

February 1987

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A MONTHLY NEWSLETTER FOR BROADCASTERS

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## AM Stereo Processing

By RONALD R. JONES

Circuit Research Labs Inc., Tempe, AZ, September 1983

With AM stereo broadcasting about to become a reality for many stations, new transmission problems will be faced. One of the most important areas of concern in AM stereo will be the new audio processing technology it requires. As different as AM stereo is from existing FM stereo technology, so are its problems of audio processing. The following is a brief discussion of those problems and their present cures.

### FM stereo and limiting

In FM stereo transmission, the left and right channel information can be described fundamentally as sent via the same transmission path during equal and alternate time periods. At any instant in time, the total modulation is equal to the summation of the audio channel being transmitted and the fixed amplitude stereo pilot.

When properly balanced, this system results in the 100% left channel only, 100% right channel only, and 100% both channels (monaural during stereo) audio limits being equal to each other. This formed the basis of separate left and right channel limiting which limits both channels to the same amplitude.

### AM stereo monaural compatibility

AM stereo broadcasting has

brought about a need for a different form of stereo audio limiting. It is called stereo "matrix" limiting because the processing action has been shifted to the matrixed sum and difference axis of the stereo sound field.

This method significantly differs from the "conventional" FM types which operate on the left and right channel axis.

It is important to understand why matrix processing is needed for AM stereo broadcasting. Its use is essential in achieving monaural versus stereo transmission compatibility.

In AM stereo, the algebraic sum and difference of left and right channels occur prior to the point of modulation.

This difference as compared to FM stereo transmissions is what makes conventional audio processing incompatible and matrix processing necessary.

### AM stereo limiting patterns

The diagrams presented next are in a form which can easily be seen on an oscilloscope when monitoring the X-Y Lissajous' patterns produced at the right and left outputs of the station's limiters or stereo modulation monitor.

If the limiters have L + R and L - R outputs instead, the patterns at these outputs will be shifted counter

(Cont. to page 3)

## NAB Convention Pre-Registration Deadline: February 20

Preregistration deadline for NAB Dallas convention is less than two weeks off: Feb. 20. Major hotels are reporting near-capacity status and if you have not yet registered for convention and made hotel arrangements, do it without delay to take advantage of the various options available. Here are some key times for March 28-31 convention, which starts on Saturday and ends Tuesday night:

- Fri/March 27 .....Engineering Sessions
- Sat/Sun/Mon/Tues/9 am-6 pm ... Exhibits Open
- Sat/March 28/2:30 pm ..... Opening Session
- Sun/March 29/12:30 pm ..... Engineering Luncheon
- Mon/March 30/12:15 pm ..... Radio Luncheon
- Tues/March 31/12:15 ..... TV Luncheon
- Tues/March 31/noon ..... Syndicators Luncheon
- Tues/March 31/6:30-10:30 pm ... Closing Dinner/Entertainment

Atlanta was approved by Exec Committee last week as site of '90 NAB contention; it features 640,000 sq. ft. of exhibit space and 5,500 first class hotel rooms near the downtown area...NAB '88, '89, '91 and '92 conventions will be in Las Vegas.



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Other features include: an all-metal boom and double-braced, all-metal headband for greater durability and comfort; a patented boom mount for total mic position flexibility; detachable cable; and a stylish matte chrome and black finish that looks great “on camera”.

The SM2 is a dual-ear headset, the SM1 — single. For complete information, write or call Shure Brothers Inc., 222 Hartrey Avenue, Evanston, IL 60202-3696. (312) 866-2553.



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## TALKBACK

SIoux CITY, IA--I can't wait for the Feb. issue to get the next installation of Metz!

Could you send me an advanced copy of his article on “Modern Remote Control of Studio Equipment?”

CONROE, TX--Like “Memo from Metz” and save articles for reference.

ENID, OK--Sure enjoy reading the latest in new equipment, and also the articles by David Metz.

Keep it up.

SOUTH BEND, IN--Thanks for the cover story on the VRC-1000, just got mine yesterday, even more, excited about it after reading!

VINITA, OK--Enjoy your publication.

Thanks for keeping us posted!

GRAND ISLAND, NE--Please add our company name to your mailing list. We contract engineer several stations in central Nebraska and The Common Point doesn't always find it's way to us. We've bought lots of equipment from you and appreciate the great service.

**COMMON  
POINT  
READINGS**

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Bill Bragg .....7



## AM Stereo

(cont. from page 1)

clockwise by 45 degrees from those illustrated.

Field experience has shown that once familiarity with these patterns is gained, they are often more helpful in checking for proper processing alignment and show more information about what is being transmitted than any modulation monitoring system.

### Conventional limiting

Figure 1 illustrates the oscilloscope X-Y display of the right and left limiter outputs of conventional stereo limiting. When applied to AM stereo transmissions, the amplitude limit levels of the left and right channels must be set equal to each other for proper stereo balancing.

As shown, the levels are perpendicular to the right and left channel axis and intersect with each other to form the L + R and L - R modulation limits.

The L + R axis represents the main monaural component transmitted by the AM envelope of the transmitter and the L - R axis represents the main stereo information component

transmitted by the phase modulation of the carrier frequency.

So long as the program input is mostly monaural, this limiting system produces nearly full 100% envelope modulation and monaural reception remains normal.

However, the figure also demonstrates such limiting creates serious monaural transmission and reception problems during varying stereo conditions.

When stereo inputs temporarily shift to the full left only (vertical) or right only (horizontal) modulation axis, stereo reception is acceptable but monaural is not.

The L + R modulation component is forced to drop to 50% as is shown by the dotted line intersection of the lower right modulation scale with the tips of the left channel or right channel limit levels.

This indicates an immediate 6dB drop in loudness in monaural reception.

Obviously this is an unacceptable condition to AM broadcasters since the existing monaural coverage as well as the monaural loudness is reduced.

Although most stereo program material does not contain significant amounts of single channel passages, this form of limiting causes significant losses of monaural loudness and coverage on nearly all stereo program material. The losses are usually directly proportional to the stereo content and become greater as separation increases.

### Full matrix limiting

Figure 2 represents the oscilloscope X-Y display of the right and left limiter outputs of full monaural support matrix limiting. With this system, the output levels of L + R and L - R are adjusted for equal modulation levels which is the point of maximum separation.

As shown, the amplitude limit levels are perpendicular to the L + R and L - R axis and intersect with each other at the left channel and right channel axis.

The significant difference between this limiting pattern and the one shown in Figure 2 is visible in the left and bottom corners of the pattern.

(cont. to pg. 4)

# Total Isolation.

The DA-16 and DA-8 provide perfect audio distribution in clean, simple packages.

