March 1990, with production units to follow shortly thereafter. The contract was awarded to Tektronix from a field of several bidders.

"The ATTC format converter will make possible a record of the official tests of advanced television (ATV) transmission systems for use by industry analysts and government policymakers in determining the new TV standard," said Peter M. Fannon, Test Center Executive Director. Without video recording, most ATV testing could be done only from live picture sources. "This would threaten the goal of thorough testing, and make comparison of different systems' test results nearly impossible," Fannon said. The format converter was invented by ATTC Chief Scientist Charles W. Rhodes, and a patent application for it has been filed.

Dr. Tran Thong, Manager of Tektronix' Electronic Systems Laboratory, said, "Tektronix welcomes the challenge of making this new equipment, which we believe will advance the science of video itself. Developing this kind of high performance tool, and addressing specialty television requirements, such as those of the Test Center, build on the strong base our company

is already establishing in HDTV," he said.

Tektronix has been involved in HDTV for more than six years and currently provides the television industry with HDTV test equipment. It has also provided prototype television routing and switching equipment.

The ATTC format converter will be a key part of the Test Center's special-purpose laboratory, which is now under construction in Alexandria, Virginia. The 12,000 square-foot facility, together with its HDTV equipment, will cost an estimated \$3.5 million, and will be completed in the spring 1990. It will be used to test the several ATV transmission systems which are being proposed as the new standard for U.S. television. The tests, which could begin by mid-1990, are being organized by the official Advisory Committee on Advanced Television Service of the Federal Communications Commission.

Robert O. Niles, Vice President, Director of Engineering, Capital Cities/ABC Inc., and Chairman of the Test Center's Technical Committee, hailed Tektronix' work on the format converter saying, "It is central to ATTC's efforts to create a fair and equitable means to test and compare a variety of leading edge television technologies." Joseph A. Flaherty, Chairman of the Planning Subcommittee of the FCC's Advisory Committee, said, "This invention will greatly facilitate the Advisory Committee's testing process, and it could help bring HDTV decisions much sooner than could have been expected without this technology."

Flaherty is Vice President and General Manager, Engineering and Development, CBS Inc., and a Director of the Test Center.

The format converter is designed to work in combination with the new Sony high definition digital videotape recorder, allowing the tape recorder, which was built to receive only one television scanning format (i.e. 1125 lines in a picture), to accept other formats using different numbers of lines (e.g. 1050, 787.5, and 525). The Test Center has acquired two of the first production units of Sony's HDD-1000 recorder for this purpose.

Tektronix, Inc., Beaverton, Oregon, is a leading manufacturer of electronic products and systems in the areas of test and measurement, computer graphics and communications. Sales in fiscal 1988 totaled \$1.4 billion. The company has approximately 16,000 employees worldwide.

The Test Center was formed by a coalition of broadcasting companies and industry organizations to test and report on transmission systems for advanced television service including HDTV. HDTV promises to bring better TV pictures and sound to the American home and workplace. The results of this work will assist the Federal Government, the public, and American industry in selecting among the proposed new systems and determining necessary national standards to implement the new service.



Editor's Notebook



A couple of things are scheduled to happen this year in the broadcast regulatory area. By now I suspect the majority of readers is already aware of them but just in case you haven't read some of the articles which have been written this will serve as a little reminder.

First of all, if you are an AM broadcaster you should have already installed an NRSC-1 pre-emphasis/filter modification to your existing audio processing equipment or purchased one of the newer excellent processing devices with the NRSC-1 circuitry built in. Not only will it improve your air sound but it will keep the FCC off your back until 1994 when NRSC-2 goes into effect for everybody. The reason being that if you implement NRSC-1 by 1990 you will be "assumed" to be in compliance with NRSC-2 standards until 1994 when all AM broadcasters will have to prove compliance.

If you do not have NRSC-1 in place this year and the inspector happens to walk in the door you will have to prove that you are in compliance with NRSC-2. This could be a little difficult at a lot of AM's around the country.

The second thing scheduled to go into effect this year, July 1 to be exact, is type acceptance of all STL systems as per FCC rule 74.550.

The rule has actually been in effect since 1985 but stations had five years to get into compliance with the rule. Prior to 1985 FCC type approval was not required, although the technical standards have been in effect for a number of years.

There seems to be quite a bit of confusion as to which systems are in compliance and how to go about getting type acceptance on presently installed systems. The best procedure is to get in touch with the manufacturer of your particular STL system and find out their recommendations.

If you have an older system the manufacturer can advise you as to what, if any, modifications are needed and how much they will cost. They can also advise you to the procedure for applying for type approval.

A lot of the older systems will not be able to meet the specs, in which case the only solution will be to replace the system with a new one.

See article below received just before deadline. The SBE has requested that the FCC push the July 1 deadline back but as of this writing no information is available as to whether this will happen.

For more info on the STL issue you can contact the following people: Dave Chancey at Moseley Associates, 805-968-9621; Jim McNally at the FCC, 202-632-9660; Hank Van Deursen at the FCC, 202-632-9660; Eric Lane of TFT, 408-727-7272; J-Square Technical Services President Jim Jones at 801-298-8515, and Mac McClanahan of Marti, 817-645-9163.

STL Authorization Deadline Extended

The FCC has given stations and equipment manufacturers an extra three years to comply with the STL authorization deadline — now July 1, 1993.

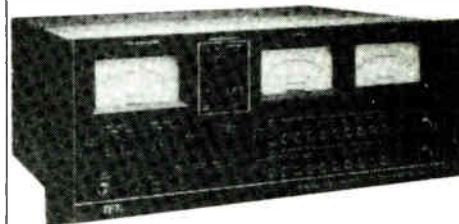
Per FCC Rule 74.550, all STL equipment operating in the 944-952 MHz band was to have been FCC authorized by July 1, 1990. The Rule was enacted in 1985 to foster an anticipated shift to narrowband channels of 300 kHz (for FM composite links) and 200 kHz (for discrete channels). In its order released last Thursday, the FCC said "...The STL band congestion has not developed to the extent originally anticipated." The FCC emphasized that, while it granted a requested delay, "all existing STL/ICR equipment must comply with current technical standards." The Commission noted that its intent to require licensees to use more spectrum-efficient bandwidths in congested areas has not changed.

High Quality AM Sound

The National Association of Broadcasters and the Consumer Electronics Group of the Electronic Industries Association have agreed to enter a joint program to promote high-quality AM sound using the standards of the National Radio Standards Committee or NRSC. The NRSC standards improve AM radio transmission and reception quality and reduce interference between stations, thus improving the quality of sound.

The first task for the groups is to establish a certification mark or logo that will be used on the faceplate of high-quality AM receivers that are equipped to comply with NRSC deemphasis and bandwidth specifications.

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More LPTV Viewers, Service Study Shows

More viewers are watching their low-power television station, according to statistics provided by A.C. Nielsen and Arbitron, the broadcast rating services.

Nielsen requires that a station show at least a 2.5 percent share of viewership between 7 a.m. and 1 p.m. to be included in its surveys. Currently, 18 LPTV stations are credited in their home market reports and an additional 179 could show reportability in the near future.

Since 1986, 209 markets measured by Arbitron showed a 300 percent increase in viewership of LPTV stations. The statistics were released at the second annual LPTV conference and exposition held in Las Vegas, which was attended by nearly 300 LPTV station owners and those in the process of obtaining construction permits from the FCC.

What allows LPTV stations to compete with network affiliates and independents is their emphasis on local programming, according to John Kompas, president of the Milwaukee-based Community Broadcasters Association, which represents the LPTV industry.