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Max. output level:

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Channel isolation:

>90dB

Signal to noise:

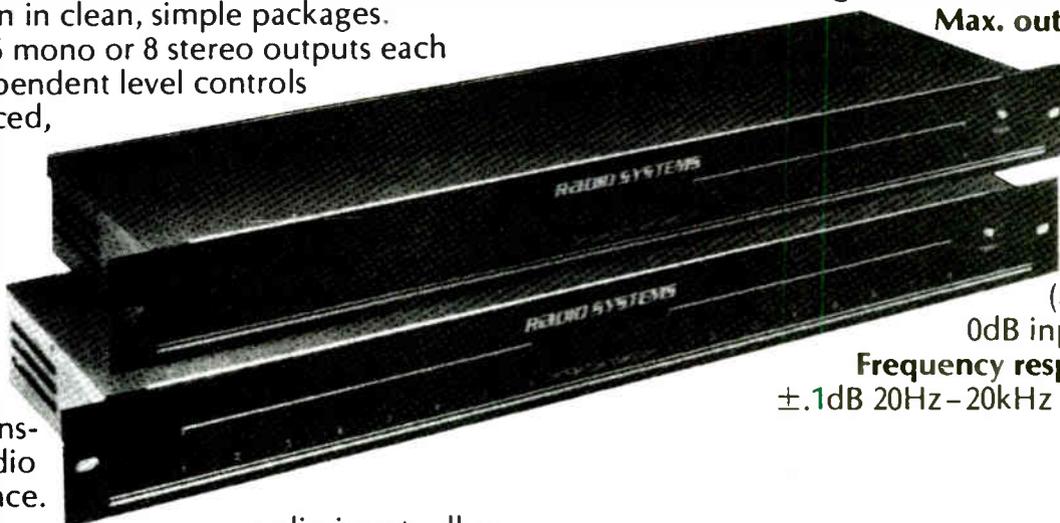
>90dB

(relative

0dB input)

Frequency response:

±.1dB 20Hz - 20kHz



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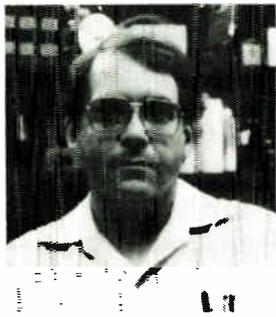
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# MEMO FROM METZ



by  
David L. Metz

## "Modern Remote Control of Studio Equipment

By David L. Metz

Last month we talked about how to debounce a single push button momentary pulse. This month I'll discuss some of the practical problems of remembering that pulse and interfacing with turntables.

The simplest way to store the decision as to if a device is on or off is with a flip flop. A flip flop can be thought of as a simple memory device in this application. The one I chose is the CD4027B. This IC has two separate JK type flip flops in one package. The JK refers to the type of flip flop the CD4027B is.

FIG. 1, shows the basic flip flop circuit. The device has an input marked "clock" and two outputs marked Q and Q (means NOT Q, that is Q is the opposite of Q. If Q is on, Q is off).

If you put a brief pulse into the clock input, the state of the flip flop will change from Q on to Q off or visa-versa. The outputs will stay in the state till the next pulse to the clock input comes along.

Now, the important part. What most simple explanations don't tell you is that the flip flop has to be programmed to do exactly what you want it to. This is where the JK part comes in. You program the flip flop by proper connection of the JK inputs and the set and reset inputs.

FIG. 2 shows the correct connections. The set and reset inputs must be grounded to disable them. Forget to do this and let the inputs "float," and your circuit will do all kinds of strange things! The J and K inputs are connected to Vcc. Now clocking will cause the Q output to alternate on

and off.

Note that the off to on transition occurs on the positive (leading) edge of the clock pulse, that's the instant you press the start button.

The output of the IC must be interfaced with the turntable. It will only deliver about 20 milliamperes, that's not near enough to drive a relay.

The simple solution is use a SSR. A SSR is a solid state relay. These have to be one of the neatest gadgets ever. The B & P relays I use have a optical isolator that drives a triac controlled by a zero crossing switch.

OK, now what does all that mean? Well it means the SSR makes your life a lot simpler. First, it's input is a LED (Light Emitting Diode) inside that draws less than 20 ma. So you can drive the SSR directly with a CMOS IC. And since the SSR will operate over a wide voltage range, you can place it a considerable distance away.

Inside the SSR, the light beam from the LED triggers a photocell that in turn activates the triac. The Zero Crossing Switch turns the triac on only when the line voltage is at zero. This eliminates the RF hash that most triac power switches cause.

I mount the SSR right on the base of the turntable. This way I don't have to run 120 VAC around the turntable area anymore than I have to. Keeps the hum down that way.

If you're old fashioned, and insist on using a relay, you can drive it with the simple transistor circuit shown in FIG. 3. Just about any transistor will work that will take the coil current of the relay. Don't forget the snubbing diode across the coil, or the reverse EMF from the coils collapsing field will destroy the IC's!

Next month cassette machines.

(cont. to pg. 5)

## AM STEREO

(cont. from page 3)

Here, the corners formed by the L + R and L - R axis are removed by an adjustable single channel limiting network.

This system allows full monaural compatibility during most stereo conditions, but causes a reduction of L - R and negative peak L + R modulation levels during left only or right only stereo conditions.

In the illustration, the single channel limits are shown set for a left or right only L + R negative limit of 70% (for example) instead of the 100% level which would occur without such limiting.

This modified matrix system is designed to reduce the potential problem areas associated with stereo transmissions.

At the removed corners shown in the figure, both L + R and L - R modulations are at maximum and can cause decoding difficulties.

If high density negative peak L + R modulations are allowed to consistently reduce the transmitter carrier, the L - R decoding process has little or no carrier to demodulate.

The result can be that either stereo decoding returns to monaural or produces distortions.

Depending upon the degree of processing used and maximum L + R modulation depth, the single channel limiting network can be adjusted to the level which prevents or greatly reduces such stereo receiving problems.

## Conclusion

This information is only the "tip of the iceberg" of what is going to be needed to make AM stereo transmission successful.