New Car Options Go High-Tech

At the recent Tokyo Motor Show, Japanese automobile makers unveiled several advanced electronic options that not only pamper drivers with the utmost convenience, but also may set the standard of car options to come.

For example, you can look for auto makers on both sides of the Pacific to adopt the special car radio currently found in the new Subaru SVX. The stereo is controlled by human voice commands, allowing drivers to keep their eyes on the road while searching for their favorite station.

The Daihatsu Sneaker also comes with a feature utilizing the human voice — a communication system that hooks up to an intercom at the driver's residence. The system allows a driver to speak to folks waiting at his front door while he races home to meet them. This same car features a small swiveling fifth wheel (!) that enables the car to swing sideways into cramped parking areas.

If you're the type of driver who plays her favorite radio station so LOUD that you don't realize there's a police cruiser behind you until it's too late, you may want to check out Nissan's new NEO-X. This sleek model comes with a warning light that flashes when other cars approach from the rear.

And...for people who like really cool autos, Nissan introduces the Chapeau — a passenger van with a built-in solar-powered fan that blows cool air into the vehicle while it's parked in direct sunlight. Meanwhile, Mazda has introduced a device that pumps fragrant scents through a car's air conditioning system.

Mazda has also developed a high-tech, dash-mounted navigational system that uses satellite signals to graphically display a car's position in a traffic jam. Incidentally, this particular system is set to debut next spring.

One final flight of engineering fancy destined to become a standard car feature is the burglar-proof locking system found on Nissan's Boga models. The car's doors will only open at the touch of the driver (after recognizing his fingerprint from an image stored in the system's memory). Happy Motoring!

PBS To Transmit On AT&T Satellite

PBS will use one of AT&T's new communications satellites to distribute its programming starting in April 1993, using up to six transponders on the Telstar 401, the first of the AT&T Telstar 4 satellites.

PBS currently uses Westar IV, which is expected to reach the end of its operating life sometime in 1991. During the interim, AT&T will obtain service for PBS on GTE Spacenet.

PBS will buy or lease transponders in both the C- and Ku-band portions of the high-frequency radio spectrum. The addition of Ku-band transponders to PBS's distribution system will allow the use of smaller and less costly satellite dishes.

The changeover will also enhance PBS's ability to feed live events from remote transmitters and will put PBS in a better position to take advantage of upcoming advanced television technologies.

Capital Cities/ABC had also bought nine transponders on Telstar 4.

WHME-TV Retooled With Sony Gear

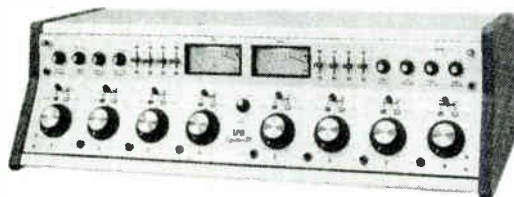
In the wake of a fire that destroyed its facility in South Bend, IN, last year, WHME-TV has retooled with a Sony equipment package valued at \$1.5 million. The six-year old station, owned by the Lester Sumrall Evangelistic Association, is concerned primarily with religious broadcasting.

Among the top end equipment lost in the fire were 13 one-inch machines, six broadcast studio cameras and three portable cameras. The new Sony package includes BVP-360 and BVP-350 cameras, BVH-3100 one-inch VTRs, Betacam equipment and a DVR-10, D-2 digital video tape recorder.

According to Sumrall, the D-2 machine is being used to produce a wide range of video segments. "We use the D-2 DVTR in teleproduction where we previously used an RCA one-inch VTR," he said. "The D-2 machine has helped us produce segments for commercials, opens and closes for programs and various other segments that require multi-generational dubbing. The D-2 machine has been especially useful for producing opens that are used repeatedly and for producing multi-layered digital effects. It has really helped improve the on-air look of our programming."

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SIGNATURE III CONSOLE FEATURES

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DUAL LINE LEVEL OUTPUTS: All audition outputs are balanced line level and metered, identical in function and performance to the main program output.

OUTPUT DIRECTOR SWITCH: All consoles have a three position output director switch on the audition output line.

INTERNAL CUE AND MONITORING SYSTEM: Separate 1 watt power amplifiers are located within the console to provide a high quality audio source for the internal 5 inch cue speaker and the two headphone monitor outputs. Another internal monitor amplifier provides 12 watts per channel of audio for monitor speakers.

MUTING AND TALLY RELAYS: Rugged telephone-type relays are utilized and are socket mounted for ease of maintenance.

POWER SUPPLY: The power supply and transformer is completely internal to the console. The transformer is specifically designed for low field operation with Mylar interwinding insulation for protection against transient damage.

CHASSIS CONSTRUCTION: All Signature consoles are constructed of heavy duty aluminum alloy with natural finished solid oak end panels.

REMOTE FUNCTIONS: All mixers except the first microphone mixer have momentary pushbuttons wired to terminal strips for the external control of cartridge machines, turntables, etc.

Cuba Still Jams U.S. AM Frequencies

Cuban transmitter interfered with three AM radio frequencies across the U.S. on Dec. 14. The FCC said three Cuban AM radio stations operating with power levels exceeding 100 kW shifted one kilohertz, causing an annoying whistle on the 830, 1040, and 1100 AM frequencies in the U.S.

The interference came after senior Cuban officials condemned U.S. plans to begin testing TV Marti at the end of the month. The signal is to be beamed to Cuba from a balloon over the Florida Keys.

The FCC sent a telex to Cuban officials, complaining that the three Cuban stations were off-frequency.

The Cubans began interfering operations on 1160 kHz last June, when the Senate approved funding for feasibility studies of TV Marti. Cuba has high-powered AM transmitters on the following seven frequencies: 570 kHz, 620 kHz, 670 kHz, 830 kHz, 1040 kHz, 1160 kHz, and 1380 kHz. They are equipped to operate with powers ranging from 500 kW to 1,000 kW and their use could interfere with AM reception of dozens of U.S. stations in more than 30 states.

NAB Hails Danforth Cable Bill as a Key Vehicle for Restoring Fair Marketplace Competition

The National Association of Broadcasters hailed the introduction of the cable reregulation bill sponsored by Sen. John Danforth (R-MO).

"There have been a number of cable reregulation measures introduced this year," said NAB President/CEO Edward O. Fritts. "However, Sen. Danforth has achieved in his bill the breadth of bipartisan support and the substantive scope to make it a prime vehicle by which Congress can re-establish fair marketplace competition."

"Even before the bill's introduction today," Fritts said, "there were signs it is leading cable to work harder on achieving a negotiated compromise on must carry and channel positioning."

"Sen. Danforth and the bill's other sponsors deserve great credit for its focus on the essential elements of cable reregulation," said Fritts.

Fritts added that the bill's must carry and channel positioning positions "are fair and constitutionally sound because they are linked to the compulsory license. This linkage provides needed

protections for local stations yet gives full editorial discretion to cable operators."

He said NAB will continue to support the bill even if the must carry/channel positioning issue is resolved through separate agreement and legislation. Fritts cited other elements of the Danforth bill which are important to broadcasters.

Among these, he said, are the reregulation of cable rates where the local cable system does not have effective local competition, the return of substantial authority to local communities, and the limits on horizontal and vertical power of cable MSOs.

Aphex Systems Moves, Expands Products

Aphex Systems has moved its headquarters to Sun Valley and doubled its space, responding to a doubling of its business in the past year, according to president Marvin Caesar.

"This has come through increased sales from our signal processing equipment, the addition of our new MIDI products and new products developed around our VCA," Caesar said. "In addition, we are building Aphex-developed surround sound decoders for Proton."

The new headquarters provides larger engineering facilities and greatly expanded manufacturing and warehousing capabilities.

The company started business in a rented room and a closet in 1975. The space from which it is now moving is in North Hollywood. It expects to be in its new facility here for the next five or six years, according to Caesar.

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Citations Dropped In Fatal Tower Crash

The Occupational Health and Safety Administration (OSHA) has dropped citations against Structural Systems Technology Inc., which constructed a broadcast tower that collapsed in Colony, MO, 2 June 1988, killing three workers.

According to OSHA's Assistant Regional Administrator Janice Barrier, the citations against the McLean, VA-based company were withdrawn because of a lack of industry-accepted standards on tower construction and maintenance.

"We had some conflicting evidence by our experts," that resulted in inconclusive findings, Barrier said.

Structural Systems Technology President J. Cabot Gowdy was pleased with OSHA's findings.

"We feel this vindicates the accusation of wrong-doing on our part," he said.

Gowdy said there are civil suits against the company stemming from the incident, but he declined to elaborate because they are still pending.

The tower was used by KTVO-TV and KRXL-FM.

Duggan To Face Senate In Early '90

Senate confirmation hearings for Ervin Duggan as FCC commissioner will probably take place in February, according to the FCC. If confirmed, Duggan would fill a five-year term that started July, 1989 and would run through June 30, 1994.

The White House said Nov. 21 that President Bush intends to nominate the communications consultant to replace Patricia Diaz Dennis, whose term expired June 30. There was no word last week on when Bush would make the nomination official.

Duggan has managed a communications consulting firm since 1980. According to his biography, his "chief enterprise is helping clients, most of them corporate leaders — communicate — through speeches, articles, reports and congressional testimony." Recent clients he served include American Express, Kaiser Steel and Kaiser Resources and CIGNA Corporation.

Before his current position, Duggan served as national editor of Washingtonian magazine. Earlier jobs included stints as a speechwriter for President Johnson and as special

assistant to Sens. Adlai Stevenson and Lloyd Bentsen. He also served in the Carter Administration as special assistant to HEW Secretary Joseph Califano, and then as a member of the State Department's Policy Planning staff.

Duggan was also a Washington Post reporter for one year. In the '70s, he co-authored *Against All Enemies* with Ben Wattenberg.

Commenting on Duggan's nomination, NAB President/CEO Eddie Fritts said "he has an impressive background in Washington politics and communication and we look forward to working with him in his new capacity as FCC commissioner when he is confirmed."

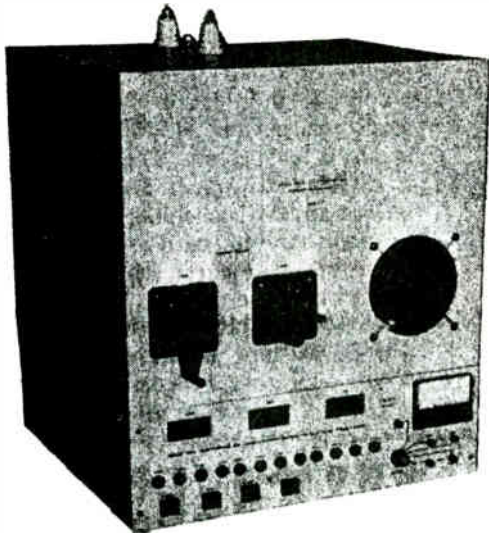
WNET-TV Introduces Audio Channel

Public television station WNET/Thirteen has launched Thirteen FM, a separate audio program (SAP) channel. The first service of its kind in the NY metropolitan area, Thirteen FM offers a wide range of audio enhancements to Thirteen programming, including descriptive narration and simultaneous language translation, to viewers who have access to a stereo television.

To access the secondary audio signal, viewers switch the remote control to SAP, Audio 2 or MTS, depending on how the manufacturer refers to the secondary audio function.

"Although we're beginning with description designed for the blind and visually impaired, we are planning to use Thirteen FM in a number of ways," said Donald Sussman, senior vice president and director, Broadcast Operations and Engineering. "We expect to broadcast simultaneous Spanish-language translations as well as strictly audio offerings, including music and information programming. Our goal with the service is to break down as many visual and language barriers as possible and make Thirteen accessible to the widest possible audience."

Eagle Hill PSA Adaptor

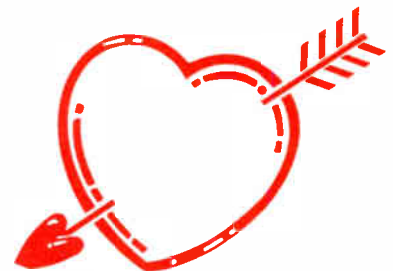


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Otari and Digidesign Team Up

An agreement has been reached between Otari Corporation of Foster City, CA, and Digidesign, Menlo Park, CA, to jointly develop a high-end professional disk recording system.

"Digidesign audio editing software, SoundDesigner II, is solid and reliable," said John Carey, marketing manager of Otari. "Reliability is essential for a professional application, and Digidesign allows Otari to overcome the problems many new software-based products encounter."

"Both companies will realize a competitive advantage by combining our digital recording technology with Otari's reputation and experience in the professional audio market," said Peter Gotcher, president of Digidesign. "A high-end product based on our Sound Tools system is the ideal next step for Otari. We believe this will help our powerful audio technology gain acceptance."

The new product will be sold in the professional audio market by Otari, and is scheduled to be introduced in mid-1990.

Iowa Station Fined

The FCC has fined the licensee of KOCR-TV in Cedar Rapids, IA \$20,000 for broadcasting from an antenna 25.4 miles from the site authorized in the station's construction permit.

According to the Oct. 17 decision, the FCC said that its Field Operations Bureau first discovered in March 1988 that the station had been operating from an unauthorized tower for about a month. The FCC issued an order, with which KOCR complied, to cease transmission from the tower on March 25, 1988.

The station was cited for "willful and repeated violation" of its rules regarding antenna placement, according to the Commission.

Gentner's Product Line Expands with Two New Telephone Hybrids

Salt Lake City, Utah -- GENTNER ELECTRONICS CORPORATION today announced the introduction of two telephone products, the SPH-5 and SPH-5E, as part of its ongoing commitment to new product development.

The SPH-5 and SPH-5E telephone hybrids utilize improved analog technology to provide superb audio quality for on-air broadcast, call recording, and audio conferencing use.

Russell Gentner, President, stated: "The SPH-5 and SPH-5E apply the most advanced analog hybrid technology available to provide users with clean, clear telephone audio. Customers can now have superior analog hybrid performance with expanded features at a reasonable price."

The SPH-5 and SPH-5E accommodate both broadcast and conference room settings with a number of creative features.

Both units provide a smooth connection to the telephone line, eliminating annoying clicks and pops. An adjustable caller control gives the announcer any desired amount of dominance by reducing the caller level with the announcer speaks. Recording is made easy with the record feature; the units start and stop a tape machine with the push of a button. The cue feature allows users to talk to callers on-air with equal ease.

In conference room settings, the SPH-5 and SPH-5E replace conventional speakerphone type systems, allowing a more natural two-way audio conversation without switching or gating. Both units are compatible with a variety of microphone mixers, PA equipment and telephone systems.

The SPH-5E is distinguished from the SPH-5 through the addition of built-in single line frequency extension. Using frequency extension, low frequencies normally lost on standard phone line are preserved, thereby improving the clarity of the telephone signal. The SPH-5E eliminates the need to provide a separate frequency extender at the studio or conference site.

List price for the SPH-5 is \$879. The SPH-5E carries a list price of \$1495. Both products are available through authorized Gentner dealers.