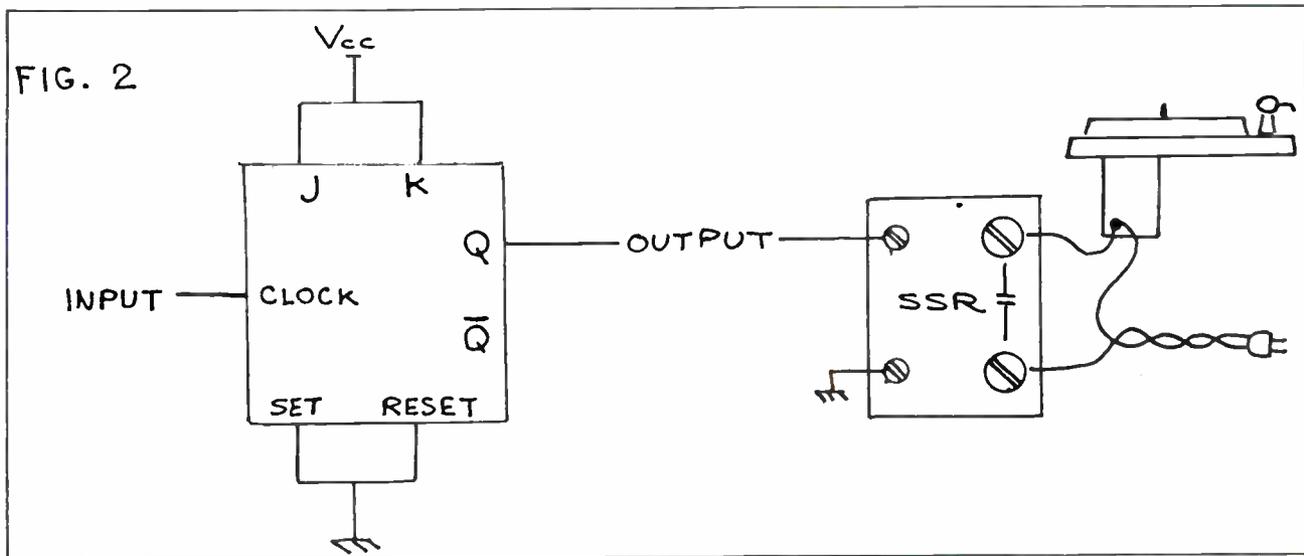
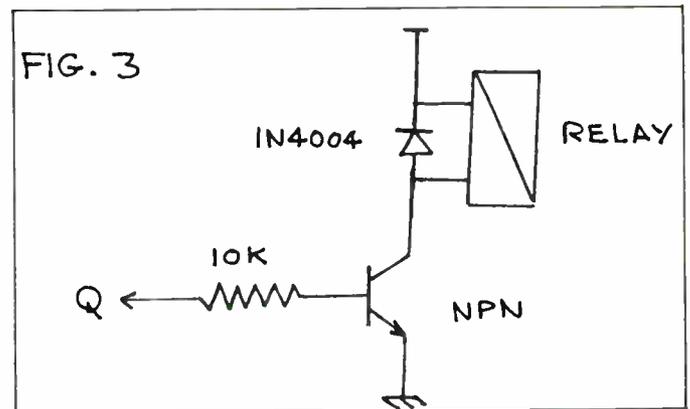
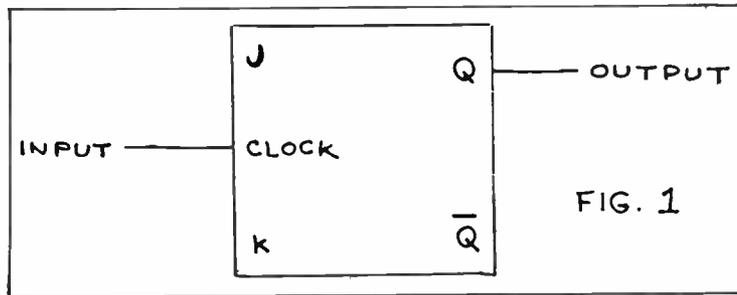
Only time and the introduction of a "typical" consumer receiver technology will be able to give the full results necessary for the proper adjustment methods and amounts of AM stereo processing which can be used.

Evolving from a six-year broadcast engineering background, Ron Jones has been designing broadcast audio processing equipment as chief engineer of Circuit Research Labs for five years. He designed the CRL prototype AM stereo processing equipment which was used in the Delco AM stereo tests held in August, 1982 at station WIRE in Indianapolis, Indiana. Since then, he has worked closely with both Magnavox and Motorola.

**TELEX**

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**CS-91**  
This is a professional headset designed specifically for live remote broadcasting such as sports events. The dynamic boom microphone allows full freedom of head movement while the circumaural ear cushions screen out unwanted background noise.



# The Studio Timer.

The TM-1 is the versatile studio broadcast timer.

Five bright, 5/8" high LED's display time up to 9:59:59. Front panel push-buttons allow operator control of all timer functions.

Rear panel, barrier strip connectors allow complete remote control plus provide six machine reset functions.



Make any production or air studio more productive with the TM-1 studio timer from Radio Systems.

**Specifications:**

**Displays:** Five, seven segment, 5/8" high LED's

**Time base:** Line

**Rate:** One second increments

**Count:** Up-time

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# Shepler Says. .



by John Q. Shepler  
Technical Consultant

## The AM Stereo Dilemma - A Way Out

The FCC never really legislated a marketplace decision on AM stereo. Oh, they intended to alright. But, the marketplace that is making the decisions consists of a minority of manufacturers and broadcasters and even fewer listeners. How can majority rule work when the majority is on the sidelines?

Probably 1 out of every 20 of you who read this column are directly involved in this controversy. You are the ones who have listened to the

systems, made the trade-offs as best you could, and decided to invest the tens or even hundreds of thousands of dollars that it takes to put high quality AM stereo on the air. You have made your marketplace decision. Unfortunately, you are in the minority.

The larger marketplace of AM broadcasters has already decided by a margin of 10 to 1 that stereo in its present form is more trouble than it is worth. After all, the cost is enormous. Certainly it is better to wait until the dust of battle has settled and then see which system is still standing.

Now it appears that the receiver manufacturers, once considered the primary force in a marketplace decision, may be tiring of the whole affair. They may drop AM stereo altogether or simply produce a limited number of "specialty" sets, like the AM/FM/Short Wave portables that were popular a few years ago.

That leaves the transmission system manufacturers, Kahn and Motorola, doing what you would expect: fighting to the bitter end. Which

system is better? It may not matter.

The real problem is that the listeners have not been allowed to decide. I went shopping for AM stereo receivers and found only a few available. Worse, these could only pick up a single local stereo station. Pity the poor listener who may not be too sure where to find a stereo signal much less a receiver.

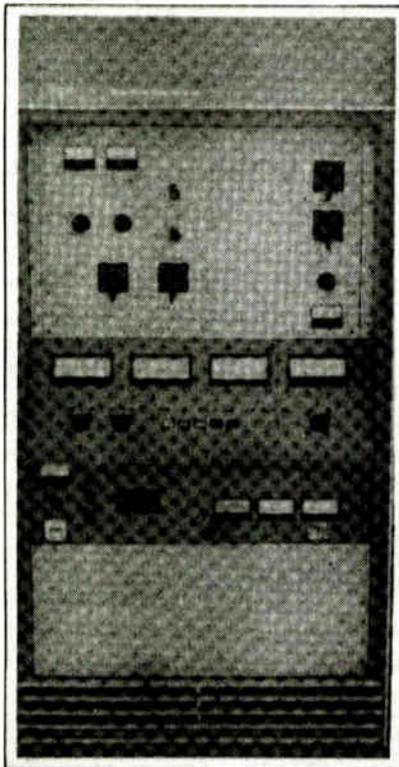
What we have is a vicious circle of incompatible systems that are not widely broadcast fighting to be heard on a minority of receivers by an uninformed and indifferent audience. Meanwhile AM listenership continues to decline.

One solution that seems to be gathering support is to send the matter back to the commission - not for them to pick a system, but to require that all new AM stereo receivers decode both the Kahn and Motorola systems.

That may not be enough. For stereo to take off, every AM station may have to pick a system and convert as soon as possible. Are you willing to give AM stereo this kind of support either voluntarily or by legislation?