Model CTM-10 Series Cartridge Recorder/Reproducers

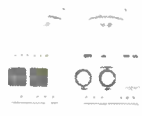
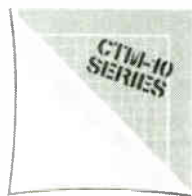
The CTM-10 series NAB audio cartridge players and recorders are designed for broadcast and audio post-production professionals. The microprocessor-controlled CTM-10 cartridge players offer the high performance, outstanding features, and "workhorse" reliability for which Otari products are known.

The series consists of three models, the CTM-10SF stereo record/play deck, and the CTM-10MR mono record/play deck, and the CTM-10 combination mono/stereo playback deck, to which recording capability is a simple conversion. Three CTM-10 series decks may be rack mounted side-by-side in only 5 1/4" of 19" rack space. The record electronics unit, housed in a separate chassis, is the same size as the playback unit.

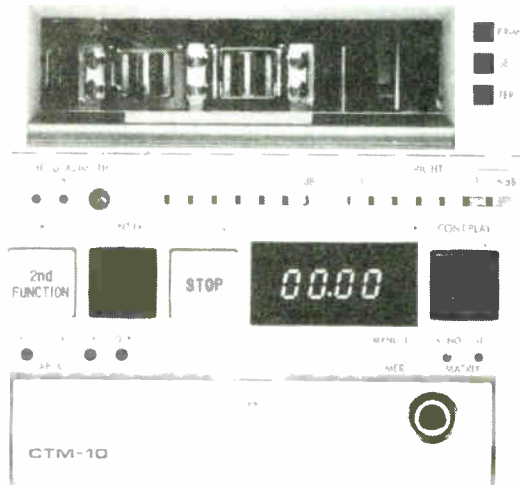
The tape speed of CTM-10 transports may be user-controlled to 15, 75 or 3.5 ips by means of internal jumpers.

The CTM-10 record electronics unit uses Dolby HX-Pro™ bias optimization circuitry. HX-Pro increases the CTM-10's high frequency dynamic headroom, to yield high frequency performance at 3.75 ips which is equivalent to non-HX performance at 75 ips and likewise 75 ips is equivalent to non-HX performance at 15 ips. HX-Pro is not noise reduction so it needs no decoding, thus the benefits of HX-Pro recording will be evident in play back on all cart machines.

For audio post-production applications, the CTM-10 includes minutes seconds display and parallel I/O control port for easy interface to SMPTE/EBU time-code based synchronizers, and 9600 Hz frequency controlled capstan speed control in addition to conventional cue tones. The cue track on CTM-10 machines may be used for time-code or other automation data.



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NAB Reiterates Concerns On AM Radio, Replies To Comments Made At EN Banc Hearing

The National Association of Broadcasters has filed a summary of its concerns on AM radio and to reply to comments made during Nov. 16th en banc hearing with the FCC.

In its filing, the NAB urges the FCC to "take all responsible steps toward improving the state of AM radio." It recommends that those steps include FCC support for congressional legislation to reach the same goals, and pledges that the industry will continue to play an active role in helping to improve AM radio.

The NAB filing urges that the FCC:

- Conclude several ongoing rule-making proceedings considering revision of FCC AM technical standards, and adopt several other rules and policies aimed at reducing interference;

- Allow daytimer "homesteading" of the expanded AM band to help reduce congestion. Under this concept, many existing AM daytimers, and perhaps other AM licensees, would get the opportunity to operate on the expanded band and later discontinue their existing facilities, thus reducing interference on the existing band;

- Adopt a policy to make a thorough, case-by-case, public interest assessment of waiver petitions filed by two or more adjacent-channel AM stations that propose a "consolidation." NAB conditions its support for this concept on at least one station going off the air and the other being allowed to expand its facilities only under more stringent technical interference criteria. The net result would be reduced interference and stronger, more viable AM operations;

"Although some AM improvement actions might be considered more important than others, NAB reiterates its view that genuine AM improvement only can result from a series of complementary actions taken by government and industry," the filing says. NAB's filing also stresses the need for greater regulation of electrical devices that cause interference to AM radio.

In response to comments made in writing and orally at the en banc hearing, NAB says it:

- Does not oppose designating some expanded AM band frequencies for minority and noncommercial applicants, but urges that most of the expanded band should be used for "homesteading" by existing stations and to diminish interference;

- Opposes FM translator expansion and/or the use of low-power FM

facilities to afford nighttime operation by daytime-only stations. Instead, NAB believes the FCC should focus on keeping listeners tuned to AM, and should avoid adopting FM policies, "in the guise of 'AM improvement,'" that would result in more interference on the FM band;

- Urges the Commission to consider further changes to its AM duopoly rule to allow two or more AM stations to be operated by the same entity in the same community, thereby strengthening AM radio and its ability to serve the public interest;

- Recommends that the FCC urge the State Department to submit the two major international AM-related treaties to the Senate for ratification. These treaties would govern expansion of the AM broadcast band and establish general principles for AM broadcasting in Region 2 (North, Central and South America); and

- Cautions against adopting "noise free radio" (converting AM broadcasting to FM) without further investigation. NAB says that "NFR" could contribute to considerable nighttime interference, would require billions of dollars worth of conversion equipment, and makes no accommodation for stereo broadcasts.

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LENGTH	A-2, 300, M.C., (Std. tape)	AA-3, M.C. II, HOLN tape)	AA-4, Cobalt, (Super-Hot)	Scotchcart (Mastering Tape)
10 sec to 90 sec	\$2.00	\$2.25	\$2.75	\$3.00
100 sec to 4 0 min	\$2.40	\$2.75	\$3.25	\$3.50
4 5 min to 7 0 min	\$2.90	\$3.25	\$3.50	\$3.75
7 5 min to 10 5 min	\$3.25	\$3.75	\$4.50	\$5.00

Replacement of pressure pads extra when needed.
Like new cart 90 day warrantee

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RISER-BOND Model 2901B+



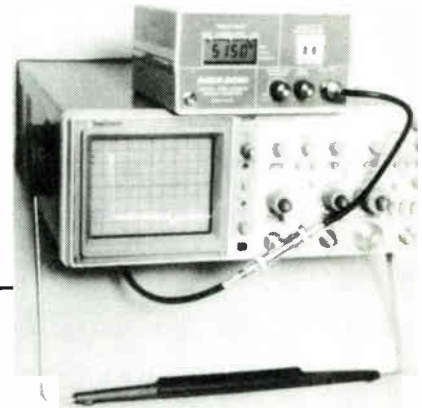
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- THE SCOPE OUTPUT CAPABILITY FEATURE OF THE 2901B+ WILL ALLOW THE OPERATOR TO LOOK AT THE TRANSMITTED AND REFLECTED SIGNAL WAVEFORM WITH AN EXTERNAL, CUSTOMER PROVIDED, OSCILLOSCOPE. THE FRONT PANEL LIQUID CRYSTAL DISPLAY WILL SIMULTANEOUSLY INDICATE THE DISTANCE TO THE FAULT IN FEET OR METERS. (Compatible with oscilloscopes of 50MHz bandwidth or greater.)
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**“The Sale Continues on Tape Cartridges.
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MODEL 300

20 Sec.
40 Sec.
70 Sec. **\$3.40**
100 Sec.

2.5 Min.
3 Min.
3.5 Min.
4.5 Min. **\$3.85**

5 Min.
5.5 Min.
7.5 Min. **\$4.25**

10.5 Min. **\$4.65**

MASTER CART

20 Sec.
100 Sec. **\$4.20**

140 Sec.
2.5 Min.
3.5 Min. **\$4.60**

5 Min.
5.5 Min.
7.5 Min. **\$4.95**

10.5 Min. **\$5.40**

DYNAMAX COBALT

40 Sec.
70 Sec.
100 Sec. **\$4.60**

2.5 Min.
3.5 Min.
4.5 Min. **\$5.10**

5.5 Min.
6.5 Min.
7.5 Min. **\$5.55**

MODEL A-2

10 Sec.
20 Sec.
40 Sec.
70 Sec.
90 Sec.
100 Sec. **\$3.25**

2.5 Min.
3.5 Min.
4.0 Min.
4.5 Min. **\$3.60**

5.5 Min.
6.5 Min.
7.5 Min.
8.5 Min.
10.5 Min. **\$4.10**

MODEL AA-3

20 Sec.
40 Sec.
70 Sec.
100 Sec. **\$4.05**

2.5 Min.
3.5 Min.
4.0 Min.
4.5 Min. **\$4.50**

5.0 Min.
5.5 Min.
6.5 Min.
7.5 Min.
8.5 Min.
10.5 Min. **\$5.20**

MODEL AA-4

10 Sec.
20 Sec.
40 Sec.
70 Sec. **\$4.45**
100 Sec.

2.5 Min.
3.0 Min.
3.5 Min.
4.5 Min. **\$4.95**

5.0 Min.
5.5 Min.
6.0 Min.
6.5 Min.
7.5 Min.
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MEMO FROM METZ



by
David L. Metz

Surface Finishing Of Metals Painting Aluminum

This month we're back to home-brewing again. Getting a professional finish on your electronic projects can be easy if you follow a few simple steps. Most of this is on aluminum since it's used for most projects.

It takes four steps to get a good looking tough finish on aluminum.

1. The metal absolutely has to be totally chemically cleaned!

2. It has to have what painters called "tack" that is, a micro roughened surface that the paint could cling to.

3. The priming and finish paint has to be of high quality.

4. "Baking" it on after spraying gives a much harder surface.

Surface cleaning is ultra critical to doing a good job. Paint will simply not stick to any metal surface that has the slightest trace of oil or dirt on it. Wiping the metal off with a rag just doesn't cut it. Nor will a wipe with mineral spirits although that's a good start.

What you really need is a cleaner that will actually etch into the surface of the metal slightly and lift off any oil or grease in the pores. In industry this step is called "pickling." Most pickle baths are some form of mild acid. Dilute hydrochloric acid is very popular and is available from most hardware stores. It works best on iron and steel.

Now at this point remember/reread all those safety warnings you have ever seen or heard because most pickles will burn your eyes or eat holes in your clothing. I always used them in a plastic pail over a floor drain with plenty of running water at hand. Always wear eye protection and gloves.

A better pickle for aluminum is sodium hydroxide, that's right, common household lye. I used a ¼ cup in a gallon of warm water to clean and etch aluminum. This process is called anodizing. The lye solution chemically dissolves a thin layer of metal off the surface of the aluminum. Done properly this procedure gives a pleasing metal finish

in itself. Many times it looks so good that you'll lose all interest in painting.

Your gloves also protect the metal from the oils from your hands that can leave finger print marks in the cleaned metal. The mild etching also gives the surface the tack the paint requires to bond with it properly. The only drawback is the caustic chemicals required.

After etching, rinse completely with cold running water. Then dry the metal completely. I like to warm it with a propane torch. As you slightly heat the metal, you can see the water evaporate from its pores. Now the metal is ready for paint!

I have a large cardboard box that I use for my spray booth to keep the over spray under control. Follow the directions on the spray can and use light coats. Spray evenly in a regular sweeping motion. Several light coats make a much better finish than one heavy one that runs!

Let the work piece set for an hour to let the paint set. Then transfer the work piece to a warm area. I used a small heat lamp held about 24" above the work piece. I adjusted it till the work piece got warm to the touch and held it there till the paint dried hard to the touch.

The choice of paints I leave up to you. There are many brands on the market. It pays to experiment with the brands available in your area. Some give a hard finish when heated, others simply don't. One clue I can give you is to check the ingredients for the amount of pigment in the paint. The more pigments the better. I have had good luck with Derusto, Krylon and Red Devil brands.

PRIMING

Available at auto supply stores are two wonderful products, sandable quick dry primer and spot putty. The primer is gray colored and dries almost instantly. A light coat gives a perfect base for your finish coat of paint. An added advantage is it allows you to sand out any minor imperfections in the surface. Then re-prime and give the coat another light standing. The finish coat can go on right away.

Spot putty is used to "fill" larger imperfections like deep scratches. The putty is really a dark red cream that comes in a tube like tooth paste. Use very thin coats of it. Let it dry overnight then sand. Remember it is better to build this stuff up slowly. Thick layers won't dry, it just skins over and makes a mess when you go to sand it.

To make your sand paper last longer and get a better finish you can

"wet sand." Keep the surface wet while you sand so the water carries the paint and putty particles away as you work. This is the method auto body refinishers use. Your local auto parts supply house has these and many other very useful products. They can also give you some great advice on how to use them.

Now comes the big secret!

After etching aluminum chassis and panels in caustic for years, I found another safer way that worked so well that I completely abandoned acid and caustic etches for aluminum. I simply sand the metal!

For surfaces to be painted I use the finest (400 grade) aluminum oxide sandpaper I can buy and my orbital sander. First I carefully debur any holes in the surface and dress the edges with a few strokes of a file. This improves the appearance and reduces chances that the sandpaper will tear. A very light sanding followed by a wash with a solution of household ammonia ready's most metal for painting.

With a heavier grade of sandpaper (150) just a few minutes of sanding give the metal a wonderful buff finish that covers all the imperfections in the metal. After sanding all you need to do is wipe the metal off with a damp rag and it's ready to assemble. Since I've started using the sanded finish, I rarely paint panels.

AP Goes To Digital Audio System

Associated Press has developed a digital audio transmission system to deliver AP Network News. The system, called "T-1 Audio Delivery," will improve the technical quality of programming to more than 1,000 affiliates, says AP.

The AP system uses just one sixth of a satellite transponder, saving thousands of dollars each month in operating costs.

Another feature of the TAD technology is the ability to remotely control the equipment. For example, one audio card will be capable of receiving a 7.5 or 15 kHz signal and can be programmed to add or change audio network signals without having a technician visit the station. Conversions to the TAD system will begin this month and will take several years to complete. Analog transmission will continue on Westar IV and Spacenet 3, Transponder 1, until the digital conversion is complete.

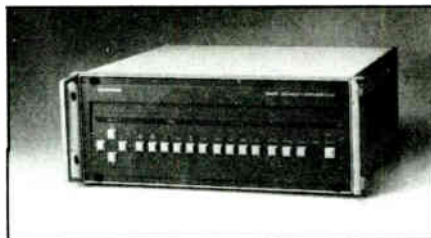
New Products

A new family of portable fiber optic studio-to-transmitter links (STL) have been introduced by American Lightwave Systems Inc., Willingford, Conn. The "LC" series comes in video-only, audio-only and audio-video as well as single and bi-directional versions. NTSC, PAL and SECAM video can be transported as far as 15.5 miles over 70 mhz channels. LC series modules are designed for ENG applications. They are built to link with FM microwave STL systems as well as fiber networks, with system prices ranging from \$1,300 to \$2,500.