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## "His Master's Voice Had A Mighty Big Boat"

By Bill Bragg

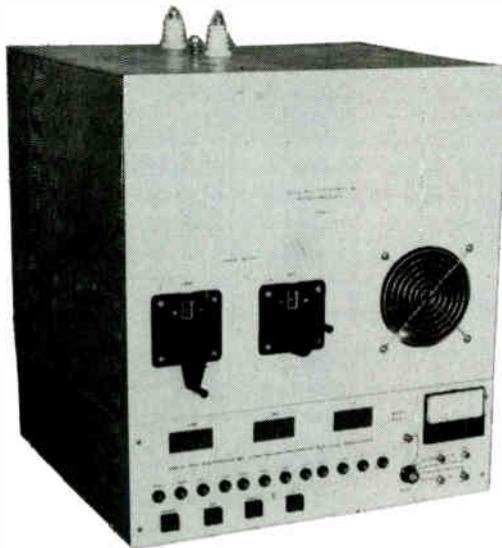
"HIS MASTER'S VOICE WAS ELDRIDGE R. JOHNSON" is a biography by E.R. Fenimore Johnson, and it traces the history of The Victor Talking Machine Company. The company was formed by Eldredge Reeves Johnson, and his number one son Fenimore, tells the story. The older Johnson was a brilliant young machinist, and in 1891 invented a book binding machine. This was his first invention, and he formed The New Jersey Wire Stitching Company to market it. Born in 1863, he was a well respected machinist at age 28, and he soon received a call from Berliner. The time was the early 1890's, and Edison was selling cylinder phonographs, powered by electric motors. Berliner was selling a hand-cranked disc machine, but it was nearly as good as Edison's. To compete with Edison, Berliner wanted to drive his disc machine with a spring motor. Because of a heavy reproducer, and the different sized grooves on a disc, no one was able to build a good spring motor. E.R. Johnson solved this problem by building the first spring motor with a governor (like the kind on a steam engine). He greatly improved the reproducer, and in 1896, he sold 200 of the motors to The Berliner Gramophone Company.

This started the ball rolling, and in 1900 he went into the talking machine business on his own. He formed The Consolidated Talking Machine Company, but due to legal problems he changed the name to Eldridge Johnson Manufacturing Machinist. His legal problems continued, and at on time he loaded his matrices on a wagon, in an effort to hide them in the wilds of New Jersey. After winning a long court battle, the name was changed the last time. Because victor means "winner", E.R. Johnson's company became known as THE VICTOR TALKING MACHINE COMPANY.

I'M GONNA TELEGRAPH MY BABY, by John O. Terrell, was released in 1900. This became the first record by The Victor Talking Machine Company. It was E.R. Johnson's idea to put paper labels on records, and he improved on the wax disc, thus reducing background noise. In 1904, he patented the idea of an inside horn phonograph, and called it

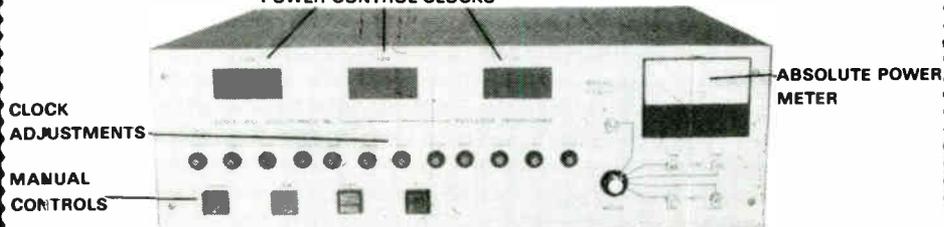
(Cont. to page 11)

# Eagle Hill PSA Adaptor



- Normal Transmitter Readings  
- No Internal Changes Needed
- Normal Monitor Readings  
Plus FCC Required Readings  
for Absolute Power
- Operate With Authorized  
Power As Low As One Watt
- FCC Authorized And Field  
Proven For Over A Year
- Adds Up To 150 Hours  
"Prime" Time Each Year

POWER CONTROL CLOCKS



### PSA-1

Contains control unit and power divider. Capable of three-level (day-psr-pss) power control with completely automatic clock operation for Pre-sunrise/ Post-sunset powers to 1000 watts. Clocks are adjusted monthly for local Sunrise-Sunset times. Local and remote control can override clocks at any time without losing clock settings. Clocks can be disabled locally without losing remote/local control. Clock and current operating mode is not lost in event of power failure . . . . . \$3,995

### PSA-2

Contains control unit and power divider. Same as PSA-1 except no clock operation, controls are set up to work manually or through remote control with no additional relays needed. . . . . \$2,995

### PSA-3

Contains power divider only. Single manual cutback to power levels less than available on transmitter. Can be set up to work through remote control with addition of latching relays. Includes RF Detector for sampling power output. Requires local manual control and metering panel . . . \$1,695

### PSA-4

Contains power divider only. Same as PSA-3 except two power cutback levels . . . . . \$1,945

### PSA-5

Contains control and power dividers. For stations with power of 2500/ 5000 watts. Includes PSA-1 with additional load type power divider with control. Not needed if transmitter cuts back to 1000 watts or less . . . . . \$4,495

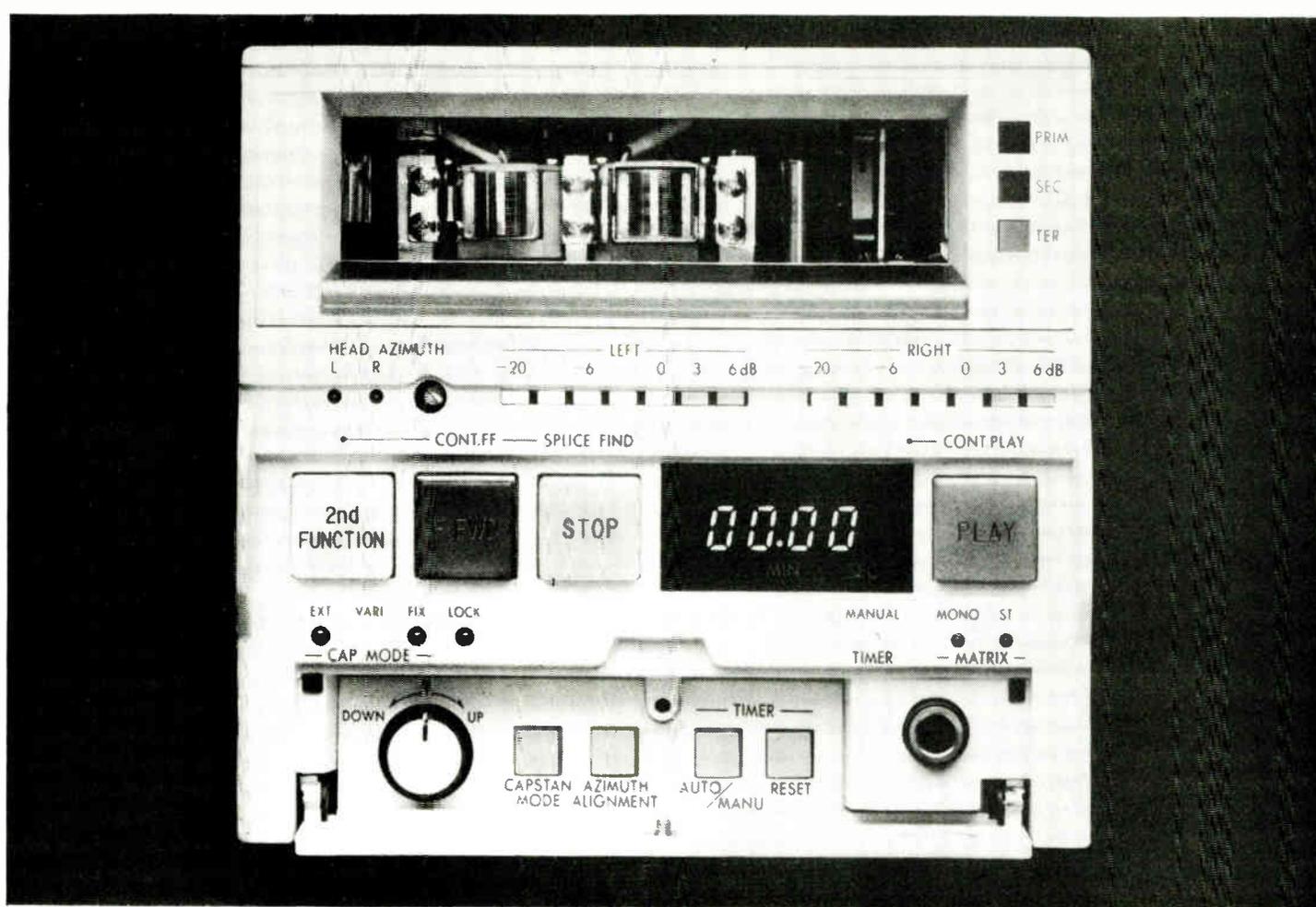
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## FINALLY, A CART MACHINE GOOD ENOUGH

In the tradition of the Otari MX5050 BII reel-to-reel recorder and the ARS-1000 Automated Radio Station Reproducer, Otari brings you a cart machine that may be the last you'll ever need to buy. Built with the same rugged precision, the CTM-10 is destined to take its place beside the BII and ARS-1000 as a standard in the broadcast industry. The newest audio machine technology and Otari reliability add up to a cart machine engineered for the 1980's.

The CTM-10 series of NAB audio cartridge recorders and payers consists of three models: The CTM-10SR stereo record/play deck; the CTM-10MR mono record/play deck, and the CTM-10 mono/stereo playback-only deck (field convertible to record/play). A CTM-10R record module provides metering, level controls and electronics for the record decks. All units are identical in size and can be mounted three abreast in a standard 19" rack. (Note: Though the CTM-10 features the NAB record and play track configuration, Otari offers Maxtrax™ heads as an optional retrofit).

### MULTIPLE DECKS...INSTEAD OF MULTIPLE PROBLEMS

Many broadcasters require multiple-deck cart machine operation to increase their flexibility on-air. Otari's CTM-10 offers several advantages to these broadcasters in terms of operation, maintenance, and flexibility.

For example, in a multiple installation, *fast-forward re-cue* can be used with any one CTM-10 deck while another deck is in *play*. And if maintenance is required, the CTM-10 decks can be serviced independently, still leaving the other cart machines on-line. Further, if the flexibility to

"borrow" a cart machine temporarily for another studio is important to you, the CTM-10 fills the bill. A triple deck does not provide these conveniences.

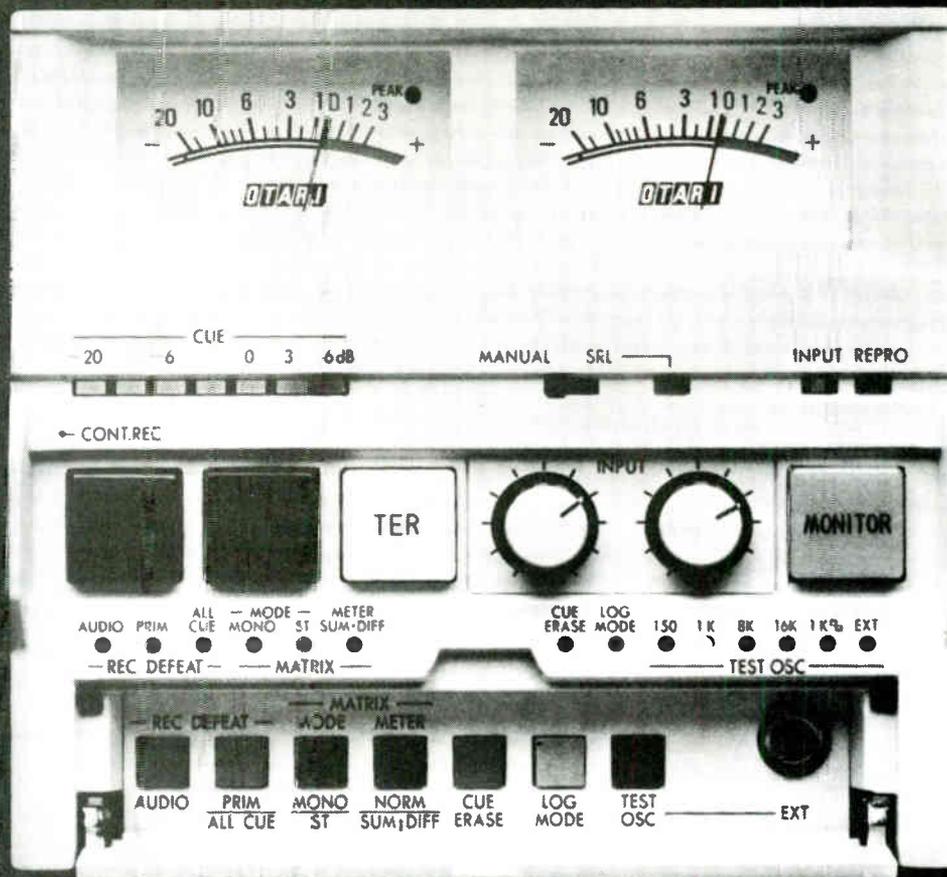
### NEW FEATURES THAT MAKE SENSE FOR TALENT AND ENGINEERING

Instead of one playback head and one dummy head, as is usually the case with playback machines, Otari's CTM-10 playback-only deck provides both mono *and* stereo heads. This makes it possible for stations to upgrade to stereo later without purchasing new stereo machines.

Three tape speeds are available, so you can either double your play time by selecting 3.75 ips, or you can opt for the extra dynamic range and high frequency response available at 15 ips. In addition, the CTM-10 record decks are equipped with HX-Pro™ bias optimization circuitry to provide increased high frequency headroom at any speed: (Please see a complete discussion of this valuable and exclusive feature later in this brochure).

The CTM-10 series also features active balanced transformerless inputs and cross-coupled outputs, plus low frequency reproduce equalization. A front panel headphone jack for cueing or testing carts off-line, and convenient front panel-mounted input level controls with SRL preset are also included.