LC series STL

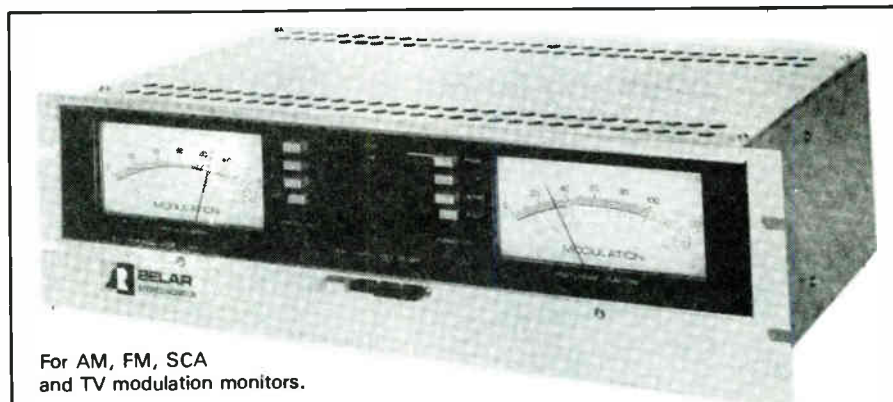
Bsys International Ltd., London, has introduced PC Newsdesk, a scaled-down, less-expensive version of its broadcast newsroom computer system, designed specifically for radio stations. Among its functions are multiple wire service storage and retrieval of stories by categories. It is also built to sound alerts for priority wire stories. A split screen is included in the software to allow for simultaneous reading of wire copy and story writing by the reporter. It is controlled by an IBM-AT or IBM-compatible personal computer. The system was tested at KVON(AM) Napa, Calif.



The 9120 downconverter

Chromatek Inc. of Kanagawa, Japan, has introduced a new real-time downconverter to transfer images from high-resolution computer graphics workstations to either NTSC or PAL video. The Model 9120 connects directly to graphics workstations and personal computers. Three separate modes of video compression are offered, and aspect ratio can be adjusted. The NTSC version includes a comb filter to eliminate cross-color artifacts. Options that can be built-in are chroma key, color bar, test pattern and D-1 (component digital) compatibility. The system sells for \$19,000 in the U.S.

Digital audio processing and storing has been miniaturized to a desktop system by Antex Electronics Corp., Gardena, Calif. It is introducing its Series 2/Model SX-10 digital audio board, which can be installed in any IBM-AT or PS2 Model 30 PC. The system records 2-channel stereo digital audio from any digital source including compact disks and digital audio tape decks and will also receive and digitize analog or natural voice inputs. Storage is on either hard disk or CD-ROM. The system is list priced at \$1,995, with an additional one-time software driver fee of \$750. An optional digital output board is also available for \$450. The system is now available.



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BELAR
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Coaxial cable Cablewave Systems has introduced a complete line of Radiaflex coaxial cables.

The cables are designed for controlled electrical coupling between the outer and inner transmission line system.

Radiaflex can be used in broadcast applications as well as two-way communications links and monitoring purposes.

Summing mini-DA Henry Engineering's USDA is a stereo mini-distribution amplifier that can combine stereo to mono without degrading the separation of the stereo source.

University Sound has introduced the PA430 and PA430T paging projectors. Features include: constant directivity allowing uniform coverage, fewer horns and higher intelligibility; an omnidirectional swivel hoop system designed to allow easy aiming in any direction and a self-centering and modular diaphragm/voice coil assembly allowing for instant field service.

RPU Receiver Marti Electronics has announced the availability of the new DR-10 includes features such as adaptive filtering and optional internal companding to enable broadcast quality audio to be delivered from weak multipath signals.

Marti's RPU receiver is available on domestic and international RPU frequencies with 25 kHz spacing.

Optional tone decoding and companding are compatible with current Marti RPU transmitters.

The unit sells for \$895.

Using the same simple design and ease of operation which has made its predecessor so popular, the DN-950FA is an industrial strength CD player built to withstand the wear and tear resulting from daily use. It features quick cartridge loading, and functions and dimensions almost identical to other professional broadcast equipment. Moreover, the DENON CD Cart Player™ offers the outstanding sound quality of the compact disc.

The CD Cart Player™ is familiar at first sight.

Adopting the CD Cartridge system, CDs are used and stored in the same manner as current tape cartridges.

The CD Cartridge is more than just a jewel box.

The CDs are permanently stored in CD Cartridges. Upon loading and unloading, a shutter door on the cartridge opens and closes. The CDs are protected from damage resulting from scratches, dust, and fingerprints.

No need for constant watching

The remaining time is digitally displayed and can be checked any time during play. In addition, an End Of Message (EOM) signal is given prior to completion of a selection.

'Instant' cueing

Track selection is facilitated by a quick response Rotary Pulse Encoder dial. Turn the dial the desired number of clicks in either direction to assign track numbers.

Audition cannot be any simpler

As soon as the STDBY/CUE button is pressed during play, the pick-up immediately returns to the last position where the PLAY button was pressed.

DENON'S Real-time D/A Conversion System

Employment of DENON's individual Super Linear Converter for right and left channels eliminates both the "Zero-cross" distortion components and left-right time difference which have the greatest influence on sound quality.

4-times Oversampling Digital Filter

A 4-times oversampling digital filter prior to D/A conversion assures sound quality that is greatly improved with very stable imaging.

CD Cartridge

The Cartridge containing a disc is loaded directly into the player. Upon loading, the player cues to the displayed Track Number. The Track Number is automatically reset to the first track when the Cartridge is unloaded.

Digital Display

Displays the Track Number and either Remaining or Elapsed Time in minutes, seconds, and frames using 7 segment LEDs.

Remaining or Elapsed Time is selected via a dipswitch located on the back panel. An additional dipswitch will eliminate the frame counter from appearing on the display.

SELECTOR

Selects Track Numbers. Turn in either direction for instant cueing. Selected Track Number is displayed. One full rotation covers 20 tracks. Turning clockwise increases track count, and vice versa. When turned counterclockwise past 1st Track, the last Track Number on the disc appears.

During Play, using SELECTOR, the next Track Number can be set. Cueing starts when STDBY/CUE button is pressed.

STEREO/MONO Selector

When this selector is set to MONO for a mono broadcast, L and R channels are mixed.

CUE LEVEL DETECT Switches

Used to select cueing levels at the actual beginning of the selected track.

PLAY MODE Switch

Single or Continuous play modes can be selected at the front panel.

Under the single play mode, the unit stops upon completion of a specific single track.

In the continuous play mode, subsequent tracks are continuously played back, and the unit stops upon completion of the final track on the disc.

PLAY/PAUSE Button

Press once to start Play (red indicator lights). Press once more to engage the Pause mode (yellow indicator lights). During Play, the red indicator blinks upon detecting an EOM setting.

REMOTE Switch

LOCAL: Permits front panel & remote control
REMOTE: Permits remote control, only

EOM Setting Switches

When engaged, the EOM signal is given prior to the completion of program. (Dry contact, 5 to 35 sec., 5 sec. increment adjustable.)

STDBY/CUE Button

Pressed during play, the pick-up instantly recues to the last point where the Play button was pressed and the stand-by mode is engaged. Pressed during Repeat Play when the search function is engaged, the pick-up will enter the stand-by mode at the present selection. The indicator in the button blinks in yellow during Cueing or Track Search.



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FM Classes: Confusion In Our Midst

By David C. Schaberg

For years and years, if you wanted a new FM channel at a specific location, you'd call your friendly engineering consultant and ask for a study to determine what was available. You'd give him the town's name and have him run a frequency study. More often than not, he'd come back and say that nothing would fit, especially in the months just before the Class A reserved channels were abolished.

But, times have certainly changed. Instead of just the A, B & C Classes, we now have A, AA, B1, B, C3, C2, C1 & C!! That's nearly a tripling of availability in just the past decade. To further complicate the issue, you now can finally use directional antennas to choose an advantageous transmitter location. And, you can even move your frequency from one city to another nearby without having to expect someone else to try and take it away from you in the process.

When all is said and done, it will be a wonder that every station owner in the country isn't half crazy trying to figure out whether he's got the maximum bang out of his station: Is my tower height correct...do I have the maximum coverage I'm allowed...am I at the highest class possible?

Many station owners and would-be owners here in the Midwest have talked with me recently about just such problems. Many are tremendously confused as to the right answer, especially when they look around and see the majority of other Class A stations in their area moving up in Class. Now, with the advent of the 6kw Class AA, the questions are getting even more complex to answer. I am, however, finding some very interesting results to basic studies for these owners.

First, lower-Class stations (A and B, particularly) are generally able to improve their lot in life by moving the tower location or putting in a directional to take advantage of the higher power now available. Moving a tower site might seem like a large undertaking, but many of these stations have been on their present site for 20 years or more. It's already time to think about major tower work anyway. Plus, many of these stations were out in the country when they were built and they now find themselves in the middle of suburbia with expensive real estate holding nothing but their tower. The taxes have increased ten-fold or more and there they sit. If the real estate has, indeed, escalated in value, then why not sell

that 4 or 5 acres to a land developer for enough to buy new land and put up that new stick? In some cases, there might even be money left over. Perhaps you can even work out a "joint venture" with the developer whereby he does all the development work and you get 25 or 30% of the final profit!! Besides that, you probably will be able to get farther away from the airport on land that won't generate a whopping tax bill!!!

How about those cases where you might have a chance to improve the Class of station? Many times, a new site can be shown that will accommodate the upgrade, but you can specify your existing site with a directional when it actually comes time to build. You might not find that out from a computer study of your present coordinates. It takes some analytical figuring by a good consultant to make that possible.

Then there's the "Grandfather" issue. If you don't meet new separation requirements, you get special treatment. That means, of course, that you don't conform and they have to create a special "Class" just for you. Does that mean that you won't have the opportunity to join in the fun of improving? Not necessarily.

Many stations will be able to take advantage of upgrades in power and in class through the use of the directional antenna. But, to do so, you're going to have to do the studies in such a way that every eventuality is accounted for and you cannot ever assume that something will work the way it was intended. Think things will

ever get easier?

Tell you a secret. Eight classes may not be the end.

Stay tuned for further eye-opening details. That is, if your station doesn't get lost in the cluttered FM band!!!

David C. Schaberg was worked in the radio field for 20 years, the last 12 as a technical consultant specializing in FM allocations. He has been an irregular contributor to Common Point since 1979. His clientele covers an area from Connecticut to Texas with more than 40 stations consulted. If you wish to contact him his address is: P.O. Box 21055, Lansing, MI. 48909. Telephone (517) 393-1037.

Women Broadcast News Directors

Women will become the majority of broadcast news directors in the early 21st century if their 1980s growth rate continues, according to a study by the Radio-TV News Directors Association (RTNDA). In radio, 26% of 337 news directors last year were women, compared to 24% in 1987, 17% in 1980, and 4% in 1972. Their 1980s growth rate would make women the majority of radio news directors by 2009. The survey, conducted by University of Missouri Professor Vernon Stone, found that, compared to their male counterparts, female news directors typically were younger, had not been in their jobs as long, and were paid less.

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The 6301B is completely self-contained. The sound is delivered from a full-range speaker that's surprisingly flat and accurate. You get a frequency response of 80 Hz-13 Hz, which makes the 6301B an ideal reference when you're producing music, radio spots or audiovisual sound tracks.

The built-in 10 watt (RMS, into 8 ohms) amplifier will handle anything you feed it. The 6301B's input has been designed to accept any line or instrument-level input, even from an amplifier. There's no confusion. Just one 1/4" phone jack to deal with.

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CRL's new PMC 450 AM Limiter is a cost effective way to convert your station to the NRSC standard, and in many cases improve your coverage as well. The PMC 450 consists of a gated input compressor followed by an NRSC compliant tri-band limiter section. An adjustable presence band boost augments vocal clarity and punch. A patented overshoot corrected low-pass filter ensures maximum modulation control. Low frequency tilt correction circuits plus adjustable asymmetry levels assure compatibility with all transmitter types. Suggested retail price is only \$1695. Our two week trial program will prove to you how sound of an investment the PMC 450 is. Call or write us for details.



You can buy an NRSC-compliant audio processor from several companies, but only GENTNER can give you NRSC and DIGITAL CONTROL. The GENTNER PHOENIX™ packs a clean, powerful wallop in one very small package. For monaural AM, you can't buy more processing power for less money anywhere. Comparing in performance and features with units costing nearly twice as much, the PHOENIX features variable asymmetry, a voice phase-rotator to assure maximum modulation, and a low-frequency tilt-corrector that can compensate for some weaknesses in plate-modulated transmitters.

The Phoenix also includes features you don't get with the competition, like the clean, powerful sound of digital control and individual gating of bands so record fades don't "swish up." A simple AC voltmeter (like a Simpson 260 or a Potomac Instruments AA-51) is the only test equipment required for setup. Simply set six voltages to equal the recommended values for your situation. The User's Manual's table of time-proven set-up values insures you get immediate results. The PHOENIX's open-architecture design means repairs or upgrades are only a card-swap away. (PC boards in some other processors are soldered in.)

Proven in the strongest RF fields, the PHOENIX's three-stage RF and transient suppression circuit stops surges and RF interference.

The Phoenix is a complete, monaural, AM, processing system, from console output to transmitter input. It begins with the industry-standard, GENTNER AUDIO PRISM, multi-band, processor. (For additional information, see the two-page AUDIO PRISM brochure.) To this proven performer are added the PR-1 Phase Rotator and the AMC-2 AM Modulation Controller. The NRSC shelving-pre-emphasis and the NRSC 10 kHz "brick wall filter" are implemented on the AMC-2.

- Full NRSC compliance
- Advanced digital control produces a clean, powerful signal
- Reduces reflected power from narrowband antenna systems
- All-in-one construction
- Operates in the highest RF environments
- Internal phase-rotator
- Internal low-frequency tilt corrector with 80 Hz squarewave generator

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EI Classifieds are free to the readers of Common Point Magazine. To place an ad, simply write it on the Acknowledgement Card that comes with each issue and mail card.

WANTED TO SELL

ATTENTION

We have had a problem with reading the writing of ads sent in for the classified section, therefore we will only accept typed written copy.

FOR SALE: Moseley MRC 1600 set up for sub-carriers, with manual. Excellent condition. \$2500. Call Pat Delaney afternoons (507) 895-2065.

FOR SALE: DIGIMAX D-1200, 9 Digit Frequency Counter, brand new, never used, with manual. \$299.95 plus UPS Collect.

FOR SALE: WAYNE KERR RF BRIDGE, 15 KHZ/S to 5MHZ/S, as is. \$50.00 plus UPS Collect.

FOR SALE: PRECISION/PACO E-200-C RF Signal Marking Generator, good condition with manual. \$75.00 plus UPS Collect.

FOR SALE: BROADCAST ELECTRONICS AM 400 Compressor-Limiter, working when removed, manual. \$225.00 plus UPS Collect.

FOR SALE: WILKINSON LGC-1 Limiter/AGC unit, working when removed, manual. \$225.00 plus UPS Collect.

FOR SALE: AKAI 4000D Reel to Reel Tape Recorder, stereo 3-3/4 7-1/2 IPS, works no manual. \$75.00 plus UPS Collect.

FOR SALE: UNITED TRANSFORMER (1) CG-104, (2) CG-44 Power Supply Chokes, values unknown unused, new. \$150.00 for all plus UPS Collect.

FOR SALE: OHMITE, MEMCOR, IRC, High Wattage Resistors, Vitreous Enameled, Slide Adjustment. 6.75 inches long, various wattages, current ratings and resistances 300 total pieces. Make an Offer.