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## TOUGH TO CARRY THE OTARI NAME

Two signal matrixing modes are standard on the CTM-10RS. A monomatrix provides compatibility with mono carts and machines, while a stereo matrix mode minimizes the effects of phase instability caused by cart or tape mechanisms.

### CUE TRACKS CAN BE MORE THAN JUST CUE TRACKS WITH THE CTM-10

With the CTM-10, you may assemble or alter the cue track independently of the audio tracks. This is helpful when you've mistakenly put the secondary tone in the wrong place. Instead of bulk-erasing the whole cart and re-recording everything, you can selectively erase the cue tone, and record another in the correct location.

Using the optional *log mode*, facilities with automated bookkeeping computers or time-code based synchronizers and machine controllers will find the ability to put SMPTE/EBU time-code or FSK automation data on the cue track very helpful.

### HEAVY DUTY DIRECT DRIVE CAPSTAN OFFERS ACCURACY, RELIABILITY, AND EASY INTERFACE TO STUDIO EQUIPMENT

A brushless, DC PLL capstan motor operates in a crystal-referenced servo system to provide absolute speed accuracy to within 0.1%. For operator convenience, a front panel servo error indicator monitors servo system performance and warns of off-speed conditions.

A 37 pin "D" connector on the rear panel provides for simple interface to such items as a console for fader start, a time compression device, an audio/video synchronizer, or a broadcast automation system. Vari-speed allows the operator to make a  $\pm 6\%$  speed correction directly from the front panel. If desired, the capstan speed may be externally controlled by a 9600Hz reference signal.

The one-half-inch thick, precision milled deckplate mounts a unique motor-driven pinch roller mechanism which provides long-term stability and cooler running temperatures.

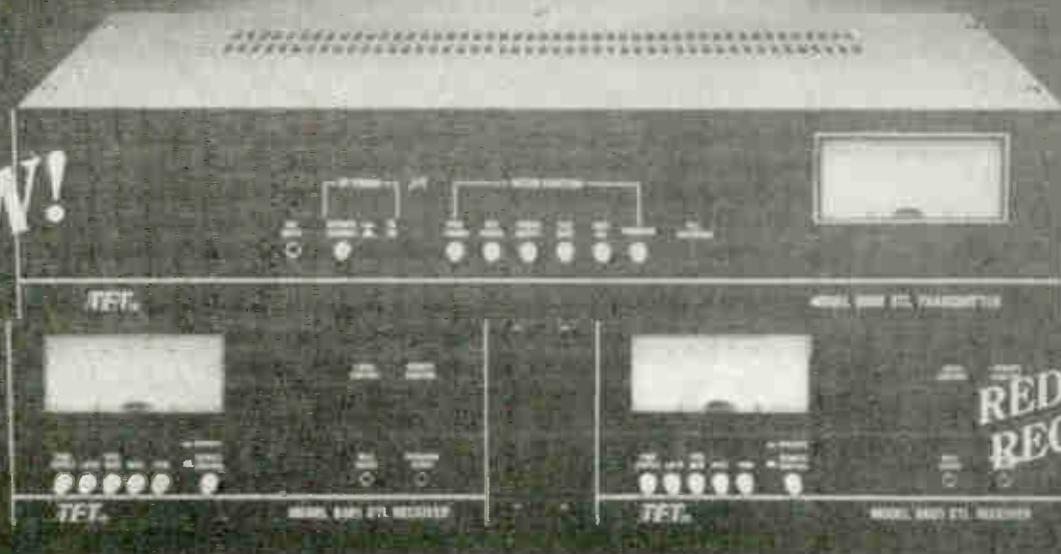
### JUST A FEW OF THE CTM-10's ADVANCED FEATURES:

- Front panel record azimuth adjustment system
- Mono/Stereo heads selectable on play machines
- Primary, secondary, and tertiary cues
- Discrete or matrix stereo operation LED minutes/seconds tape time display with auto/manual reset
- Optical splice-finder, built -in
- Independent cue track record/erase
- Adjustable record phase compensation

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## The new 8600 Aural STL System

### *MORE FEATURES*

Designed for either single channel or dual monaural operation, our new 8600 STL system is loaded with features: a built-in subcarrier generator and demodulator for voice and data linking; spurious-free power amplifier; front panel mic input (transmitter) and headphone jacks (receiver) and built-in capability to properly match phase and gain between dual links for either AM or FM stereo applications.

### *MORE PERFORMANCE*

From our extensive experience with STLs we have used the latest design techniques and components to create a superlative sounding system. Because the design is derived from our respected 8300 Composite STL, you can also expect the same caliber of stable performance.

### *MORE COMFORT*

Because TET is behind the new 8600, so is a full two year limited warranty with service if you need it: 24 hours a day, 7 days a week.



For more than 10 years, this is the kind of back-up support we've provided to broadcasters who have relied on our legendary 8300 and 7700B Composite STLs.

### *MORE MONEY\**

A compact, single rack-space, single channel 8600 system is an affordable \$3,195 suggested list (1 Receiver & 1 Transmitter). Five bucks more than the Marlin STL-10.\*

### *LESS DELIVERY*

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Please check Model 8600 STL System (Model 8600 Transmitter) or a similar link with your preferred receiver (Model 8600) ...  
\*Based on available price information 8/88

## Mighty Big Boat

(cont. from page 7)

the VICTROLA. In 1920, he came out with the slant-top victrola. The top was slanted because Johnson never wanted to see a flower vase on one of his phonographs. In it's prime, the V.T.M. Company had 1,663,552 sq. ft. of factory floor space, 16½ acres of lumber stacked 20 to 50 ft. high, and 10,000 employees. The payroll came to \$300,000.00 per week, and in one year, they used 36,850,000 feet of lumber and burned 55,000 tons of coal. During WWI, when hard metal was rationed, Johnson began using tungsten for his phonograph needles. This idea proved superior to the old metal ones, and production soon rose to 25,000 needles per day.

On January 6, 1927, E.R. Johnson sold the Victor Talking Machine Company for \$22,229,960. The company later became part of RCA. One year, he gave away ALL of the income from his fortune, to what he thought were worthy individuals. This soon got out of hand, as people would line-up for blocks to get their share. Everywhere he went, people begged for money. He soon became a prisoner in his own home. There was nothing left to do, except to pursue his hobby of collecting fine art and YACHTING.

Upon retirement, E.R. Johnson went yachting. His yacht was THE CAROLINE, the with a crew of 30 men, the yearly expences were \$52,000.00. In 1929, with an art collection valued at \$1,173,532.39, he decided to buy a better yacht. THE CAROLINE II was launched in 1931, at a cost of \$1,567,410.90. It had a crew of 42, and to keep it in a standby condition, it cost \$90,000.00 per year. This yacht carried 365 tons of fuel oil, 1163 gallons of lubricating oil, and 347 tone os fresh water. It had a cruising range of 10,000 nautical miles at 12 knots. the yacht remained stable by means of a GYROSCOPE, weighing 105,790 pounds. The wheel was 8 ft. in diameter, and it's weight was 45,000 pounds. The main dining room was 29 ft. long by 26 ft. wide. There were bigger yachts in the world, but none were as luxurious. E.R. Johnson spent many happy days on his yacht, but with the approach of WWII, it was no longer safe to sail the high seas. In 1939, THE CAROLINE II was sold for \$200,000 to a Mr. Leeds. In 1941, it was sold to the U.S. Navy, and commissioned "U.S.S. HILO".