FOR SALE: AMPEX 6 Input Mike Mixer. \$150.00 Plus UPS Collect.

FOR SALE: SHURE Model SR101 Series 2 Audio Console, 8 input, as is. \$150.00 Plus UPS Collect.

WLLS, Hartford, KY 42347
(502) 298-3268
Lloyd Spivey, Jr.

TALKBACK

ANNA, IL -- DEAR TALKBACK.... Our transmitter goes dark if you look at it wrong. Is there someone who knows how it was possible for Romanian TV to stay on the air while the Secret Police were shooting at the broadcast building in late December/early January?

N. ROYALTON, OH -- Enjoy your newsletter. Keep up the good work.

KANSAS CITY, MO -- Your newsletter has lots of good ideas and information. Regarding "Brushing Up On Towers," I wonder how many stations would actually sign off during painting?

ANDERSON, IN -- Thanks for Common Point. Enjoy it very much.

HARTFORD, KY -- Keep up the good work.

OTARI SHOWS MOST SOPHISTICATED AUDIO MACHINE YET AT AES

NEW YORK, NY--Otari will previewed the MTR-15 series tape machine to AES convention attendees. The MTR-15 provides 1/4" and 1/2" tape formats in mono, stereo, 2-track, and 2-track with center channel time code, configurations.

"Otari has developed its most sophisticated and flexible studio/production recorder in the MTR-15," according to John Carey, Marketing Manager of Otari. "The automatic alignment system featured in the MTR-100A 24-track machines is also featured in the MTR-15 for easy, fast calibration," said Carey. "Its basic design allows for 19" rack cabinet or console style mounting, and tape formats can be easily exchanged on a single machine. It's our machine for the 90's," added Carey.



PMD 221
Mono Portable
Cassette Recorder

Deluxe Portable
Three-Head Two-Speed
Cassette Recorder

- 3-Head design
- Two-speed 1 7/8 and 1 5/16 IPS
- Full auto shutoff
- 3-Way power with low battery indication
- Vu level indication
- Switchable limiter
- 3 Position mic attenuation (0, 10, 20, dB)
- Built-in monitor speaker
- 3-Digit tape counter
- Direct telephone connective jack
- Telephone pickup jack modular
- Line input and output jacks
- External speaker jack
- Anti-roll transport
- Vari-speed
- 3-Position tape selector (normal, CRO., Metal)
- Automatic or manual record level
- Built-in electret condenser microphone
- Cue and review
- Volume and tone control
- 3-Position automatic noise cancel switch
- External mic jack
- Headphone jack
- Memory rewind and replay

PMD 221
\$269.95

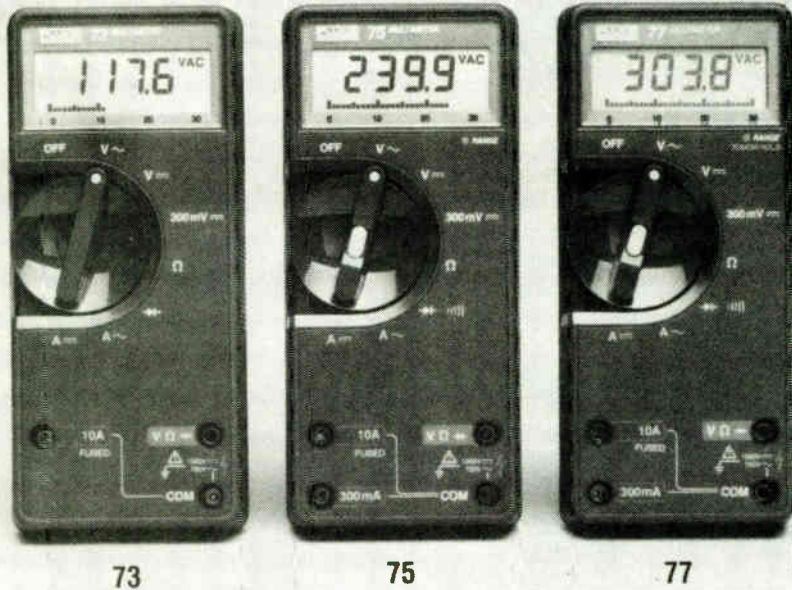
PMD 201
(Same as above except
2 head design)
\$229.95

Accessories: Carry case option available -
Rechargeable battery pack available.

Electronic Industries
19 E. Irving - Oshkosh, WI 54901
Out-of-State: 800-558-0222 or
In State: 800-445-0222

FLUKE

70 Series Analog/Digital Multimeters



Feature-Packed Handheld Meters Provide Unbeatable Performance and Value

- 3½-digit, 3200-count display
- 31-segment analog bar graph
- Single rotary dial to select all functions
- Autoranging and automatic polarity selection
- Battery-saving "Sleep Mode" powers-down display if you forget
- Tough, textured case resists drops and rough handling
- Touch Hold® (Fluke 77)
- UL 1244 listed
- Made in U.S.A.



These digital multimeters with analog bar graph displays take advantage of the latest advances in microcircuit technology to provide uncompromising quality and capabilities. The result is a series of high-performance meters with combined features never before available, even on more expensive instruments.

Operating any of the Fluke 70 Series multimeters is exceptionally simple. Choose the function you want, connect the test leads, and the meter automatically selects the correct range.

Analog/Digital Display

The high-resolution 3200-count digital display delivers better accuracy than conventional 3½-digit DMMs. A 31-segment bar graph reacts 10 times faster than the numerical display, making peaking and dipping adjustments easy.

Fast Autoranging

Simply choose a function and the meter automatically selects the range with the greatest accuracy and resolution. Symbols on the liquid crystal display show what function is being measured and the range of measurement.

Range Hold (Fluke 75 and 77)

Touching the range hold button once prevents the meter from changing ranges. Pushing the button again changes the range, and holding the button down for a couple of seconds restores the "Autorange" function. Repetitive go-no-go checks are accomplished much faster using range hold.

Audible Continuity/Diode Test (Fluke 75 and 77)

A continuous audible tone provides a fast check for continuity of current paths having 150 ohms or less. A brief tone indicates a voltage drop of about 0.6 volts, the normal forward bias for semiconductor devices passing about 500 µA.

Touch Hold® (Fluke 77)

This feature allows automatic measurements while watching probes and circuits. The meter captures the measurement, beeps, and locks it in the display until you're ready to view it. It automatically updates with each new measurement.

Standard Equipment

All 70 Series meters are packaged with a pair of safety-designed Fluke TL70 right-angle test leads, operator's manual, battery and spare fuse. The multipurpose C70 holster is included with the Fluke 77.

Basic Accuracy

(% of reading + number of digits)

	73	75	77
DC Voltage	0.7% + 1	0.5% + 1	0.3% + 1
AC Voltage	3% + 2	2% + 2	2% + 2
Ohms	1% + 1	0.7% + 1	0.5% + 1
DC Current	2% + 2	1.5% + 2	1.5% + 2
AC Current	3% + 2	3% + 2	3% + 2

Battery Life

2000 hours typical.

Three Year Warranty

One year guaranteed calibration.

Size

1.12" H × 2.95" W × 6.55" L
(28mm H × 75mm W × 166mm L)

Weight

12 oz.
(0.34 kg)

Order

Fluke 73 Multimeter	\$ 79.00
Fluke 75 Multimeter	\$ 119.00
Fluke 77 Multimeter/ with Holster	\$ 159.00
C70 Holster	\$ 14.00
C50 Compact Soft Case	\$ 15.00

Electronic Industries
19 E. Irving - Oshkosh, WI 54901
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