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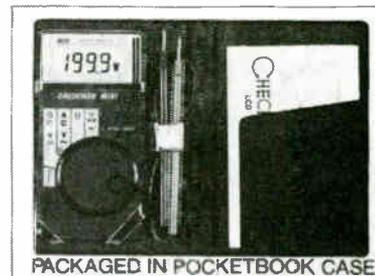
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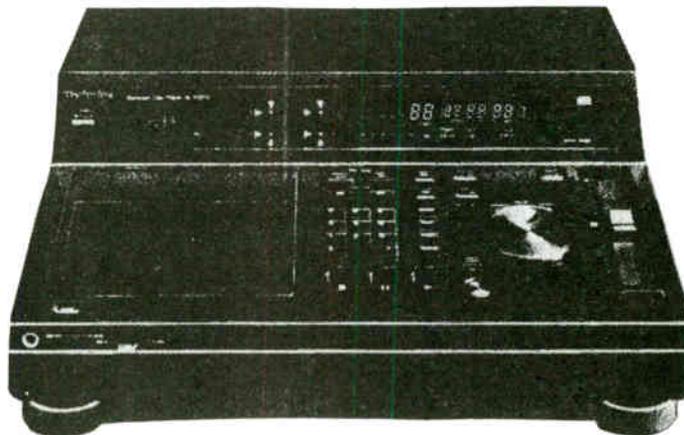


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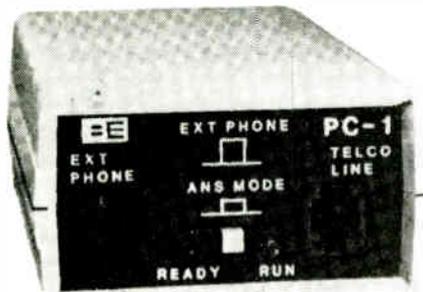
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## E.I. Spotlight On NEW PRODUCTS



### Telephone/Cart Machine Interface

Broadcast Electronics' new PC-1 telephone/cart machine interface is designed to operate in conjunction with virtually any NAB tape cartridge playback unit, or with any remote-start, remote-run playback system.

It works by detecting an incoming call and relaying a "start" signal to the cart machine's remote start input. The PC-1 will answer a call only if the cart machine is ready.



### Gain Box

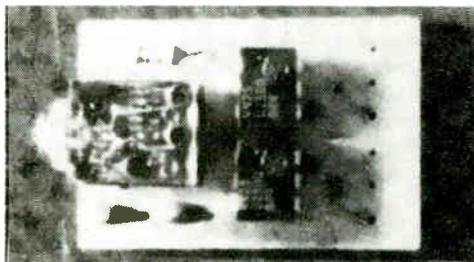
The new Zercom Gain Box is the answer to many broadcast station problems. The Gain Box is a stereo amplifier designed primarily to boost audio levels of consumer type audio equipment to console inputs. Gain is adjustable from 0 to 30 DB. Inputs and outputs are active balanced for complete versatility. Amplifying telephone to console input is another potential use. The Gain Box can also be used as a program amplifier as its output clips at +22 DBM into 600 ohms. Input impedance is 66k ohms for minimum circuit loading. The Gain Box can also be used as a headset amplifier on consoles that have limited headset drive capability.

The unit can be mounted to any flat surface. One or two can be bolted to a standard 1 3/4" high rack panel. Dimensions are: 8 1/2" by 4 1/2" by 1 5/8". The Gain Box runs on 120 or 240 VAC 50/60 Hz power.

Technical specifications are excellent. Signal to noise is 100 DB.

Harmonic distortion is less than .05%. Intermodulation distortion is less than 0.10%. Frequency response is DC to 20 KHz  $\pm$ 0.25 DB.

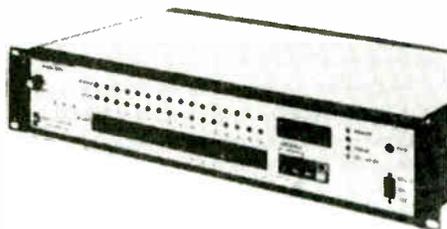
The Zercom Gain Box sells for \$175.00



### Remote Opto-interface Unit

Henry Engineering's P5A Remote Opto-Interface is a small, inexpensive circuitboard that can be added to nearly any CD player, cassette deck or other unit to provide or extend a device's remote control capability.

Measuring 1" X 1 1/2" in size, it contains two opto-isolator ICs, and solves the problem of connecting remote control wiring to a DC player that has no remote socket. It does not disrupt the operation of the micro-processor and related circuitry.



### "Talking" DTMF Remote Control

Monroe Electronics Inc. has introduced the Model 5001 DTMF Remote Control, which answers DTMF-coded inquiries and generates alarm reports in English using synthesized speech.

The device monitors 16 on-off type logic inputs and controls 16 outputs through built-in Form C relays. It controls its output relays as instructed, and reports the state of its logic inputs when queried by the user. It will generate an alarm report spontaneously when designated inputs change state.

## Rep. Swift Addresses Comparative Renewal Before Washington Post

Rep. Al Swift (D-Wa) of House Communications Subcommittee told monthly meeting of Washington broadcast reps at NAB Wednesday that elimination of comparative license renewal has best chance of Congressional passage if it starts out as part of a balanced package. He said that lessens the chances it will end up "like a Christmas tree" loaded down with other items unacceptable to broadcasters. Swift said he was "fairly optimistic" that such legislation could pass muster in new session which began last week. He said the climate is right since the attitudes of both broadcasters and the public interest community are more realistic now than when Congress last addressed comparative renewal question. "Members of Congress, including myself, feel strongly that the public trust aspects of the Communications Act need to be re-asserted," said Swift.

On political advertising, Swift predicts a lot of activity this session due to continued great concern among many lawmakers. One possibility he mentioned: halving the current lowest unit charge. Swift said chance for passage of some related legislation is "very good"...On Fairness Doctrine--"any attempt to codify it will be in equal proportion to attempts to eliminate it."



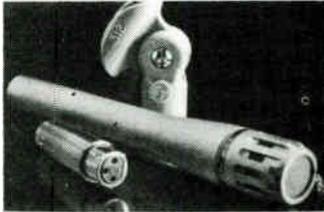
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### MODEL 400 MAGNETIC TAPE ERASER

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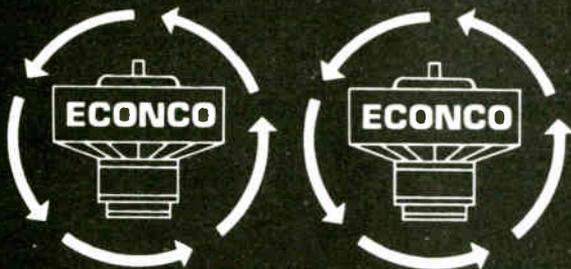
 <p><b>RE18</b> Shock-mounted Variable-D® Cardioid <b>\$204.00</b></p>	 <p><b>RE20</b> Variable-D® Cardioid <b>\$360.00</b></p>
 <p><b>644</b> <b>SOUND SPOT®</b> <b>DUEL-Z</b> <b>DYNAMIC</b> <b>\$188.00</b></p>	<p><b>RE15</b> <b>VARIABLE-D®</b> <b>SUPER-CARDIOD</b> <b>\$189.00</b></p> 
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 <p><b>RE85</b> Noiseless Lavalier <b>\$109.00</b></p>	<p><b>635A</b> Omnidirectional <b>\$74.00</b></p> 
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 <p><b>658L</b> <b>CARDIOD DYNAMIC</b> <b>WITH SWITCH</b> <b>\$47.69</b></p>	<p><b>PROFISSIONAL MICROPHONE MIXER</b> <b>\$374.00</b></p>  <p>Features</p> <ul style="list-style-type: none"> <li>• 4 mic or line inputs</li> <li>• Phantom power</li> <li>• Peak Limiter</li> <li>• AC/DC power</li> <li>• Headphone amplifier</li> <li>• 1 khz tone oscillator</li> <li>• balanced inputs/outputs</li> </ul>

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### NAB Supports Proposal To Eliminate Main Studio/ Local Origination Rules

WASHINGTON, Dec. 24--The National Association of Broadcasters supports a Federal Communications Commission proposal to eliminate its main studio and station program origination rules for radio and television stations. However, NAB said steps are needed to ensure that the public has access to a station licensed to its community.

NAB Board Chairman Ted L. Snider, president, KARN/KKYK, Little Rock, AR, said, "NAB believes that if the FCC adopts its proposal, broadcasters could employ many cost efficiencies which could aid their continued airing of programming responsive to local issues."

The Association suggested that the Commission require a broadcaster who chooses to locate its studio outside its community of license to maintain a local or toll-free telephone number for local residents. Also, the public file should be maintained in a place which is reasonably accessible to residents of that community.

The rules were implemented in 1950 to provide a fair, efficient and equitable distribution of a station's service to every state and community. However, NAB feels that with competition and technological advances the rules are obsolete. "Broadcasters in today's society," NAB stated, "can often more effectively address local problems through programming which does not originate within the confines of their cities of license."

### 'I've Heard AM That's as Sharp as FM'

Quote Worth Noting... "After what I've seen, I won't discount anything--I wouldn't rule out that AM could mean 'All-Music' in ten years... There's nothing wrong with AM stereo separation--it's the fidelity problem that's created listener dissatisfaction, and that is being resolved as we speak. Your readers are all very much aware of the work being done by the NAB in that area, and I've heard AM that's as sharp as FM--so that's very possible."

*Consultant Kent Burkhart  
Pulse/12/15/86*

# Talk Shows Aren't Tough Anymore!

## <sup>3</sup> Stereo Audio So Clean . . .

You'll want to keep the BD980 in-line at all times. BD980 features 16 bit linear PCM design and 50kHz digital sampling rate.

## <sup>1</sup> Cleanest, Fastest Catch-up Ever . . .

Automatically builds up delay quickly and inaudibly. Uses exclusive Eventide patented technology for catch-up quality light-years ahead of earlier designs.

## <sup>2</sup> BD980 Comes Fully Loaded.

Stereo operation, 20kHz. bandwidth and 10 seconds of delay are standard. And BD980 is priced to be a great value.

## <sup>4</sup> 4, 6, 8, or 10 Seconds Of Stereo Delay.

All of BD980's automatic modes can be set to give you 4, 6, 8 or 10 seconds of on-air stereo delay.

## <sup>5</sup> It's A Stereo Time Compressor, Too.

Instantly shortens (or lengthens) audio spots up to ten seconds. Better stereo/mono phase compatibility than megabuck single purpose time compressors. Works with ANY cart or tape machine — variable speed NOT required.



## New Eventide BD980 Broadcast Delay

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## <sup>6</sup> When It's Time To Get OUT Of Delay . . .

Just push the RAMP TO ZERO button and go on with the show. It's that simple. Delay inaudibly "catches-down" to zero. Frantic switching or monitoring hassles? Forget 'em!

## <sup>7</sup> Switch To A Helicopter Traffic Report . . .

Or other "live cued" event, with no timing or monitoring hassles. Just push the WAIT & EXIT button. The Eventide BD980 makes the "impossible" switch easy!

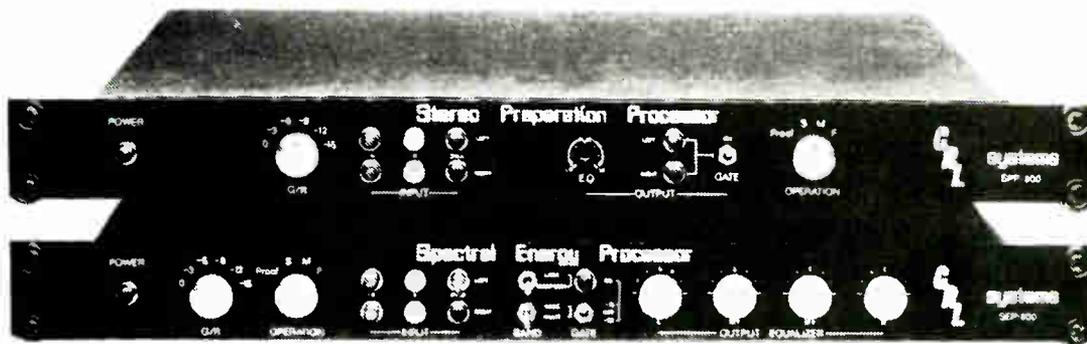
## <sup>8</sup> As A Production Tool . . .

BD980's Manual mode lets you set delay in one millisecond steps, from zero to 10 seconds. Ideal for vocal doubling, echo, and other effects.

## <sup>9</sup> Large Alphanumeric Display.

Shows amount of delay, "safe" reading and operating mode at a glance. BD980 operating functions are fully remoteable and plug-compatible with our BD955.

# Don't just optimize . . . maximize



## The Secret Is Out . . . THE FM 3 SYSTEM FROM CRL

In the past few months we have been receiving orders for the two units pictured above. Since it was not a complete system, we were curious about how they were being used. A few phone calls revealed that they were being placed in front of the 8100A. It seems that the multiband processing provided by CRL greatly improved the loudness and allowed precise adjustment of the sound to fit any format. The 8100A was then "backed off" so that it sounded better. The result was a louder, brighter sound that was very consistent. Well, it's hard to keep a good thing secret. Because so many customers have discovered this combination we decided to give it a name: *The FM 3*.

Customers using the CRL/O' mod combination include many of America's major broadcasters, including all three networks. Call us for more information. We can arrange a FREE 10 day trial of any CRL system: The FM 2, FM 3, or FM 4.

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